CSSE 230 Day 14

AVL insert/Delete Review
Exam

After today, you should be able to…
…determine where a tree is imbalanced after insertion.
… do single and double rotations on paper

Agenda

- EditorTrees:
  - Work together
  - Commit often
  - Switch drivers often and commit who drove.
    - If each uses own laptop, then SVN records username
    - If you all share a laptop, then identify yourself in the commit log.
- AVL insertion review and deletion intro
- Exam
- For those who finish early:
  - Practice with AVL rotation, finish after class, due tomorrow at start of class.

After insertion into AVL or EditorTree, go up tree, updating balance codes and checking for imbalance

- p = parent of inserted node
- while p != null
  - // 3 cases (=, tipped towards, tipped away)
  - if p.balanceCode is '='
    - set code to '/' or '\' (towards insertion point)
    - p = p.getParent()
  - else if p.balanceCode indicates "insertion was in shorter subtree"
    - change code to '='
    - Break (STOP)
  - else //insertion was into taller side.
    - do the appropriate rotation
    - Break (STOP)

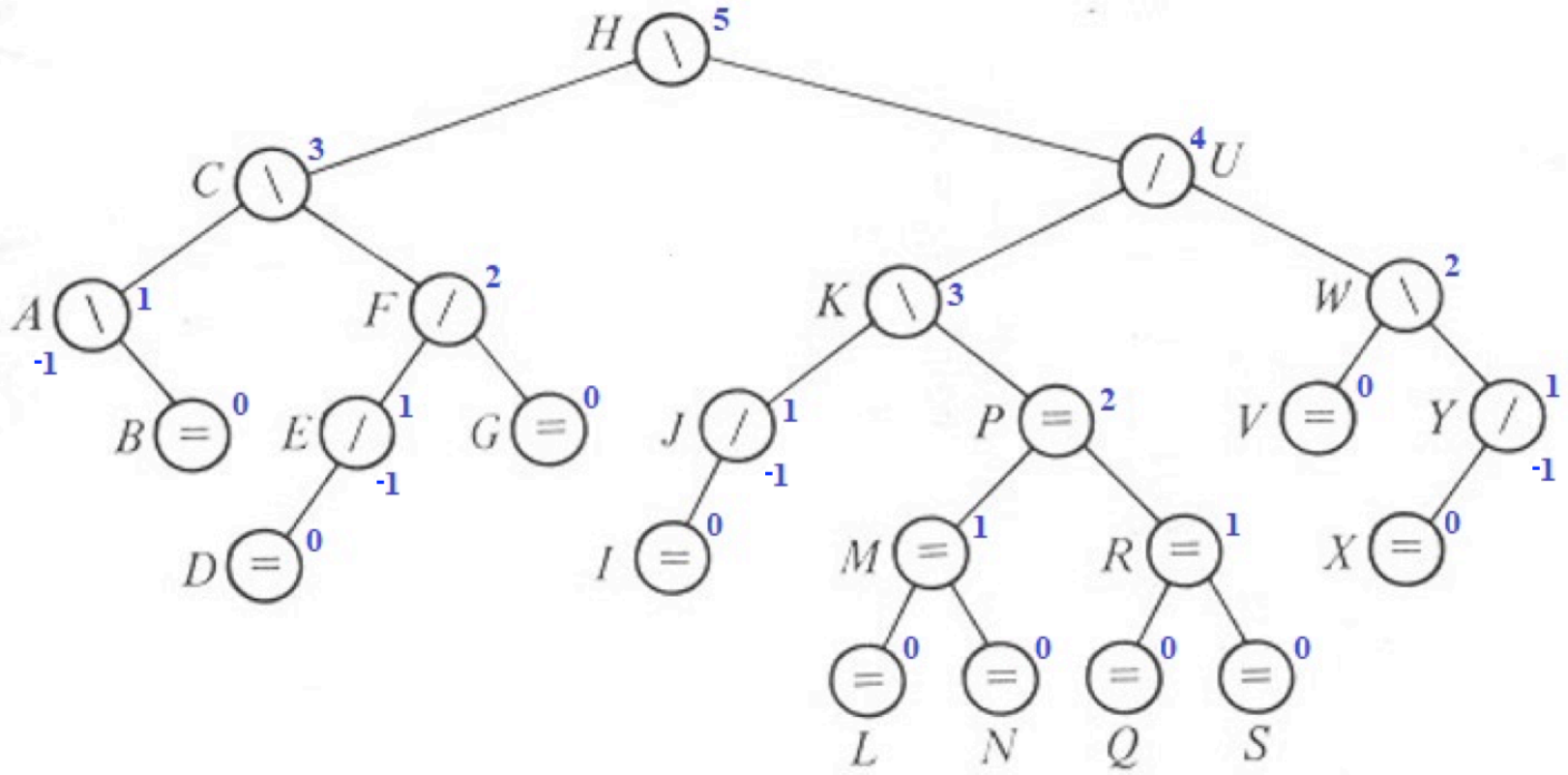
This is for Milestone 1; You will design a similar procedure for deletion (milestone 2)

Which kind of rotation to do after an insertion?

Depends on the first two links in the path from the lowest node that has the imbalance (A) down to the newly-inserted node.

First link (A)	**Second link** (A's child in that direction)	**Rotation type** (rotate "around A's position")
Left	Left	Single right
Left	Right	Double right
Right	Right	Single left
Right	Left	Double left

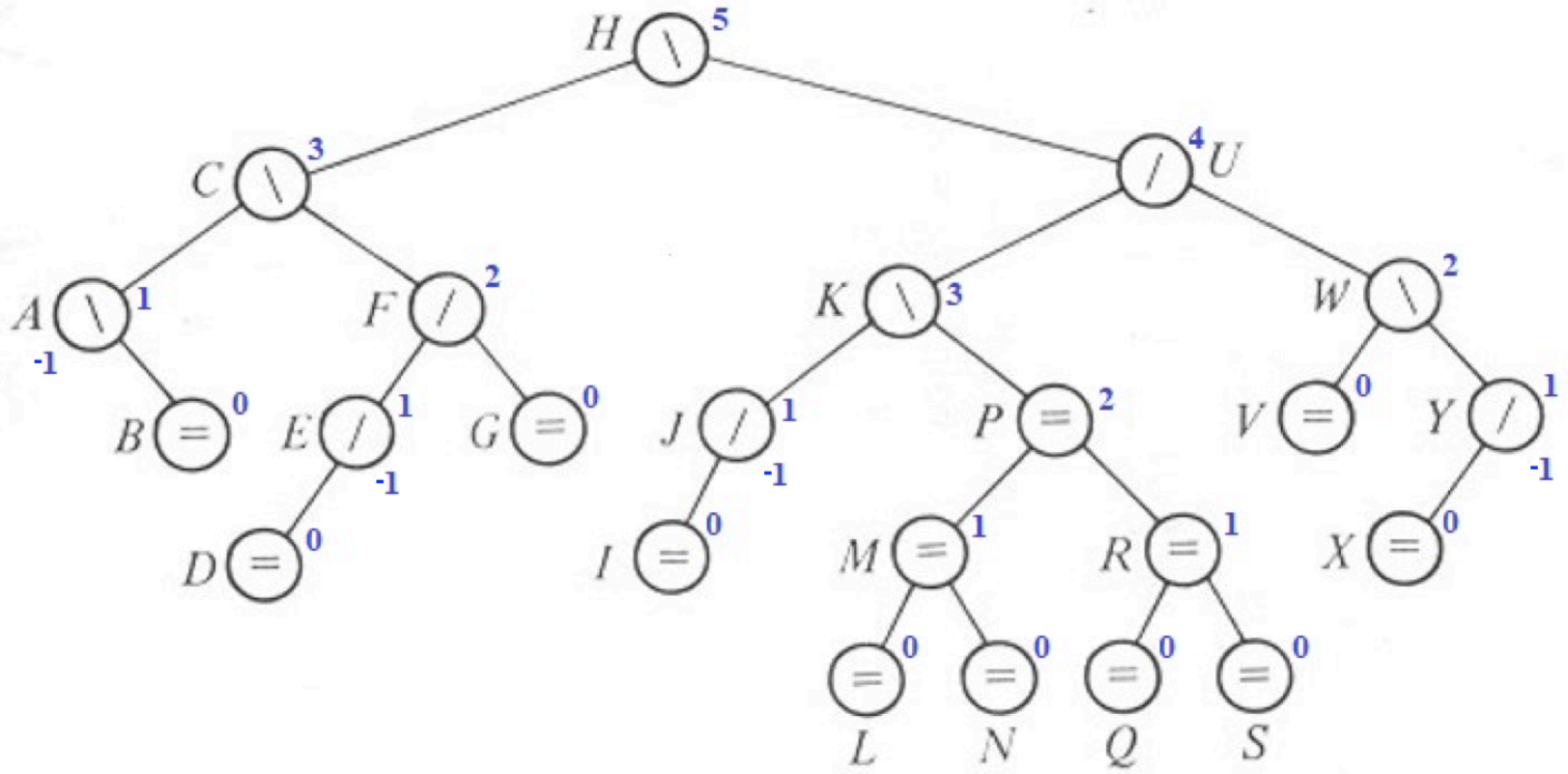
A sample AVL tree



Is this tree balanced?

If not, under which node is rebalancing required?

A sample AVL tree



After each insertion/deletion, update balance codes:

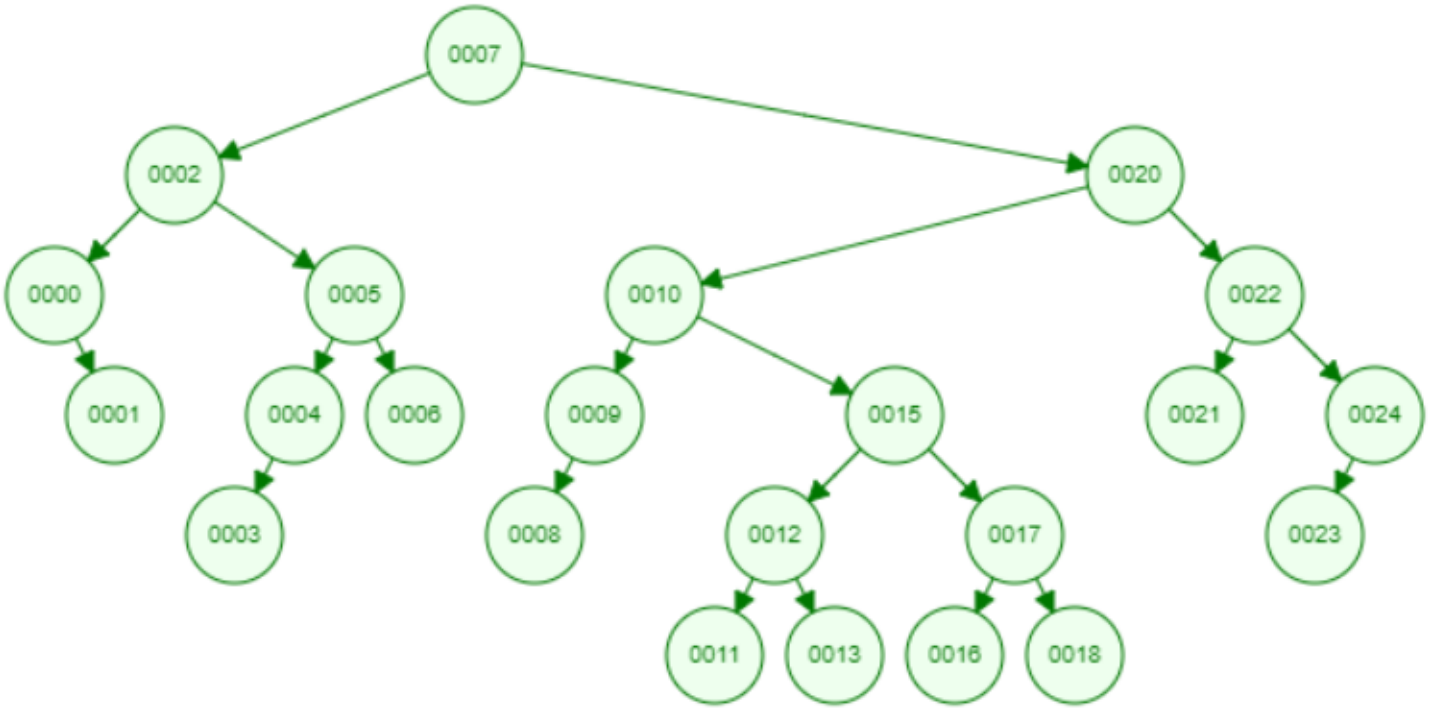
Insert "**HA**" into the tree, then "**DA**", then "**O**"

Now, delete **G** from the original tree, then **I**, **J**, **V**

After the test

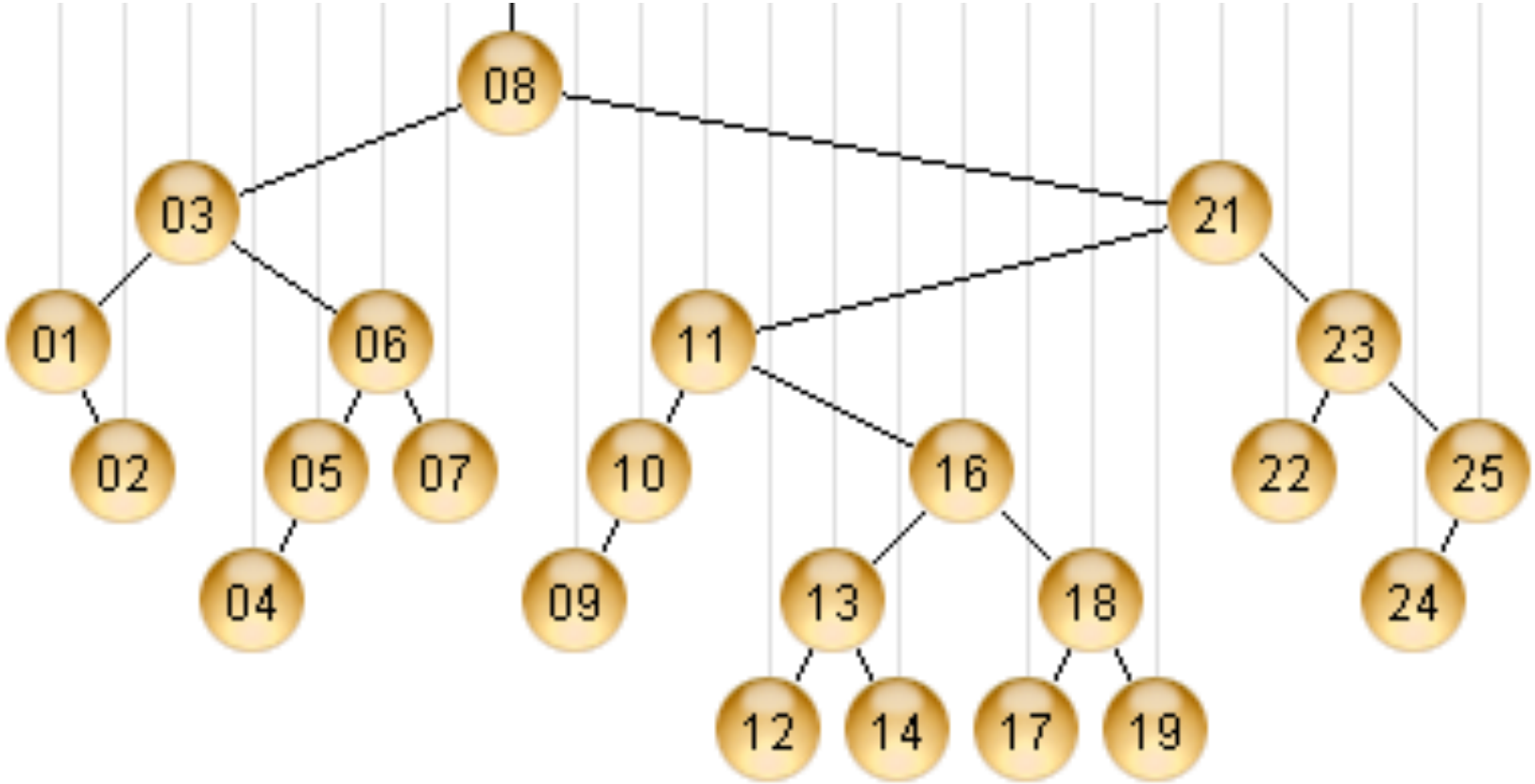
- Do today's in-class quiz outside of class
  - Check your work using the demo website at the given URL
  - Quiz #14 is due **next class, at the start of class.**
    - Try to finish before then, but you may ask questions during class if you got stuck.
  - Please don't discuss the exam with anyone until after 5 pm.

Each Node Labeled w/ Rank



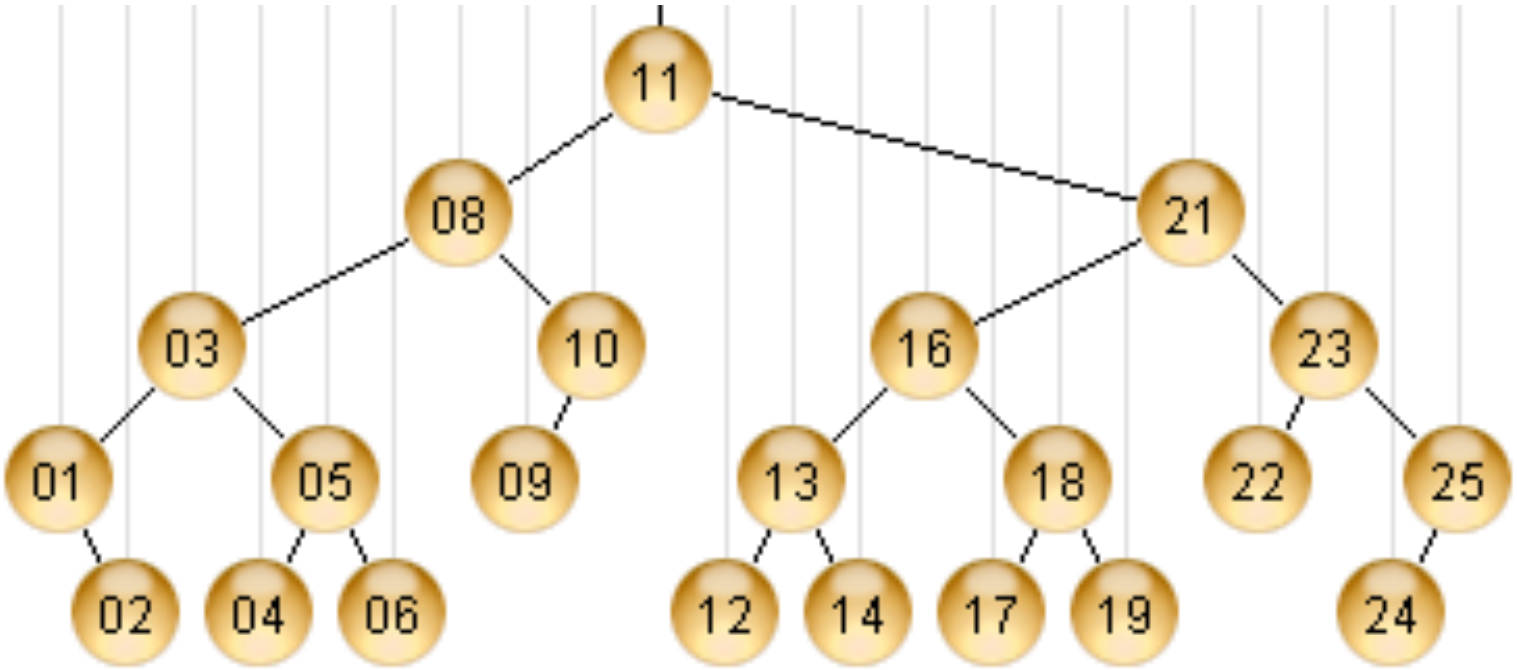
Courtesy of: https://www.cs.usfca.edu/~galles/visualization/BST.html

Delete 7 and Rebalance

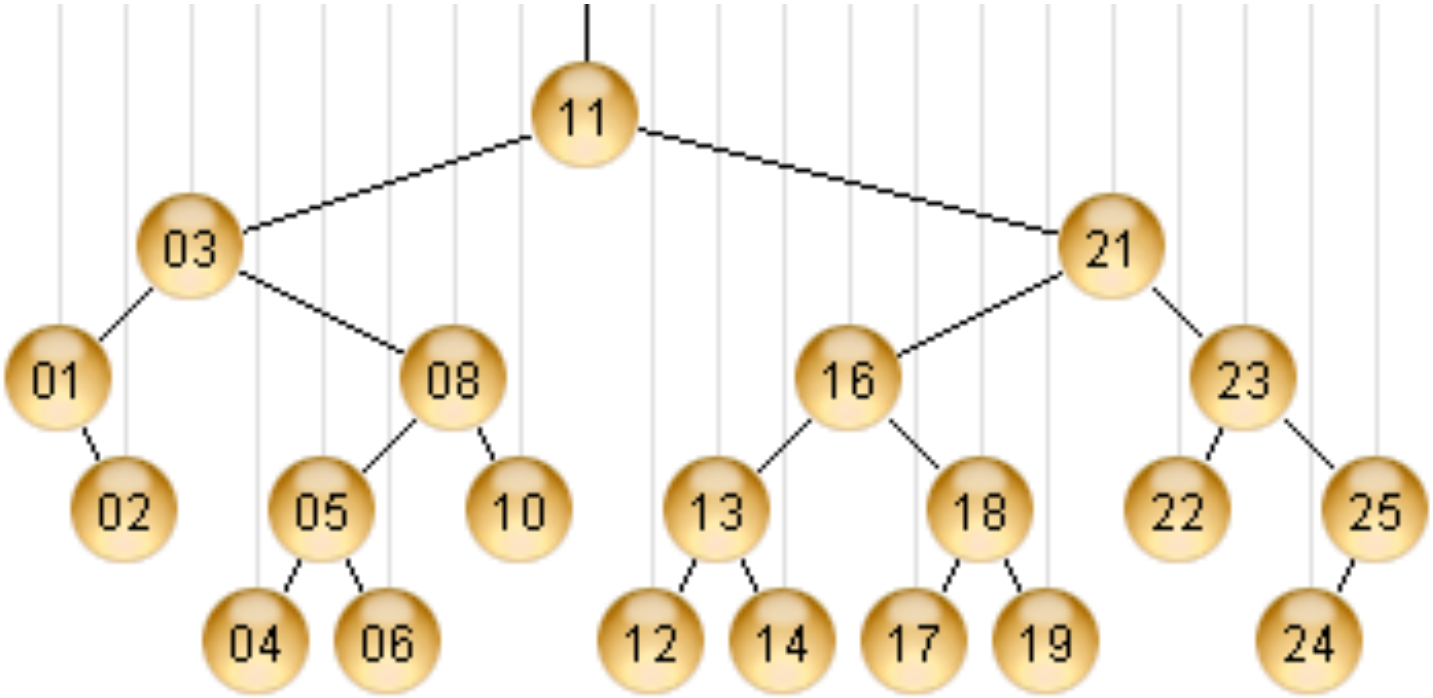


Courtesy of http://webdiis.unizar.es/asignaturas/EDA/AVLTree/avltree.html

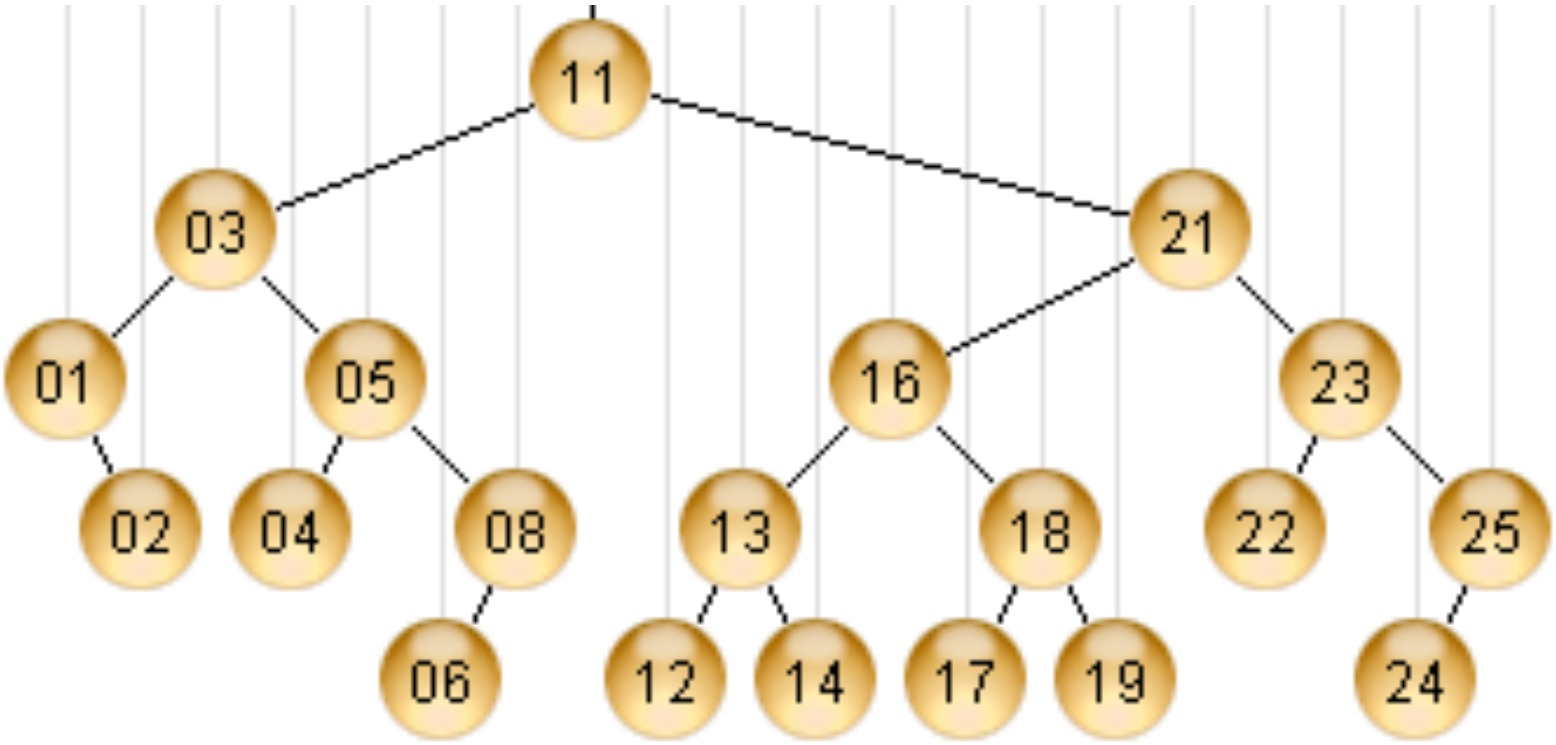
Delete 9 and Rebalance



Delete 10 and Rebalance



Delete 22 and Rebalance



Final result