class MergeSort{

public static void mergeSort(int[] arr, int left, int right) {

if(left<right) {

int mid = left + (right - left ) / 2;

mergeSort(arr, left, mid);

mergeSort(arr, mid + 1, right);

merge(arr, left, mid, right);

}

}

//This method combines two sorted sections of the array into one sorted section

//Imagine you have two sorted piles of cards and want to merge them into one sorted pile

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

int n1 = mid - left + 1;

int n2 = right - mid;

//Create temporary arrays to hold copies of the left and right sections

//Like making photocopies of your two card piles

int[] leftArr = new int[n1];

int[] rightArr = new int[n2];

//copy the left section into the temporary left array

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

leftArr[i] = arr[left + i];

}

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

rightArr[j] = arr[mid+1+j];

}

//Set up pointers to trak our positioin in each array

int i = 0; //Positoin in left array

int j = 0; //Position in right array

int k = left;//Position in the main array where we'll put the merged result

// Compare elements from both arrays and put the smaller one first

//Like comaparing the top cards from two piles and picking the smaller one

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

if (leftArr[i] <= rightArr[j]) {

//Left element is smaller or equal, so use it

arr[k] = leftArr[i];

i++; // Move to next element in left array

}else {

//Right element is smaller, so use it

arr[k] = rightArr[j];

j++;//Move to next element in right array

}

k++;//Move to next position in main array

}

//If there are leftover elements in the left array, add them all

//Like adding remaining cards from the left pile

while(i < n1) {

arr[k] = leftArr[i];

i++;

k++;

}

//If there are leftover elements in the right array, add them all

//Like adding remaining cards from the right pile

while(j<n2) {

arr[k] = rightArr[j];

j++;

k++;

}

}

//This is where the program starts running

public static void main(String args[]) {

//Create an array of numbers that we want to sort

int[] arr = {64, 34,25,12,22,11,90};

//Call our sorting method to sort the entire array

//Starting from position 0 to the last position

mergeSort(arr, 0, arr.length - 1);

//Print out the sorted array to see the result

for(int num : arr) {

System.out.print(num + " ");

}

}

}