Laboratory Work #6 - Binary Tree Processing

Due Date: Friday, November 17, 2023
Handover Date: Tuesday, November 01, 2023

1 Introduction

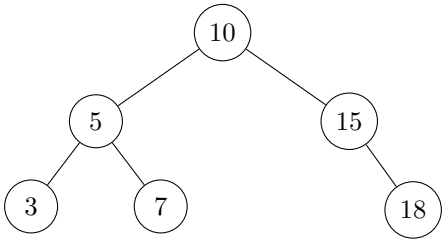
A binary tree is a tree-type non-linear data structure with a maximum of two children for each parent. Every node in a binary tree has a left and right reference along with the data element. The node at the top of the hierarchy of a tree is called the root node.

2 Input

You will have to create a binary tree structure and then read from console a value which your program should insert into the binary tree.

3 Task

Choose one/multiple tasks from the list below and build up your mark.
A mandatory task is to create a function to display the tree in a shape similar to the following one but not necessarily exactly the same(worth 2 points)



3.1 Easy - each of them is worth 1 point

- Create a function to calculate the height of a binary tree.
- Create a function to count the number of leaf nodes in the binary tree.
- Create a function to perform an in-order traversal of the binary tree and print the values of the nodes.
- Create a function to check if the binary tree is a binary search tree (BST).

3.2 Medium - each of them is worth 2 points

- Create a function to find the lowest common ancestor (LCA) of two nodes with given values in a binary tree.
- Create a function to delete a node with a given value from the binary search tree. Ensure that the tree remains a valid binary search tree after the deletion.
- Create a function to check if the binary tree is balanced.

4 Grading

There is no base task for this laboratory work, you should build up your mark based only on the tasks provided above.

5 Reporting

IMPORTANT!!! As i specified on else, you have to use latex to create/format your report