

Merge sort :

```
#include <iostream>
```

```
using namespace std;
```

```
// Function to merge two halves
```

```
void merge(int arr[], int left, int mid, int right) {
```

```
    int n1 = mid - left + 1;
```

```
    int n2 = right - mid;
```

```
    int L[n1], R[n2];
```

```
    // Copy data to temp arrays
```

```
    for(int i = 0; i < n1; i++)
```

```
        L[i] = arr[left + i];
```

```
    for(int j = 0; j < n2; j++)
```

```
        R[j] = arr[mid + 1 + j];
```

```
    int i = 0, j = 0, k = left;
```

```
    // Merge temp arrays back
```

```
    while(i < n1 && j < n2) {
```

```
        if(L[i] <= R[j]) {
```

```
            arr[k] = L[i];
```

```
            i++;
```

```
        } else {
```

```
            arr[k] = R[j];
```

```
            j++;
```

```
        }
```

```

        k++;
    }

    // Copy remaining elements
    while(i < n1) {
        arr[k] = L[i];
        i++; k++;
    }

    while(j < n2) {
        arr[k] = R[j];
        j++; k++;
    }
}

// Merge Sort function
void mergeSort(int arr[], int left, int right) {
    if(left < right) {
        int mid = (left + right) / 2;

        mergeSort(arr, left, mid);
        mergeSort(arr, mid + 1, right);

        merge(arr, left, mid, right);
    }
}

int main() {

```

```
int n;

cout << "Enter number of elements: ";

cin >> n;

int arr[n];

cout << "Enter elements:\n";

for(int i = 0; i < n; i++)

    cin >> arr[i];

mergeSort(arr, 0, n - 1);

cout << "Sorted array:\n";

for(int i = 0; i < n; i++)

    cout << arr[i] << " ";

return 0;

}
```

Output :

```
Output
Enter number of elements: 5
Enter elements:
52 21 12 45 99
Sorted array:
12 21 45 52 99

=== Code Execution Successful ===
```