

## Merge sort :-

```
#include <stdio.h>

#include <stdlib.h>

void merge(int arr[], int l,
int m, int r)
{
    int i, j, k;

    int n1 = m - l + 1;

    int n2 = r - m;

    int L[n1], R[n2];

    for (i = 0; i < n1; i++)
        L[i] = arr[l + i];

    for (j = 0; j < n2; j++)
        R[j] = arr[m + 1 + j];

    i = 0;
    j = 0;
    k = l;

    while (i < n1 && j < n2)
    {
        if (L[i] <= R[j])
        {
            arr[k] = L[i];
            i++;
        }
        else
        {
            arr[k] = R[j];
            j++;
        }
        k++;
    }
```

```

while (i < n1) {
    arr[k] = L[i];
    i++;
    k++;
}
while (j < n2)
{
    arr[k] = R[j];
    j++;
    k++;
}
}

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

void printArray(int A[], int size)
{
    int i;
    for (i = 0; i < size; i++)
        printf("%d ", A[i]);
    printf("\n");
}

int main()

```

```
{  
int arr[] = {8,3,5,1,9,4,10,83,31};  
int arr_size = sizeof(arr) / sizeof(arr[0]);  
printf("Given array is \n");  
printArray(arr, arr_size);  
mergeSort(arr, 0, arr_size - 1);  
printf("\nSorted array is \n");  
printArray(arr, arr_size);  
return 0;  
}
```

The screenshot shows a C++ IDE with a project named "12a.cpp" open. The code in the editor is a merge sort implementation. The console output shows the execution results:

```
Given array is  
8 3 5 1 9 4 10 83 31  
Sorted array is  
1 3 4 5 8 9 10 31 83  
-----  
Process exited after 2.114 seconds with return value 0  
Press any key to continue . . .
```

A Windows Security notification is displayed in the bottom right corner, stating: "Security scan required. To protect your device, Microsoft Defender Antivirus needs to perform a cloud security scan. The scan could take up to 10 seconds." with a "Dismiss" button.