

Name	Komal Tarachandani
UID no.	2021600065
Experiment No.	7

AIM:	To implement max heap creation and heapsort
Program6	
PROBLEM STATEMENT :	<p>Implementation of a Min/Max Heap Structures.</p> <p>1-Assume Sequence of numbers as input, build a min/max heap using BUILDHEAP procedure</p> <p>2- Delete a node from heap. show the updated heap and get Kth smallest/largest number from a heap</p> <p>3- Heapsort</p>
PROGRAM:	<pre>#include <bits/stdc++.h> using namespace std; void heapify(int arr[], int N, int i) { int largest = i; // Initialize largest as root int l = 2 * i + 1; // left = 2*i + 1 int r = 2 * i + 2; // right = 2*i + 2 if (l < N && arr[l] > arr[largest]) largest = l; if (r < N && arr[r] > arr[largest]) largest = r; if (largest != i) {</pre>

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        swap(arr[i], arr[largest]);
        heapify(arr, N, largest);
    }
}

void buildHeap(int arr[], int N)
{
    int startIdx = (N / 2) - 1;
    for (int i = startIdx; i >= 0; i--) {
        heapify(arr, N, i);
    }
}

void heapSort(int arr[], int N)
{
    for (int i = N / 2 - 1; i >= 0; i--)
        heapify(arr, N, i);
    for (int i = N - 1; i > 0; i--)
    {
        swap(arr[0], arr[i]);
        heapify(arr, i, 0);
    }
}

void printHeap(int arr[], int N)
{
    for (int i = 0; i < N; ++i)
        cout << arr[i] << " ";
    cout << "\n";
}

int main()

```

```
{  
  
    int N;  
  
    cout<<"Enter number of elements: ";  
  
    cin>>N;  
  
    int arr[N];  
  
    cout<<"Enter elements: ";  
    for(int i=0;i<N;i++)  
    {  
        cin>>arr[i];  
    }  
  
    buildHeap(arr, N);  
    printHeap(arr, N);  
    cout<<"after deletion: ";  
    N=N-1;  
    printHeap(arr, N);  
    cout<<"HEAPSORT: ";  
    heapSort(arr, N);  
    printHeap(arr,N);  
    cout<<"\nEnter k for kth smallest element: ";  
    int k;  
    cin>>k;  
    cout<<arr[k-1];  
    return 0;  
}
```

RESULT:

```
65
input
Enter number of elements: 5
Enter elements: 5 6 7 1 3
7 6 5 1 3
after deletion: 7 6 5 1
HEAPSORT: 1 5 6 7

Enter k for kth smallest element: 2
5

...Program finished with exit code 0
Press ENTER to exit console.
```

CONCLUSION:

Hence I was able to learn the proper implementation and application of heapify, build max heap and heapsort.