24 Lecture - CS301

Important Subjective

1. **What is AVL Tree? Describe the steps to delete a node in AVL Tree.**

Answer: AVL Tree is a self-balancing binary search tree in which the height of the left and right subtrees of any node differs by at most one. To delete a node in an AVL Tree, we perform the following steps:

1. **Perform the standard BST delete operation for the node to be deleted.**
2. **Check the balance factor of all the nodes in the path from the deleted node to the root.**
3. If the balance factor of any node becomes +2 or -2, perform the appropriate rotation to balance the tree.
4. What is the difference between the deletion of a node in a BST and AVL Tree?

Answer: The deletion of a node in a BST can lead to an unbalanced tree, while in AVL Tree, after the deletion of a node, the balance factor of all the nodes is checked, and the tree is rebalanced by performing appropriate rotations.

3. **What are the different cases that can arise while deleting a node from an AVL Tree?**

Answer: The different cases that can arise while deleting a node from an AVL Tree are:

1. The node to be deleted is a leaf node.
2. The node to be deleted has only one child.
3. The node to be deleted has two children.
4. **How is the height of a node in an AVL Tree calculated?**

Answer: The height of a node in an AVL Tree is calculated as the maximum height of its left and right subtrees plus one.

5. **Why is AVL Tree preferred over other binary search trees?**

Answer: AVL Tree is preferred over other binary search trees because it is self-balancing, which ensures that the height of the tree remains balanced, and the search, insertion, and deletion operations take O(log n) time complexity.

6. **How is the balance factor of a node in an AVL Tree calculated?**

Answer: The balance factor of a node in an AVL Tree is calculated as the difference between the height of its left and right subtrees.

7. **What is the role of rotations in AVL Tree?**

Answer: Rotations are performed in an AVL Tree to balance the tree after insertion or deletion of a node. There are four types of rotations: left-rotate, right-rotate, left-right-rotate, and right-left-rotate.

8. **How is the balance of an AVL Tree maintained?**

Answer: The balance of an AVL Tree is maintained by keeping the height difference of the left and right subtrees of each node within the range of -1 to +1. If the balance factor of a node becomes -2 or +2, appropriate rotations are performed to balance the tree.

9. **What are the advantages of AVL Tree?**

Answer: The advantages of AVL Tree are:

1. **It ensures that the height of the tree is balanced.**
2. **Search, insertion, and deletion operations take O(log n) time complexity.**
3. **It is efficient in terms of time and space complexity.**
4. **What is the worst-case time complexity of the deletion operation in an AVL Tree?**

Answer: The worst-case time complexity of the deletion operation in an AVL Tree is O(log n).