Data Structures Lab (CSC204) **Session: Monsoon 2023-24**
III BTech (CSE) **Date: 25.09.2023**

Assignment-6 (Tree-I)

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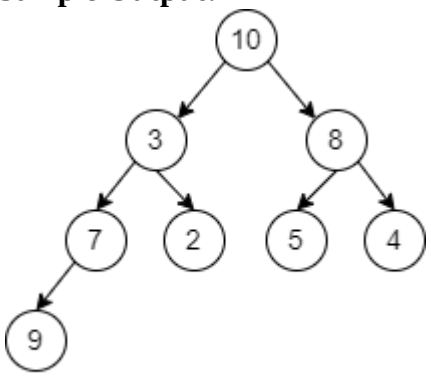
1. Write a program to perform the following task:

(i) Construct a complete binary tree as per the input data given by the user. You may use any fundamental data structure to implement tree data structure.

Sample Input: 10 3 8 7 2 5 4 9

Sample Output:



Created Tree

Note that this is only the visual representation of the created tree. The actual representation will be as per the fundamental data structure used to create the tree.

(ii) Print all the nodes whose values are less than the sum of the values of their children.

Sample Output: 10 3 8 7

(iii) Check whether a given sequence represents a valid traversal of the above tree or not. Here valid traversal means either it has to be an In-order, Pre-order, or Post-order traversal.

Sample Input:
Enter the sequence: 9 7 3 2 10 5 8 4

Sample Output:
It is a valid In-order traversal.

2. A binary heap is either min-heap or a max-heap. In a min-heap, the key at the root must be minimum among all keys present in a heap. The same property must be recursively true for all nodes in that heap. Given an empty binary min-heap, our task is to implement the two functions **insertKey** and **extractMin** as follows:

(i) insertKey(x): Inserts an element with value x in the existing min-heap and retail the heap property.

(ii) extractMin( ): Removes the minimum element from the non-empty min-heap and prints it. If the heap becomes empty, then it prints '-1'.

Input:
insertKey(4)
insertKey(2)
insertKey(6)
extractMin()
insertKey(8)
extractMin()
extractMin()
extractMin()
extractMin()

Output: 2 4 6 8 -1