



SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35
An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A+’ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF INFORMATION TECHNOLOGY

DATASTRUCTURES

II YEAR III SEM

UNIT 2 –TREE DATASTRUCTURES

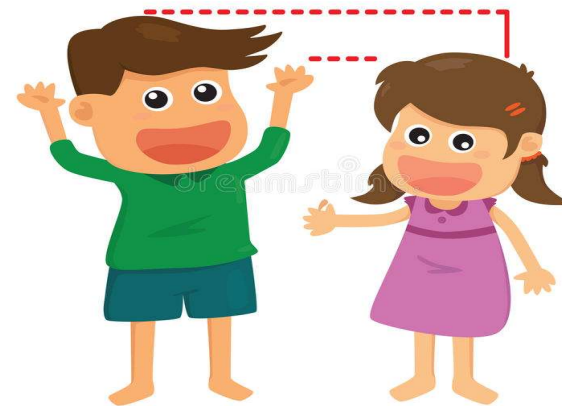
AVL TREE



Is it Practically Possible?

? Adjusting the height of a tree

Physical Tree / Manmade Tree



What is the idea to make a tree as height balanced?

Picture Source : [shutterstock.com](https://www.shutterstock.com)



AVL TREE



A Height balanced Tree

Inventor: **A**delson, **V**elski & **L**andis

The tree is height balanced if:

T_L and T_R are height balanced

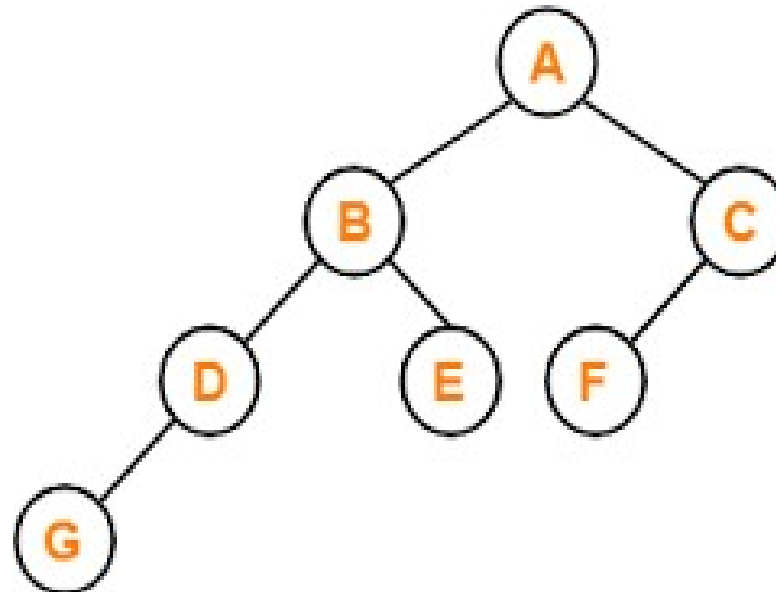
$h_L - h_R \leq 1$, where $h_L - h_R$ are the heights of T_L and T_R

The Balance factor of a node in a binary tree can have value 1, -1, 0,

Picture Source : btechsmartclass.com



AVL TREE-EXAMPLE



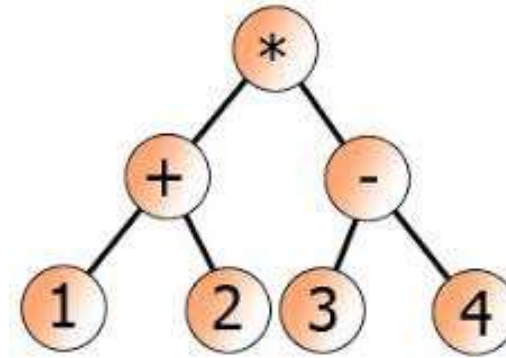
Picture Source : btechsmartclass.com



APPLICATIONS



- Calculating expression trees
- Expressing arithmetic expressions
- For dynamic sorting
- Virtual Memory Area management
- IP address indexing



$$((1+2)*(3-4))$$

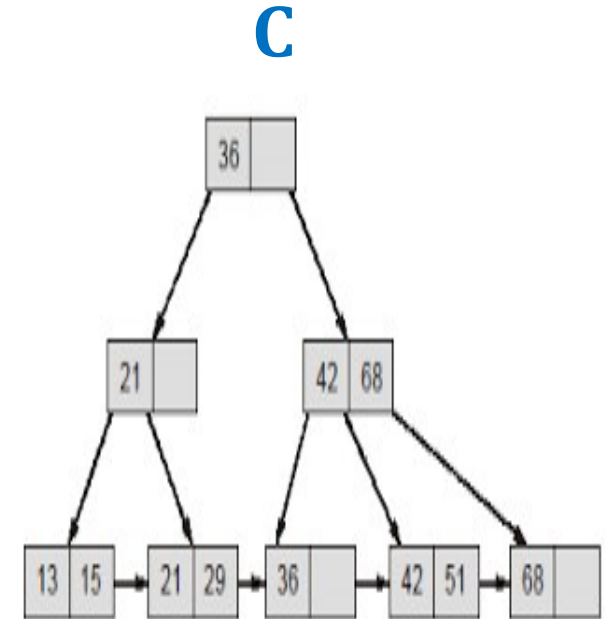
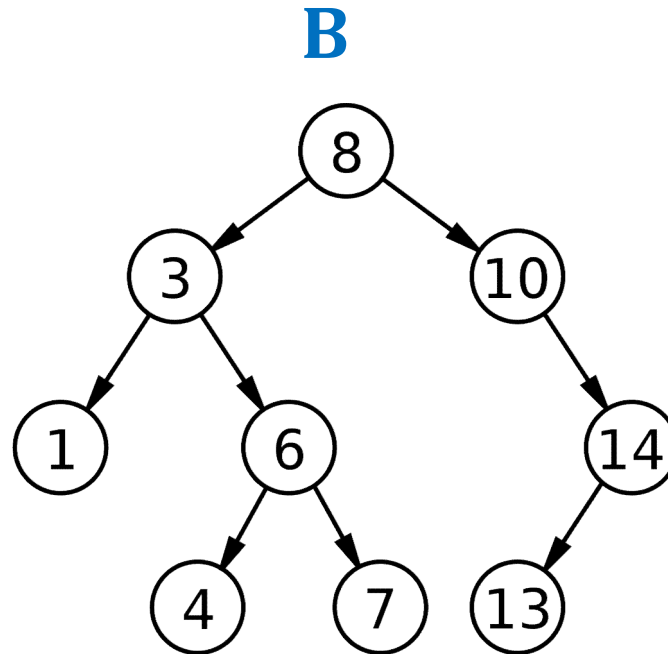
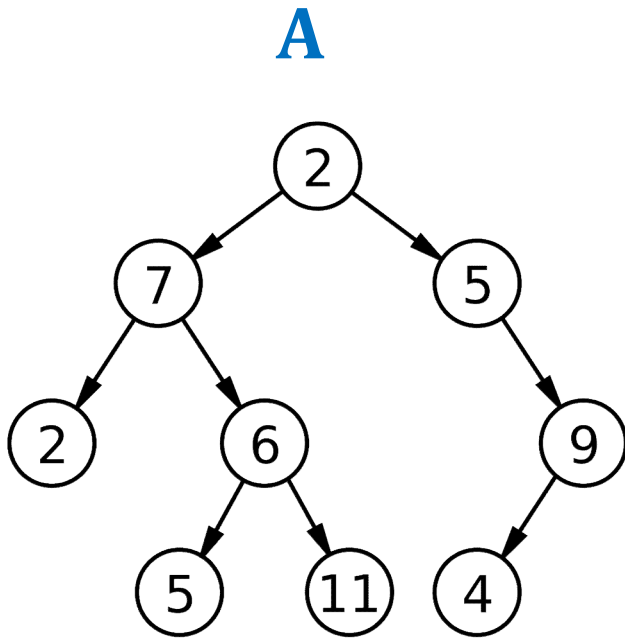
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02/03/2007	nkhj	Untitled 0	IndexType
02/03/2007	nkhj	Untitled 0	IndexType

Picture Source : geeksforgeeks.org



ASSESSMENT - 1

Which of the following is the example for AVL tree?



Picture Source : picuki.com



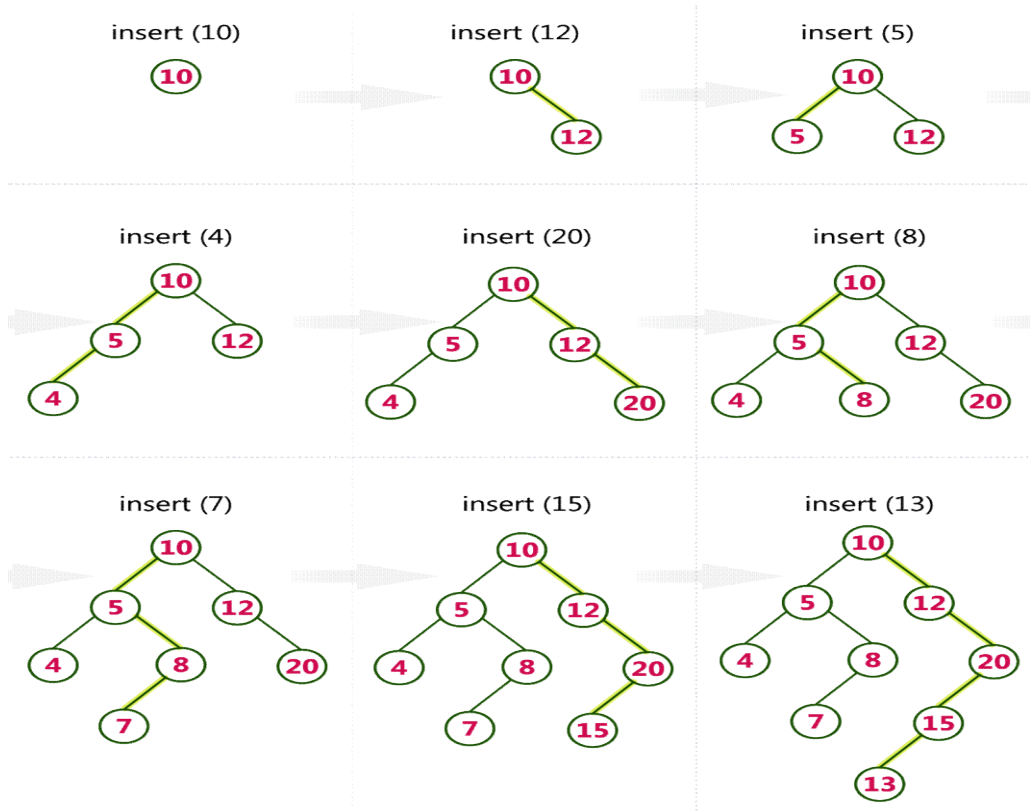
OPERATIONS

Insert()

Delete()

Create()

Display()



Picture Source : helloacm.com



ASSESSMENT – 2



1. Construct and place the following elements in a AVL tree.

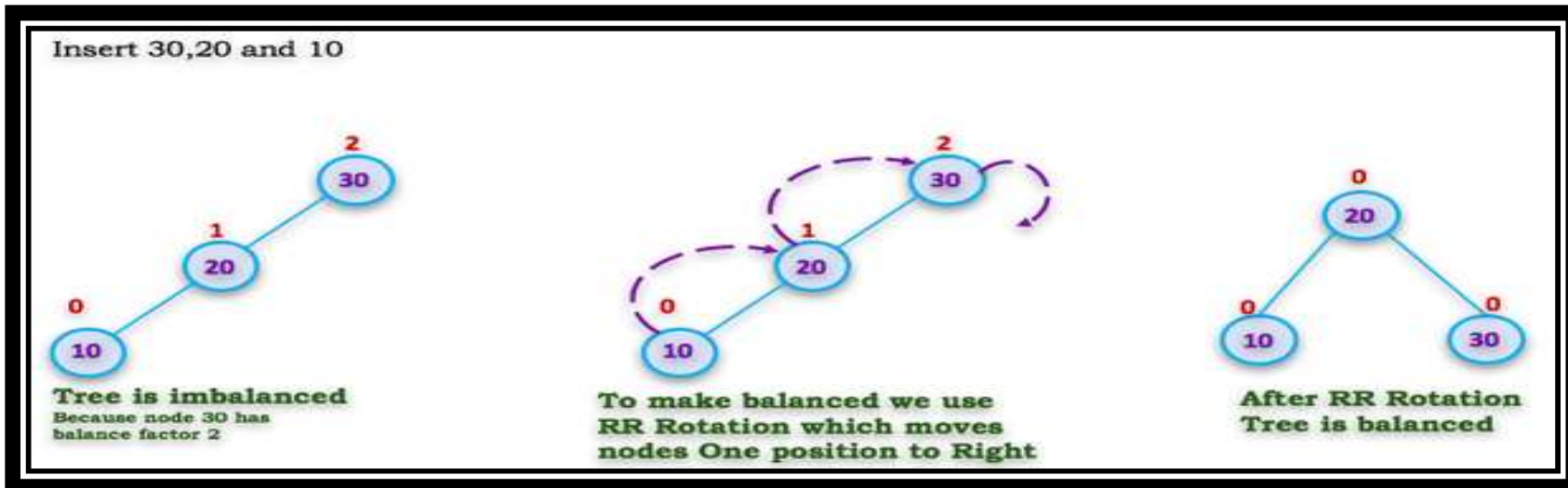
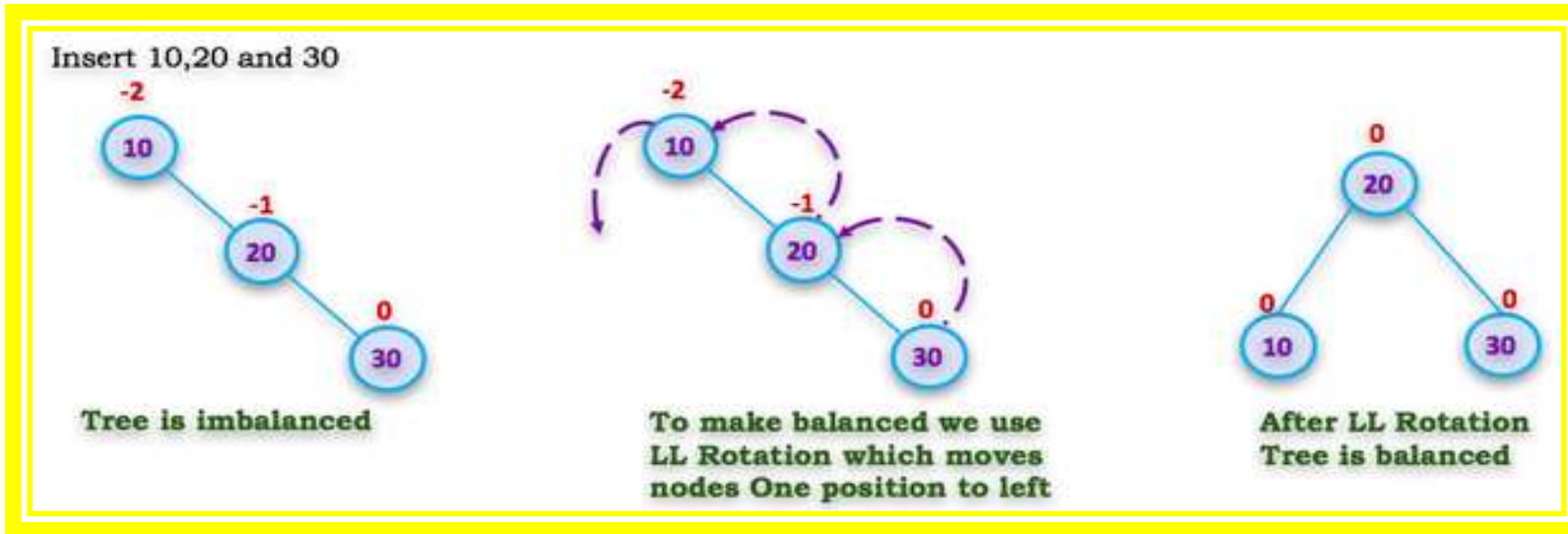
10,12,5,4,20,8,7,15 and 13



Rotation is the process of moving the nodes to either left or right to make tree balanced in terms of its height.

To balance itself, an AVL tree may perform the following four kinds of rotations –

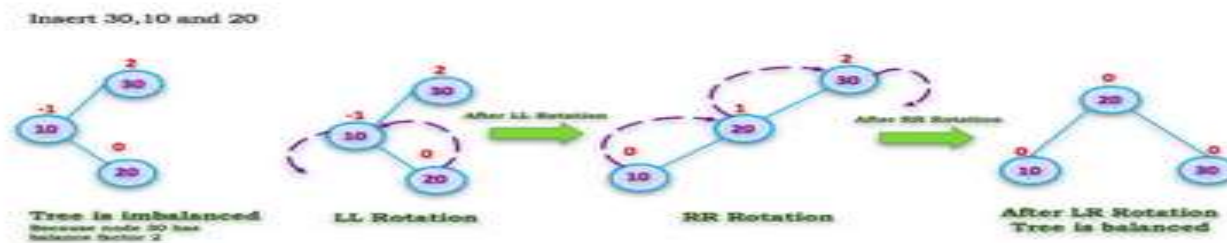
- 1> Left rotation (Single)**
- 2> Right rotation (Single)**
- 3> Left-Right rotation (Double)**
- 4> Right-Left rotation (Double)**





3> Left Right Rotation (Double — LR Rotation)

The LR Rotation is combination of single left rotation followed by single right rotation. In LR Rotation, first every node moves one position to left then one position to right from the current position. To understand LR Rotation, let us consider following insertion operations into an AVL Tree...



4> Right Left Rotation (Double — RL Rotation)

The RL Rotation is combination of single right rotation followed by single left rotation. In RL Rotation, first every node moves one position to right then one position to left from the current position. To understand RL Rotation, let us consider following insertion operations into an AVL Tree...





REFERENCES



- <https://ece.uwaterloo.ca/~dwharder/aads/Lecture materials>
- <https://www.quora.com/datastructuresctures/realtimeexamples>
- <https://tutorialpoints.com/datast/AVL>

Thank You