Height in C++

```
#include <iostream>
#include <vector>
#include <stack>

using namespace std;

// Node class definition
class Node {
public:
    int data;
    vector<Node*> children;

    Node(int val) {
        data = val;
    }
};

// Function to construct the tree from the given array
Node* construct(vector<int>& arr) {
    Node* root = nullptr;
    stack<Node*> st;

    for (int i = 0; i < arr.size(); ++i) {
        if (arr[i] == -1) {
            st.pop();
        } else {
            Node* t = new Node(arr[i]);

            if (!st.empty()) {
                st.top()->children.push_back(t);
            } else {
                root = t;
            }

            st.push(t);
        }
    }

    return root;
}

// Function to calculate the height of the tree
int height(Node* node) {
    if (node->children.empty()) {
        return 0;
    }

    int maxChildHeight = 0;
    for (Node* child : node->children) {
        int childHeight = height(child);
        if (childHeight > maxChildHeight) {
            maxChildHeight = childHeight;
        }
    }

    return maxChildHeight + 1;
}

// Main function
int main() {
    vector<int> arr = {10, 20, -1, 30, 50, -1, 60, -1, -1,
```

Input Array:

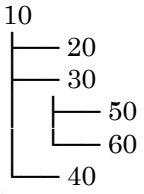
{10, 20, -1, 30, 50, -1, 60, -1, -1, 40, -1, -1}

🛠 Tree Construction (construct function):

We use a **stack** to maintain the current path in the tree. When we encounter -1, we pop a node from the stack (finished with that node's children). Here's a **step-by-step construction** of the tree:

Step	arr[i]	Stack Top	Action	Tree Change
0	10	—	Create node(10), push	root = 10
1	20	10	Add 20 as child to 10, push	10 → 20
2	-1	20	Pop 20	
3	30	10	Add 30 as child to 10, push	10 → 30
4	50	30	Add 50 as child to 30, push	30 → 50
5	-1	50	Pop 50	
6	60	30	Add 60 as child to 30, push	30 → 60
7	-1	60	Pop 60	
8	-1	30	Pop 30	
9	40	10	Add 40 as child to 10, push	10 → 40
10	-1	40	Pop 40	
11	-1	10	Pop 10 (tree complete)	

✅ Final Tree:



🌲 Height Calculation:

The **height** of a tree is the number of edges in the longest path from the root to a leaf node.

We traverse each subtree and compute the max height:

- Leaf nodes like 20, 50, 60, and 40 → height = 0
- Node 30 has children 50 and 60 → height = 1
- Root 10 has children:
    - 20 → 0
    - 30 → 1

40, -1, -1};
 	
Node* root = construct(arr);
int h = height(root);
cout << h << endl;
 	
return 0;
}
	○ 40 → 0
	→ max child height = 1
	→ root height = 1 + 1 = 2
	
	✅ **Final Height: 2**
	
	✅ **Output:**
	
	2

2	