#include <bits/stdc++.h>

using namespace std;

void combine(vector<int> &arr, int lo, int mid, int hi)

{

vector<int> temp(hi - lo + 1);

int i = lo, j = mid + 1;

int k = 0;

while(i <= mid && j <= hi)

{

if(arr[i] < arr[j])

{

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

}

else

{

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

}

}

while(i <= mid )

{

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

}

while(j <= hi)

{

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

}

for(int i = 0; i < hi - lo + 1; i++)

{

arr[lo + i] = temp[i];

}

}

void merge\_sort(vector<int> &arr, int lo, int hi, int n)

{

if(lo < hi)

{

int mid = (lo + hi)/2;

merge\_sort(arr, lo, mid, n);

merge\_sort(arr, mid + 1, hi, n);

if(lo == 0 && hi == n - 1)

{

cout << "Before final combination\n";

cout << "Left Half: ";

for(int i = 0; i <= mid; i++)cout << arr[i] << " ";

cout << "\nRight Half: ";

for(int i = mid + 1; i <= hi; i++)cout << arr[i] << " ";

cout << "\n";

}

combine(arr, lo, mid, hi);

}

}

int main()

{

cout << "Enter ther size of the array\n";

int n; cin >> n;

vector<int> v(n);

cout << "Enter the elements of the array\n";

for(auto &i: v)cin >> i;

merge\_sort(v, 0, n -1, n);

cout << "Sorted array\n";

for(auto &i: v)cout << i << " ";

}

