DSA

Assignment No. 06

Title: Threaded Binary tree

Aim: To implement a threaded binary tree

problem statement: Implement Inorder threaded binary tree transverse the implemented tree in pre-order and inorder

Theory:

Limitation of Normal binary tree:

1) Too many null pointers:
The binary tree node have at most two children. But if they have only one child or no children the link part in the link representation remains null
n: number of nodes
no of non-null link: n-1
total link: 2n
null link: 2n(n-1) = n+1.

2) Tempory data structure (stack) is required to implement non recursive transversal algorithm

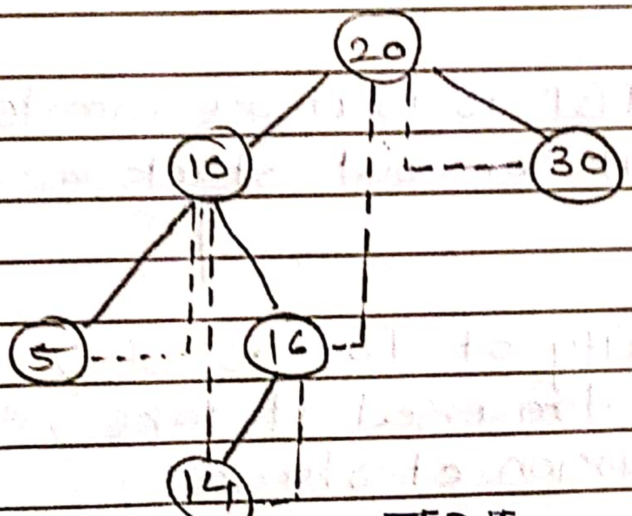
Threaded Binary tree:
The concept of threaded binary tree is introdu to overcome thee limilation of binary tree The idea of TBT is to make inorder traversal faster and do it without stack & without recursion. A binary tree is made threaded by making all right children pointers would

normally be Null point to inorder successor of node (if it exist)

There are two types of TBT :

1) Single Threaded : where a Null right pointer is made to point inorder succesor.

2) Double threaded : where both the left and right pointers are made to point to inorder predecessor and inorder successor respectively.



TBT

Advantages of TBT over normal binary tree

1) No wastage of memory for null pointers
2) Non-recursive transversal without stack
3) Node can keep record of its roots
4) Backword transverse is possible.

validation:

1) Duplicate numbers are not allowed
2) only integer data for tree creation and insertion

Test cases:

1) Random input
2) Sorted input
3) Input for skewed tree concept

Conclusion:

The idea of TBT is to make inorder traversal faster & do it without stack and without recursion

Space complexity of TBT is O(1)
for inorder traversal it take, O(n) time without recursion of stack.