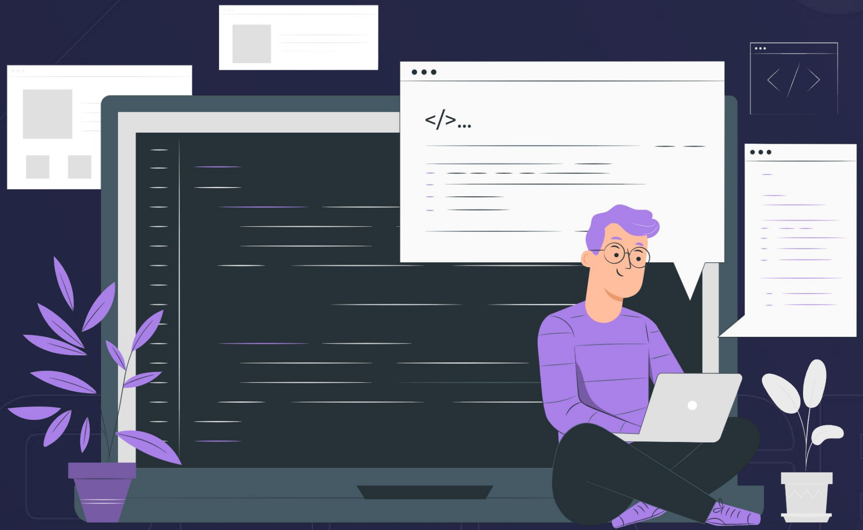
Lecture 57

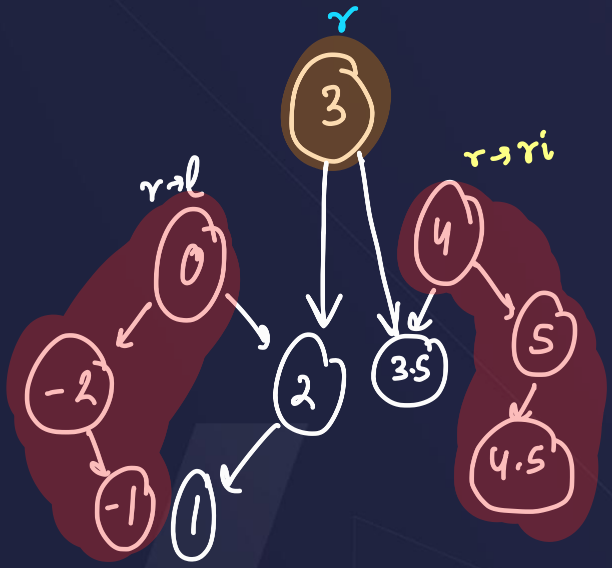
Binary Search Trees - 3



Recap

- Searching, Insertion, Deletion
- Interview Problems on BST

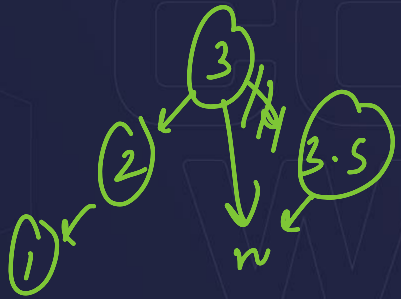
Ques: Trim a Binary Search Tree [LeetCode 669]



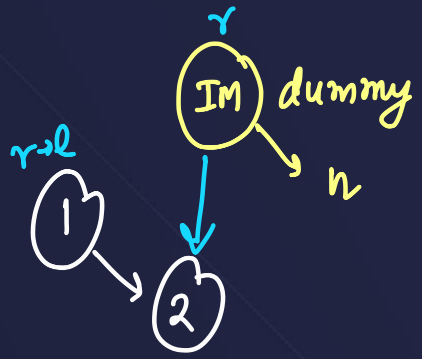
```
if(r→left→val < lo){
    r→left = r→left→right
}

if(r→right→val > hi){
    r→right = root.right→left
}
```

lo = 1
hi = 3



Ques: Trim a Binary Search Tree [LeetCode 669]

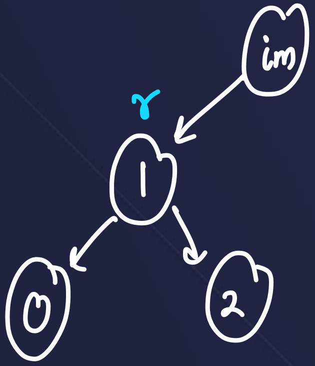


if(root->left->val < lo)

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

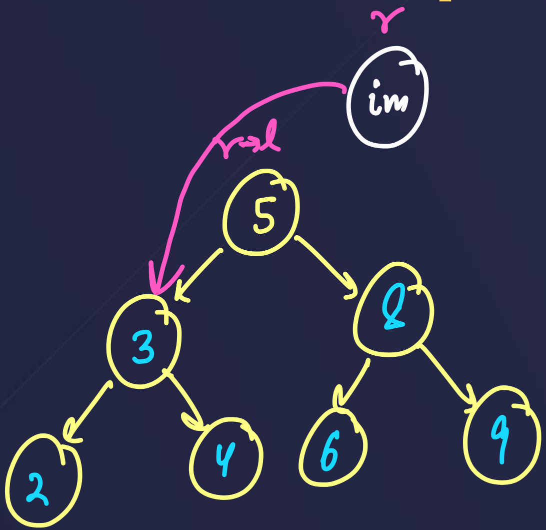
lo = 2, hi = 4

Ques: Trim a Binary Search Tree [LeetCode 669]



lo = 1

hi = 2



lo = 1
hi = 4

```
if(r->left->val > hi)
    r->left = r->left->left
```

Morris Traversal = Inorder Traversal

Pre, In, Post → Recursive / Iterative   T.C. = O(n)   S.C. = O(h) / O(n)

Iterative inorder traversal → S.C. = O(1)

↳ start curr with root

↳ 1) curr→left exists → pred

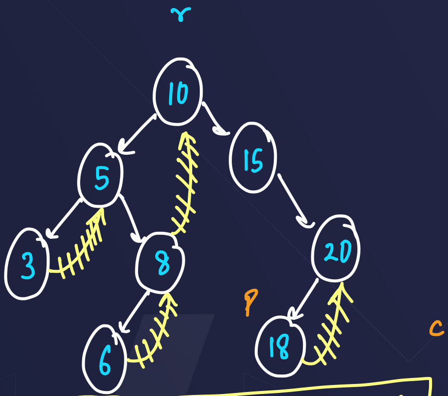
link

unlink & visit

2) curr→left == NULL → visit(curr)

curr = curr→right

Morris Traversal → Predecessor (Inorder)

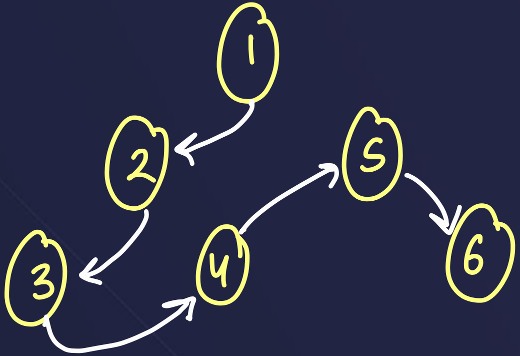


3 5 6 8 10 15 18 20

```
while(curr != NULL){
    if(curr -> left != NULL){ //find pred
        pred = curr->left
        while(pred->right != NULL && p->right != c)
            pred = pred->right
        if(pred->right == NULL) //link
        {
            pred->right = curr
            curr = curr->left
        }
        if(pred->right == c){ //unlink
            prod-> right = NULL
            visit(curr)
            curr = curr->right
        }
    }
    else{
        visit(curr)
        curr = curr->right
    }
}
```

Ques: Flatten Binary Tree to Linked List [LeetCode 114]

M-I :



Make a preorder vector of treenodes.

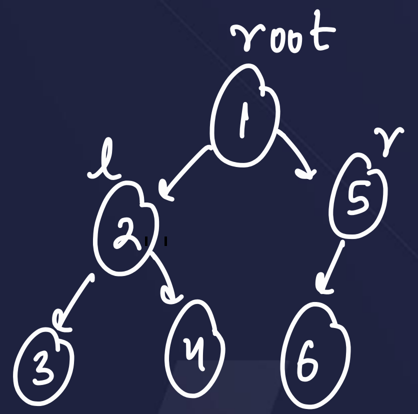
vector< TreeNode* > ans = { 1, 2, 3, 4, 5, 6 }

$$\boxed{T.C. = O(n) \qquad S.C. = O(n)}$$

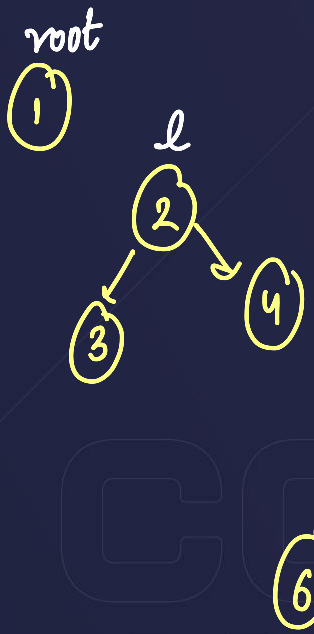
Ques: Flatten Binary Tree to Linked List [LeetCode 114]

M-2 : Recursion :

Preorder → Root Left Right



→



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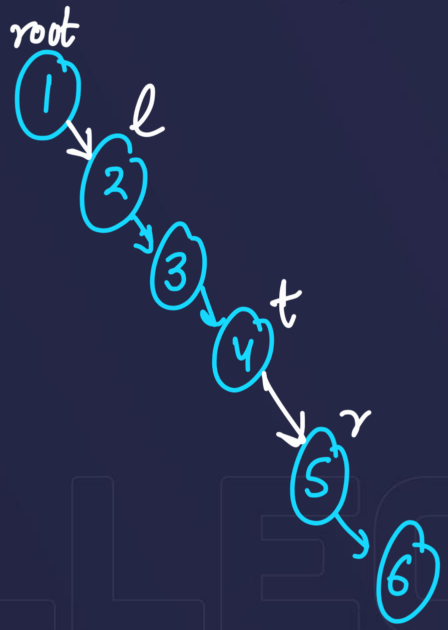


$l = root \to left$

$r = root \to right$

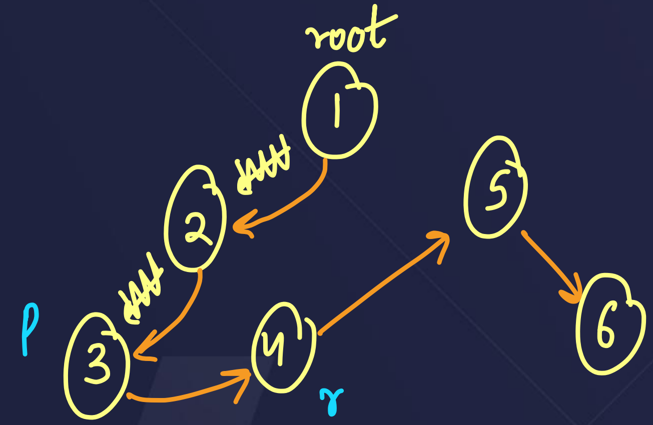
$$\boxed{\begin{array}{l} T.C = O(n) \\ S.C = O(n) \end{array}}$$

Ques: Flatten Binary Tree to Linked List [LeetCode 114]

M-3 : Morris Traversal

$\boxed{S.C. = O(1)}$

Curr, pred, right



c

```
if (C->left != NULL) { //find pred & make r
    r = curr->right
    curr->right = curr->left
    finding pred
    Link -> pred->right = r
    Curr = curr->left
}
else curr = curr->right
```

Next Lecture

- Sets, Maps, Heaps ✓

PW SKILLS

THANK YOU