SC165

Problem Statement : **Read the marks obtained by students of second year in an online examination of a 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 100
int n=0;
void maxheapify(int arr[],int n,int i){
 int parent = (i-1)/2;
 int temp;
 if(parent>=0){
 if(arr[parent]<arr[i]){
 temp=arr[parent];
 arr[parent]=arr[i];
 arr[i]=temp;
 maxheapify(arr,n,parent);
 }
 }
}

void minheapify(int arr[],int n,int i){
 int parent = (i-1)/2;
 int temp;
 if(parent>=0){
 if(arr[parent]>arr[i]){
 temp=arr[parent];
 arr[parent]=arr[i];
 arr[i]=temp;
 minheapify(arr,n,parent);
 }
 }
}

void insertnode(int arr[],int n1,int k){
 int ch=0;
 if(n1==0)
 arr[n1]=k;
 else{
 n1=n1+1;
 arr[n1-1]=k;
 }
 n=n1;

 cout<<"1.maxheap\n2.minheap\n";
 cin>>ch;
```

```
 if(ch==1)
 maxheapify(arr,n,n-1);
 else
 minheapify(arr,n,n-1);
}

int minimum(int arr[],int n){
 int mini=arr[0];
 for(int i=0; i<n; i++){
 if(arr[i]<mini)
 mini = arr[i];
 }
 return mini;
}

int maximum(int arr[],int n){
 int maxi=0;
 for(int i=0; i<n; i++){
 if(arr[i]>maxi)
 maxi = arr[i];
 }
 return maxi;
}
void print(int arr[],int n){
 cout<<"################\n\n\n";
 cout<<"The Marks of students are: \n";
 for(int i=0;i<n;i++){
 cout<<arr[i]<<" ";
 }
 cout<<"\nMinimum marks are :";
 int p = minimum(arr,n);
 cout<<p;

 cout<<"\nMaximum marks are :";
 int s = maximum(arr,n);
 cout<<s<<"\n";
}

int main() {
 int c;
 int k,key,flag=1,t;
 int arr[max] ;
 cout<<"Enter the number of students :";
 cin>>t;

 for(int i=0;i<t;i++){
 cout<<"Enter the marks of the student : ";
 cin>>k;
 insertnode(arr,i,k);
 }
 do{
```

```
 cout<<"Enter your choice\n 1.Insert marks\n2.Display marks\n3.Exit\n";
cin>>c;
 switch(c){
 case 1:
 cout<<"Enter the key: ";
cin>>key;
 insertnode(arr,n,key);  break;
 case 2:
 print(arr,n);
 break;
 case 3:
 flag=0;
 break;
 }
 }while(flag==1);
return 0;
}
```

Min Heap

```
Enter the number of students :4
Enter the marks of the student : 10
1.maxheap
2.minheap
2
Enter the marks of the student : 5
1.maxheap
2.minheap
2
Enter the marks of the student : 3
1.maxheap
2.minheap
2
Enter the marks of the student : 12
1.maxheap
2.minheap
2
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
2
###############


The Marks of students are:
3 10 5 12
Minimum marks are :3
Maximum marks are :12
```

```
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
1
Enter the key: 1
1.maxheap
2.minheap
2
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
2
#################


The Marks of students are:
1 3 5 12 10
Minimum marks are :1
Maximum marks are :12
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
```

Max Heap

```
Enter the number of students :4
Enter the marks of the student : 10
1.maxheap
2.minheap
1
Enter the marks of the student : 5
1.maxheap
2.minheap
1
Enter the marks of the student : 3
1.maxheap
2.minheap
1
Enter the marks of the student : 12
1.maxheap
2.minheap
1
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
2
###############


The Marks of students are:
12 10 3 5
Minimum marks are :3
Maximum marks are :12
```

```
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
1
Enter the key: 14
1.maxheap
2.minheap
1
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
2
#################


The Marks of students are:
14 12 3 5 10
Minimum marks are :3
Maximum marks are :14
Enter your choice
 1.Insert marks
2.Display marks
3.Exit
3
```