Exp 4

**INPUT::**

Write java program to implement the heap /shell sort.

Use Java-14 To run 😎

\* This is Generic Heap Sort Program demostrate -

\* Integer Heap Sort

\* Character Heap Sort

\* Double Heap Sort

\* String Heap Sort

\* \*/

// Heap Sort Class using T data type as place holder and extends Comparable Class to compare two generic class

public class HeapSort<T extends Comparable<T>> {

private T data[];

private int length;

HeapSort(T data[]) {

this.data = data;

this.length = this.data.length;

}

public T[] buildMaxHeap(T[] tempData) {

for(int i = (int) Math.floor(length/2); i >= 0 ; i--) {

tempData = heapify(tempData, i);

}

return tempData;

}

public T[] heapify(T[] tempData, int node) {

int leftNode = node\*2+1;

int rightNode = node\*2+2;

int maxNode = node;

if(leftNode < length) {

if(tempData[leftNode].compareTo(tempData[maxNode]) > 0){

maxNode = leftNode;

}

}

if(rightNode < length) {

if((tempData[rightNode].compareTo(tempData[maxNode])) > 0) {

maxNode = rightNode;

}

}

if(maxNode != node) {

T temp = tempData[node];

tempData[node] = tempData[maxNode];

tempData[maxNode] = temp;

tempData = heapify(tempData, maxNode);

}

return tempData;

}

public void sort(){

this.data = buildMaxHeap(this.data);

while(length > 0) {

this.length--;

T temp = this.data[0];

this.data[0] = this.data[length];

this.data[length] = temp;

this.data = heapify(this.data, 0);

}

}

public void printData() {

for(T i : this.data) {

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

}

System.out.println();

}

public static void main(String[] args) {

/\* Sorting Integer Data using Heap Sort \*/

// Integer[] dataToBeSorted = {2, 8, 5, 3, 9, 1};

// HeapSort heapSort = new HeapSort<Integer>(dataToBeSorted);

/\* Sorting Double Data using Heap Sort \*/

// Double[] dataToBeSorted = {1.2, 4.3, 6.7, 7.1, 3.9};

// HeapSort heapSort = new HeapSort<Double>(dataToBeSorted);

/\* Sorting Character Data using Heap Sort \*/

// Character[] dataToBeSorted = {'b', 'a', 'z', 'v', 'T'};

// HeapSort heapSort = new HeapSort<Character>(dataToBeSorted);

/\* Sorting String Data using Heap Sort \*/

String[] dataToBeSorted = {"lalu", "vivek", "kia", "priya", "jui"};

HeapSort heapSort = new HeapSort<String>(dataToBeSorted);

System.out.println("Given Data - ");

heapSort.printData();

heapSort.sort();

System.out.println("Sorted Data - ");

heapSort.printData();

}

}