

Children Sum Property (CSP) Algorithm

The **Children Sum Property (CSP)** states that for every non-leaf node in a binary tree, the value of the node must be equal to the sum of the values of its left and right children. This algorithm checks if a given binary tree satisfies the CSP using a level-order traversal (BFS).

Pseudocode:

```
FUNCTION isSumProperty(root):
    CREATE an empty queue q
    ENQUEUE root into q

    WHILE q is not empty:
        temp = DEQUEUE from q

        IF temp has both left and right child:
            IF temp.left.data + temp.right.data != temp.data:
                RETURN 0

        ELSE IF temp has only left child:
            IF temp.left.data != temp.data:
                RETURN 0

        ELSE IF temp has only right child:
            IF temp.right.data != temp.data:
                RETURN 0

        IF temp.left exists:
            ENQUEUE temp.left
        IF temp.right exists:
            ENQUEUE temp.right

    RETURN 1
```

This algorithm uses a queue for level-order traversal. It ensures that at every node, the Children Sum Property is validated. If any node violates the property, the function immediately returns 0. Otherwise, it returns 1 after checking all nodes. The time complexity is **O(N)** where N is the number of nodes in the tree.