Experiment 14 - Heap

Read the marks obtained by students of second year in an online examination of particular subject. Find out maximum and minimum marks obtained in that subject. Use heap data structure. Analyze the algorithm.

#include <iostream>

using namespace std;

#define max 10

class heap

{

int marks[max];

int n;

public:

heap()

{

n=0;

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

{

marks[i]=0;

}

}

void insert();

void makeheap();

void heapsort();

void display();

void max\_min();

};

void heap::insert()

{

cout<<"Enter the number of students"<<endl;

cin>>n;

cout<<"Enter the marks of the students "<<endl;

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

{

cin>>marks[i];

}

}

void heap::makeheap()

{

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

{

int val=marks[i];

int j=i;

int f=(j-1)/2;

while(j>0 && marks[f]<val) //creating a max heap

{

marks[j]=marks[f];

j=f;

f=(j-1)/2;

}

marks[j]=val;

}

}

void heap::heapsort()

{

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

{

int temp=marks[i];

marks[i]=marks[0];

int k=0;

int j;

if(i==1)

{

j=-1;

}

else

{

j=1;

}

if(i>2 && marks[2]>marks[1])

{

j=2;

}

while(j>=0 && temp<marks[j])

{

marks[k]=marks[j];

k=j;

j=2\*k+1;

if(j+1<=i-1 && marks[j]<marks[j+1])

{

j++;

}

if(j>i-1)

{

j=-1;

}

}

marks[k]=temp;

}

}

void heap::display()

{

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

{

cout<<" "<<marks[i];

}

cout<<"\n";

}

void heap::max\_min()

{

cout<<"\n The maximum marks are "<<marks[n-1];

cout<<"\n The minimum marks are "<<marks[0];

cout<<"\n";

}

int main()

{

heap obj;

obj.insert();

cout<<"following marks are obtained by the students: "<<endl;

obj.display();

obj.makeheap();

cout<<"\n heapified "<<endl;

obj.heapsort();

obj.display();

obj.max\_min();

return 0;

}