DATA STRUCTURES PROJECT 2

CSE2025.1

*“Construct BST with given conditions”*

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**Problem definition and aim of the program**

Aim of the program is construct a binary search tree which has to satisfy exactly two conditions:

-It should provide best possible access time

- Given depth level – node relation.

**Functions and explanations**

Note: More detailed explanations made in source code file.

-**int\* get\_inputs(int size):** getting inputs from “input.txt” file

**-void decrasing\_order\_sort(int b[],int size):** sorting the integers according the decreasing order.

**-struct bst\* newNode(int item):** Creating new node with given key.

**-struct bst\* create\_balanced\_bst(int array\_size,int low,int high,int b[]):**

Creating binary search tree with given ordered array.

**-struct bst\* modify\_tree(struct bst\* root):** Modifying the tree with given condition 1

**-struct bst\* modify\_tree2(struct bst\* root):** Modifying the tree with given condition 1

**-int nodes\_each\_level(int depthlevel):** Calculating the number of nodes each level

**-int height\_of\_tree(struct bst\* x):** Calculating the height of tree

**-int get\_level(struct bst \*node,int key, int level = 1):** Getting specific node’s depth level

**-int get\_size():** Getting the number of nodes in tree

**-void display\_part1(struct bst\* x,int size,int depth\_level):** Display menu for case 1

**-void display\_part2(struct bst\* x,int size,int depth\_level):** Display menu for case 2

**Detail Explanation**

Firstly, the program reads the integers in input file which exactly name is “input.txt”. If input file contains 0 or negative values, it prints error massage. Else, from those inputs program creates normal balanced binary tree without considering the given conditions with help of order-array. After constructing normal balanced binary tree program check two cases to satisfy the given conditions. Consider following examples to understand cases:

Case 1: If we have 16 nodes, according to the normal balanced tree, we should have 4 depth level. But we need 6 depth level due to satisfy the given depth level-node condition. Because of that, program find most right node and his parent, carry those nodes into deep levels.

Case 2: If we have more than 16 nodes (e.g 18), again according to the normal balanced tree, we should have 5 depth level. But we need 6 depth level due to satisfy the given depth level-node condition. Because of that we should carry one node from fifth depth level to sixth depth level.

(Explanations of node transfer process explained in source file more clearly)

According to the number of nodes, these cases perform the normal balanced tree and program satisfy the conditions. After that program prints depth level of tree, and depth level of each specific node with interactive menu.

**References**

Getting some help from lesson’s presentations and internet sources such as https://www.geeksforgeeks.org/. especially well-known functions considering the binary search tree topic.

1)<https://www.geeksforgeeks.org/sorted-array-to-balanced-bst/>

2) https://www.geeksforgeeks.org/get-level-of-a-node-in-a-binary-tree/