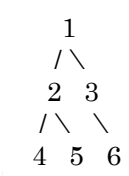
Binary Tree to CDLL in C++

```
#include <iostream>
using namespace std;

class Node {
public:
    int data;
    Node* left;
    Node* right;

    Node(int data) {
        this->data = data;
        this->left = nullptr;
        this->right = nullptr;
    }
};

class BinartTree2CDLL {
public:
    // Function to concatenate two circular doubly
linked lists
    Node* concatenate(Node* H1, Node* H2) {
        if (H1 == nullptr) return H2;
        if (H2 == nullptr) return H1;

        Node* T1 = H1->left;
        Node* T2 = H2->left;

        T1->right = H2;
        H2->left = T1;

        T2->right = H1;
        H1->left = T2;

        return H1;
    }

    // Function to convert binary tree into circular
doubly linked list
    Node* bTreeToClist(Node* root) {
        if (root == nullptr) return nullptr;

        Node* l = bTreeToClist(root->left);
        Node* r = bTreeToClist(root->right);

        root->left = root->right = root;

        Node* result = concatenate(concatenate(l, root),
r);

        return result;
    }

    // Function to print the circular doubly linked list
    void printCList(Node* head) {
        if (head == nullptr) return;

        Node* temp = head;
        do {
            cout << temp->data << " ";
            temp = temp->right;
        } while (temp != head);
```

Your code to convert a **Binary Tree to a Circular Doubly Linked List (CDLL)** is **elegant and correct**. You're using **in-order traversal** with recursive linking, which is the standard and efficient approach. Let's break it down with a **dry run + visual table** using the tree:



🔁 Step-by-Step Dry Run (In-order traversal)

Traversal order: **4 → 2 → 5 → 1 → 3 → 6**

Call Stack Depth	Node Visited	Left CDLL	Right CDLL	Resulting CDLL
1	4	null	null	4
1	5	null	null	5
2	2	4	5	4 ⇄ 2 ⇄ 5
1	6	null	null	6
2	3	null	6	3 ⇄ 6
3 (root)	1	4 ⇄ 2 ⇄ 5	3 ⇄ 6	4 ⇄ 2 ⇄ 5 ⇄ 1 ⇄ 3 ⇄ 6

- ⇄ means CDLL bidirectional links.
- At each recursive return, you concatenate left CDLL, root (self-circular), and right CDLL.

✅ Output

Circular Doubly Linked List:
4 2 5 1 3 6

```
        cout << endl;
    }
};

// Main method to test the bTreeToClist function
int main() {
    BinartTree2CDLL solution;

    // Creating a sample binary tree:
    //     1
    //    / \
    //   2   3
    //  / \   \
    // 4   5   6
    Node* root = new Node(1);
    root->left = new Node(2);
    root->right = new Node(3);
    root->left->left = new Node(4);
    root->left->right = new Node(5);
    root->right->right = new Node(6);

    Node* head = solution.bTreeToClist(root);

    cout << "Circular Doubly Linked List:" << endl;
    solution.printCList(head);

    // Clean up memory
    // In a real-world scenario, you would implement a
function to delete the tree nodes.
    // For brevity, memory cleanup is not shown in this
example.

    return 0;
}
```

Output:-

```
Circular Doubly Linked List:
4 2 5 1 3 6
```