#include <stdio.h>

#include <stdlib.h>

// Merge two subarrays arr[l..m] and arr[m+1..r]

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

int n1 = m - l + 1;

int n2 = r - m;

int L[n1], R[n2];

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

L[i] = arr[l + i];

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

R[j] = arr[m + 1 + j];

int i = 0, j = 0, k = l;

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

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

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

} else {

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

}

}

while (i < n1) arr[k++] = L[i++];

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

}

// Merge Sort function

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);

}

}

// Display array

void display(int arr[], int n) {

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

printf("%d ", arr[i]);

}

printf("\n");

}

int main() {

int n;

printf("Enter number of elements: ");

scanf("%d", &n);

int arr[n];

printf("Enter %d numbers: ", n);

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

scanf("%d", &arr[i]);

}

printf("\nOriginal array: ");

display(arr, n);

mergeSort(arr, 0, n - 1);

printf("Sorted array (Merge Sort): ");

display(arr, n);

return 0;

}