import java.util.Scanner;

import java.util.Random;

public class Main

{

public static void main(String[] args)

{

Scanner scan=new Scanner(System.in);

Random ran=new Random();

long start,stop;

System.out.println("Enter no of elements");

int n=scan.nextInt();

int[] a=new int[n];

System.out.println(" Enter the choice 1: Best Case 2: Average Case 3: Worst Case");

int ch=scan.nextInt();

switch(ch)

{

case 1: System.out.println(" Best Case");

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

a[i]=i;

break;

case 2: System.out.println(" Average Case");

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

a[i]=ran.nextInt(n);

break;

case 3: System.out.println(" Worst Case");

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

a[i]=n-i;

break;

}// end switch

//recording the start time

start=System.nanoTime();

//function call

Mergesort(a,0,n-1);

// recording the end time

stop=System.nanoTime();

display(a);

System.out.println("\nTime taken to sort " +a.length+ " elements =" +(stop-start));

}// end main

private static void display(int[] a)

{

// TODO Auto-generated method stub

System.out.println("the sorted array is");

for(int i=0;i<a.length;i++)

System.out.println(a[i]);

}//end dispaly

//function o divide the array

public static void Mergesort(int[] a, int low, int high)

{

int mid;

if(low<high)// array contains more than one element

{

mid=(low+high)/2;// dividing the array in to two sub arrays

Mergesort(a, low, mid);// sorting sub arrays

Mergesort(a, mid+1, high);

Merge(a,low,mid,high);// combining or merging the sorted arrays

}

}// end Mergesort

//function to merge two sorted arrays

public static void Merge(int[] arr,int low,int mid,int high)

{

int k,h=low,i=low,j=mid+1;

int[] b=new int[arr.length];

while(h<=mid && j<=high)

{

if(arr[h]<=arr[j])

{

b[i]=arr[h];

h++;

}

else

{

b[i]=arr[j];

j++;

}

i++;

}// end while

if(h>mid) // for remaining elements in upper half

{

for(k=j;k<=high;k++)

{

b[i]=arr[k];

i++;

}

}

else // for remaining elements in lower half

{

for(k=h;k<=mid;k++)

{

b[i]=arr[k];

i++;

}

}

//copy the contents from auxiliary array i.e. from b to arr

for(k=low;k<=high;k++)

arr[k]=b[k];

}// end merge

}// end MergeSort class