Practical # 12

Objective:

*Understand merge Sorting techniques and **Design** C++program to sort data in the some specific order.*

Theory:

In this Lab, we discuss the four Sorting techniques (i.e., Merge Sort, Quick Sort, and Radix Sort). Sorting refers to the operation or technique of arranging and rearranging sets of data in some specific order.

Merge Sort works:

Merge Sort Algorithm works in the following steps:

Step 1 - It divides the given unsorted array into two halves- left and right sub arrays.
Step 2 - The sub arrays are divided recursively.
Step 3 - This division continues until the size of each sub array becomes 1.
Step 4 - After each sub array contains only a single element, each sub array is sorted trivially.
Step 5 - Then, the merge procedure combines these trivially sorted arrays to produce a final sorted array.

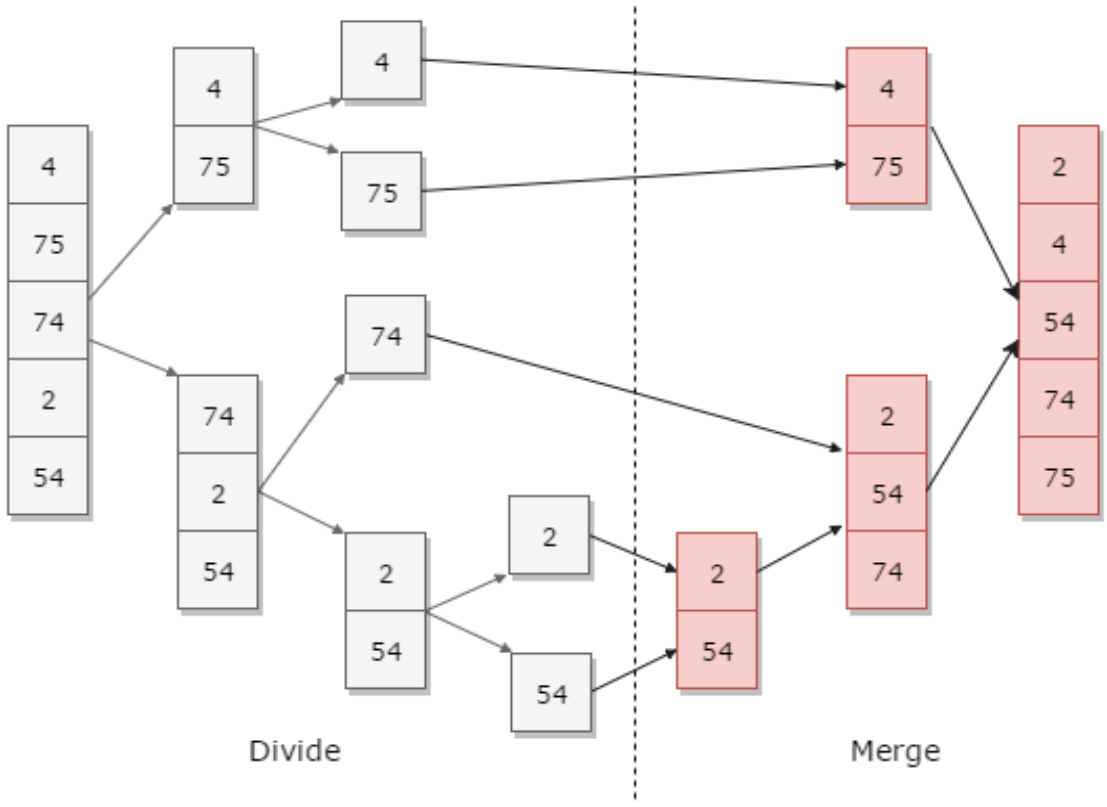

Fig: Merge Sort Technique

Lab Objectives:

- To be able to write C++ program for sorting algorithm.

C++ program: Write C++ program to arrange elements in ascending order using Merge sorting algorithm.

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

void merge(int *,int, int , int );
void mergesort(int *a, int low, int high)
{
     int mid;
     if (low < high)
     {
mid=(low+high)/2;
mergesort(a,low,mid);
mergesort(a,mid+1,high);
merge(a,low,high,mid);
     }
     return;
}
// Merge sort concepts starts here
void merge(int *a, int low, int high, int mid)
{
     int i, j, k, c[50];
     i = low;
     k = low;
     j = mid + 1;
     while (i <= mid && j <= high)
     {
if (a[i] < a[j])
{
     c[k] = a[i];
     k++;
     i++;
}
```

```
else
{
     c[k] = a[j];
     k++;
     j++;
}
     }
     while (i <= mid)
     {
c[k] = a[i];
k++;
i++;
     }
     while (j <= high)
     {
c[k] = a[j];
k++;
j++;
     }
     for (i = low; i < k; i++)
     {
a[i] = c[i];
     }
}
// from main mergesort function gets called
int main()
{
     int a[30], i, b[30];
     cout<<"enter  five elements (unsorted array):\n";
     for (i = 0; i < 5; i++) { cin>>a[i];
```

OUTPUT

```
    }
    mergesort(a, 0, 4);
    cout<<"sorted array\n";
    for (i = 0; i < 5; i++)
    {
cout<<a[i]<<"\t";
    }
}
```

```
enter  five elements (unsorted array):
45
12
32
2
5
sorted array
2       5       12      32      45
```

Review Questions/ Exercise:

1. Write a C++ program that implements Merge sort algorithm to arrange a list of integers in descending order.

_____

Name: _____

Roll #: _____

Date: _____

Subject Teacher

Remarks: