**Assignment number: 14**

**Subject: ADVANCED DATA STRUCTURES LAB**

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Division: ***B***

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**PROBLEM STATEMENT:**

Implement the Heap/Shell sort algorithm implemented in Java demonstrating heap/shell data structure with modularity of programming language.

**Code:**

package heapsort;

import java.util.\*;

public class heapsort

{

public void sort(int arr[])

{

int n = arr.length;

for (int i = n / 2 - 1; i >= 0; i--)

heapify(arr,n,i);

for(int j=n-1;j>=0;j--)

{

int temp=arr[0];

arr[0]=arr[j];

arr[j]=temp;

heapify(arr,j,0);

}

}

void heapify(int arr[],int n,int i)

{

int largest = i;

int l = 2\*i + 1;

int r = 2\*i + 2;

if(l<n && arr[l] > arr[largest])

largest = l;

if(r<n && arr[r] >arr[largest])

largest =r;

if(largest !=i)

{

int swap =arr[i];

arr[i]=arr[largest];

arr[largest]=swap;

heapify(arr,n,largest);

}

}

static void printArray(int arr[])

{

int n = arr.length;

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

System.out.print(arr[i]+" ");

System.out.println();

System.out.println("the minimum marks : "+ arr[0]);

System.out.println("the maximum marks : "+ arr[n-1]);

}

public static void main(String[] args) throws Exception

{

Scanner scan = new Scanner(System.in);

System.out.print("Enter no. of Student: ");

int num=scan.nextInt();

int arr[] = new int[num];

System.out.println("Enter marks: ");

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

arr[i] = scan.nextInt();

}

heapsort H = new heapsort();

H.sort(arr);

printArray(arr);

}

}

**OUTPUT:**

Enter no. of Student: 10

Enter marks:

12

6

33

100

45

67

78

100

86

34

6 12 33 34 45 67 78 86 100 100

the minimum marks : 6

the maximum marks : 100