

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

- ▶ AVL insertion/deletion review
- ▶ Questions on EditorTrees requirements?
- ▶ Exam
- ▶ Practice with AVL rotation, finish after 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)

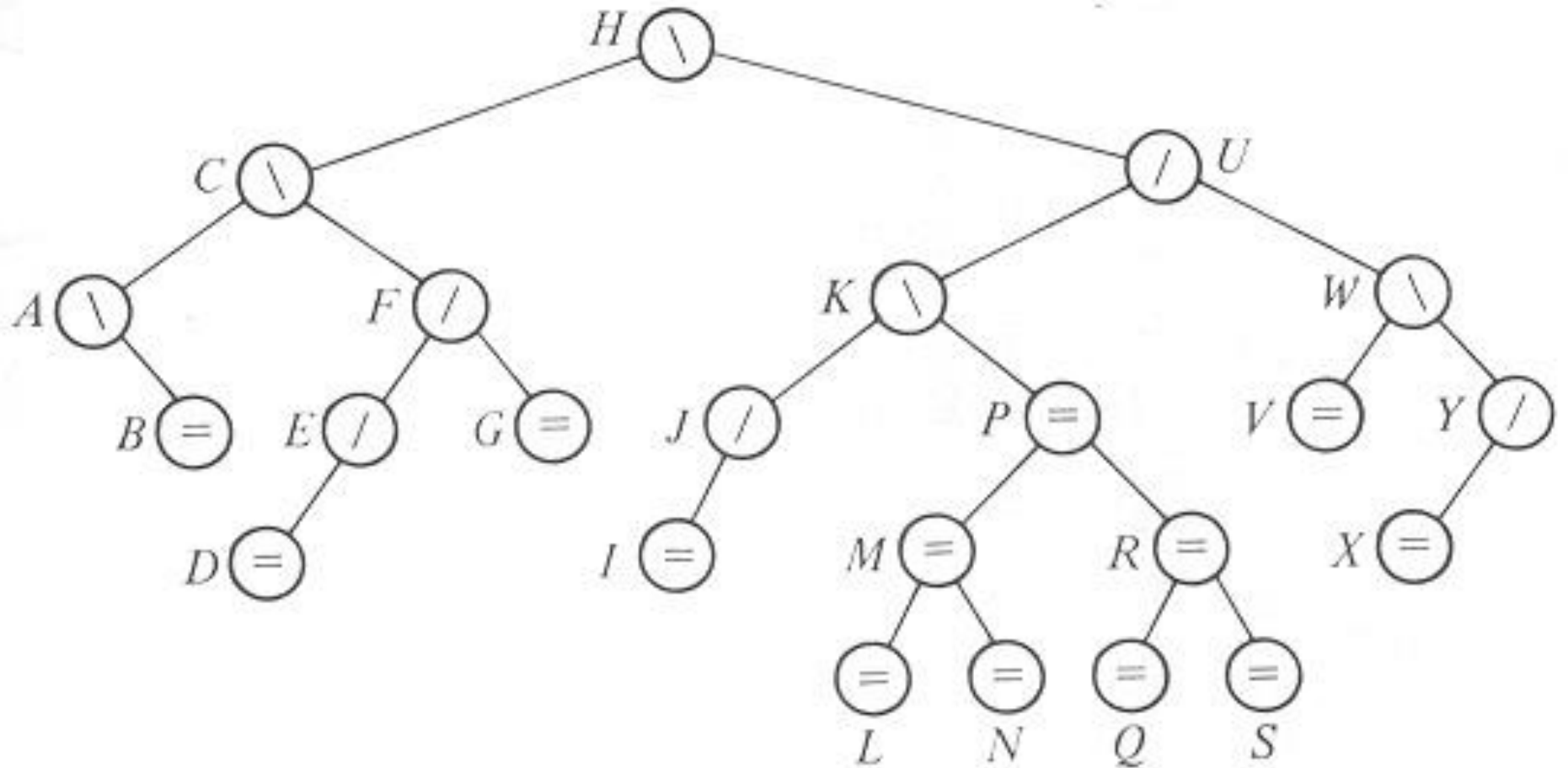
You will design a similar procedure for deletion (milestone 2)

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.

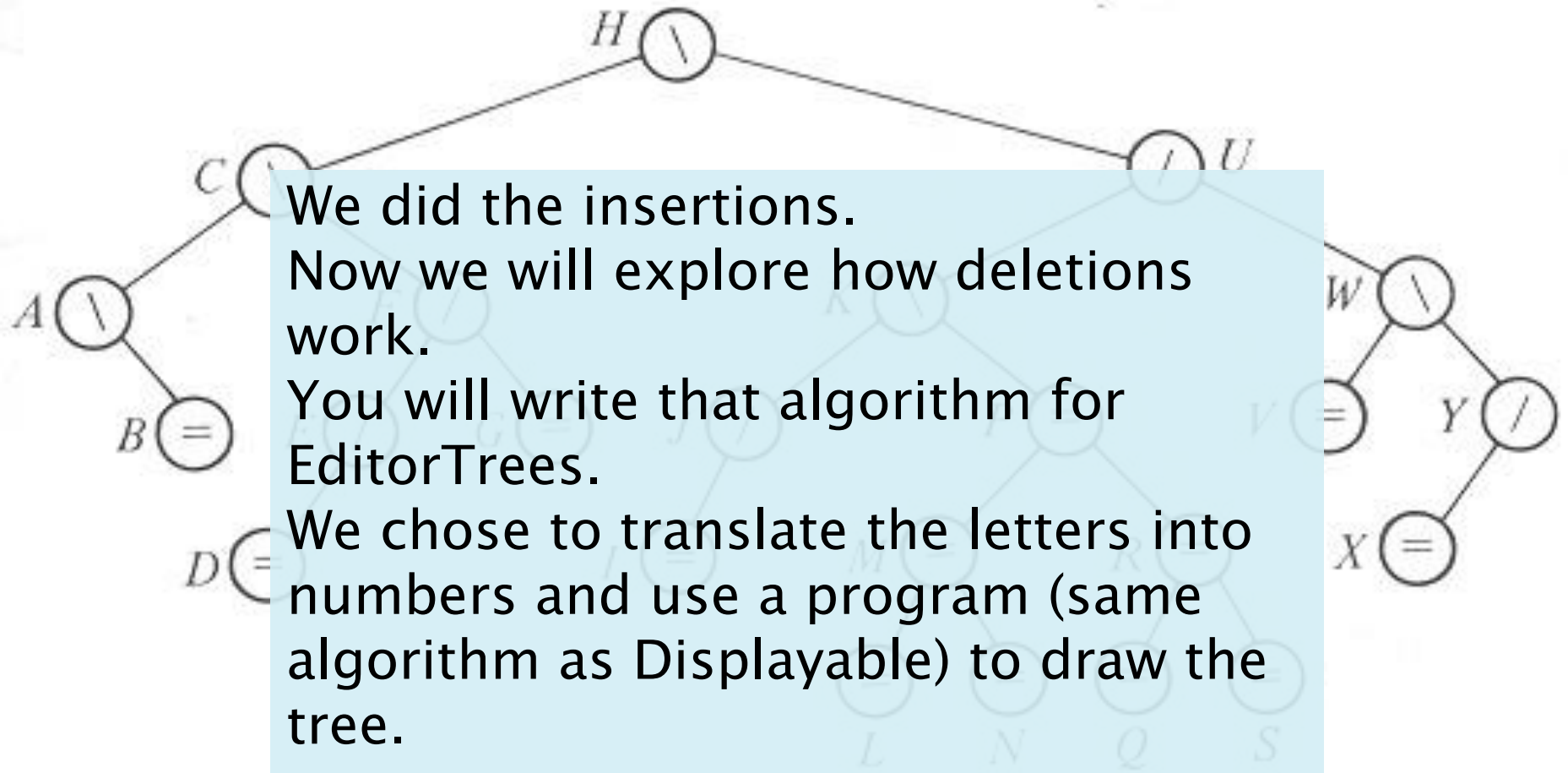
First link (down from A)	Second link (down from A's child)	Rotation type (rotate "around A's position")
Left	Left	Single right
Left	Right	Double right
Right	Right	Single left
Right	Left	Double left

A sample AVL tree



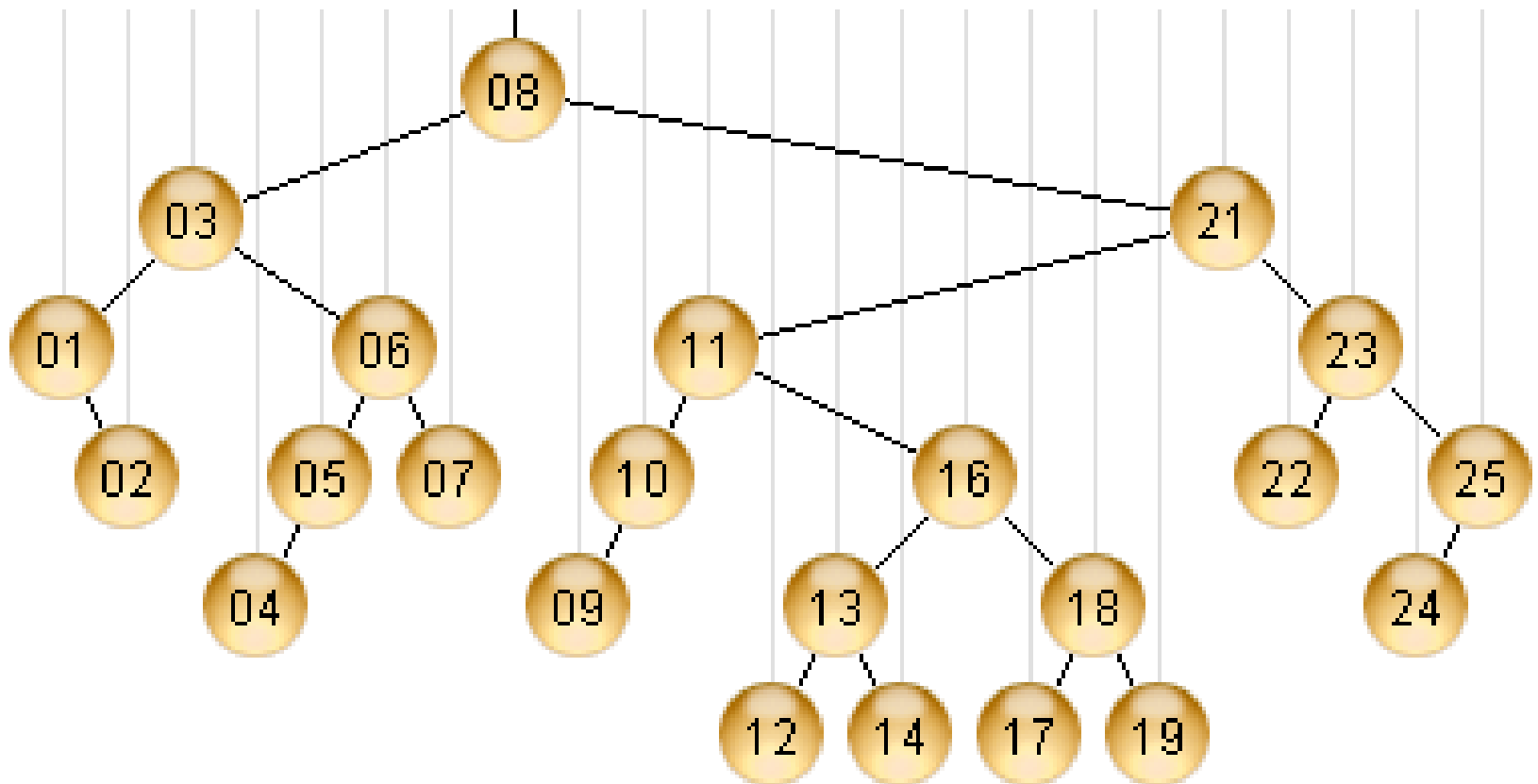
Insert **HA** into the tree, then **DA**, then **O**.
Delete **G** from the original tree, then **I**, **J**, **V**.

A sample AVL tree



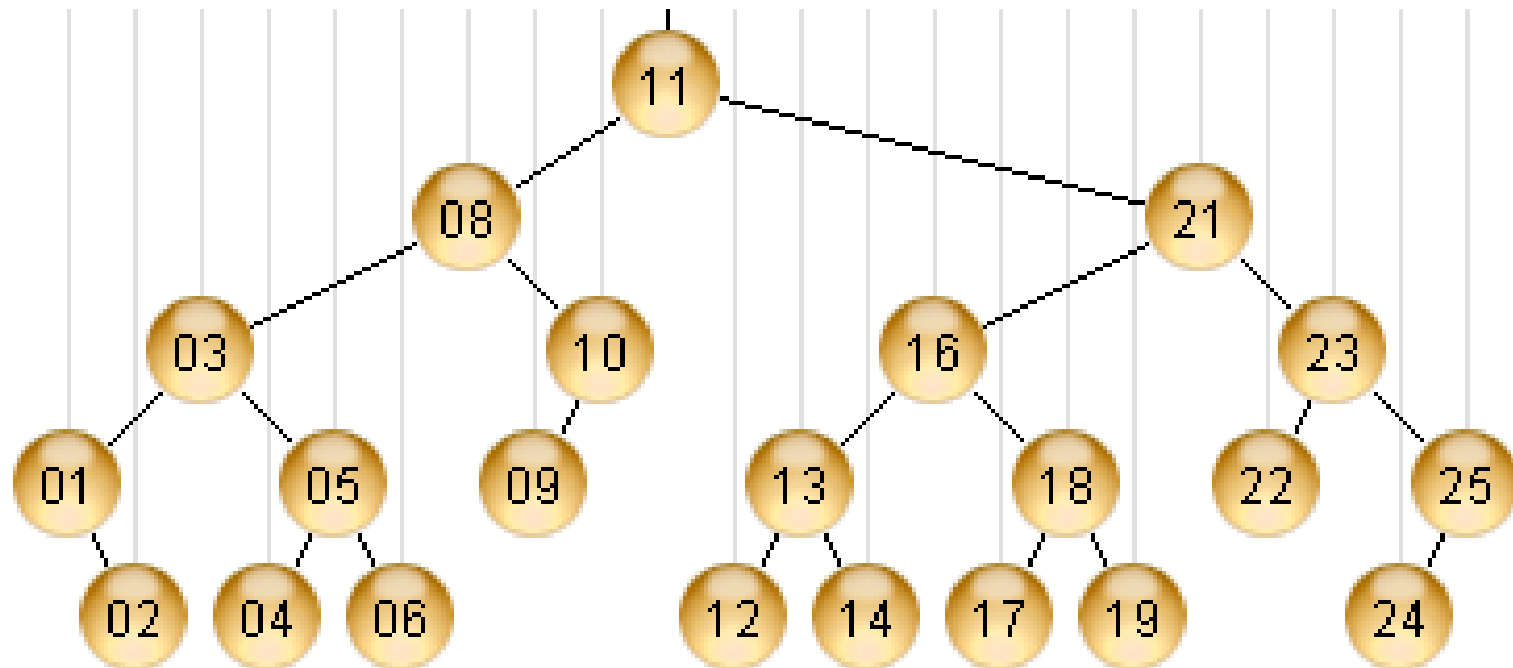
Insert **HA** into the tree, then **DA**, then **O**.
Delete **G** from the original tree, then **I**, **J**, **V**.

Delete 7 and Rebalance

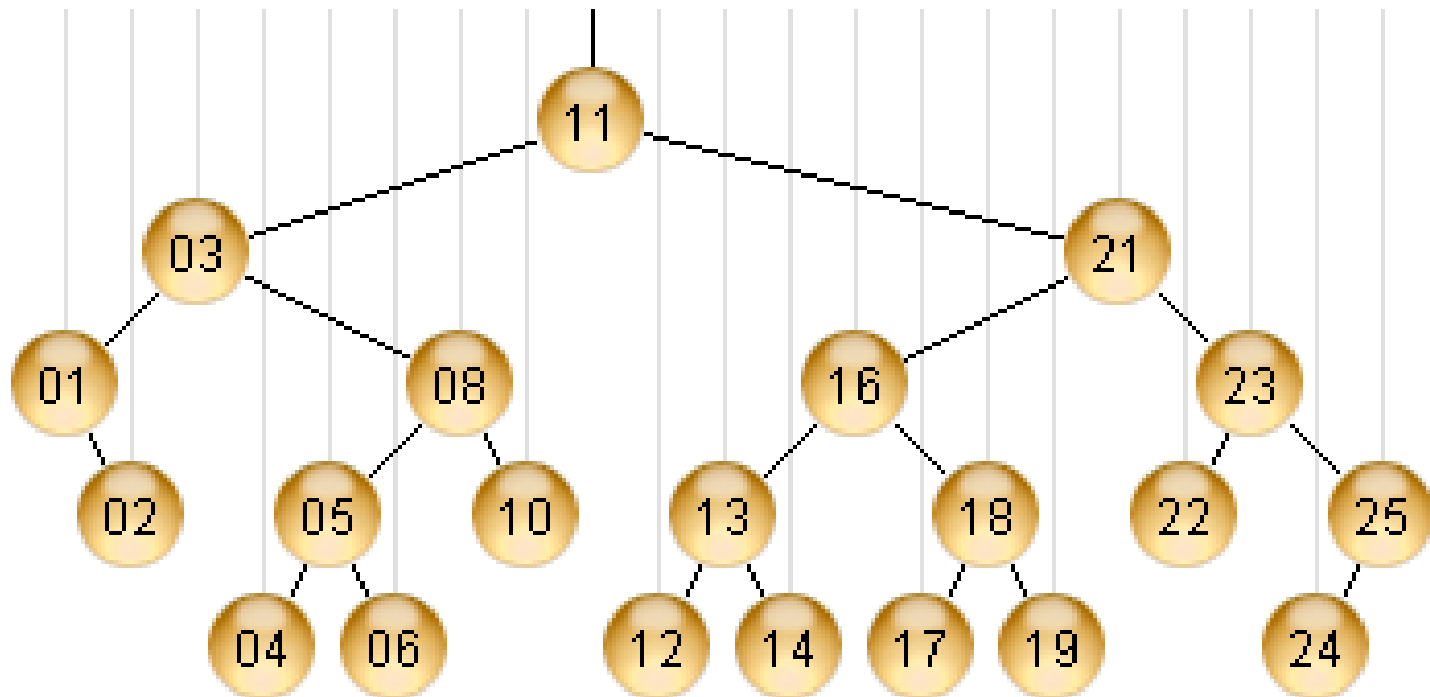


<http://webdiis.unizar.es/asignaturas/EDA/AVLTree/avltree.html>

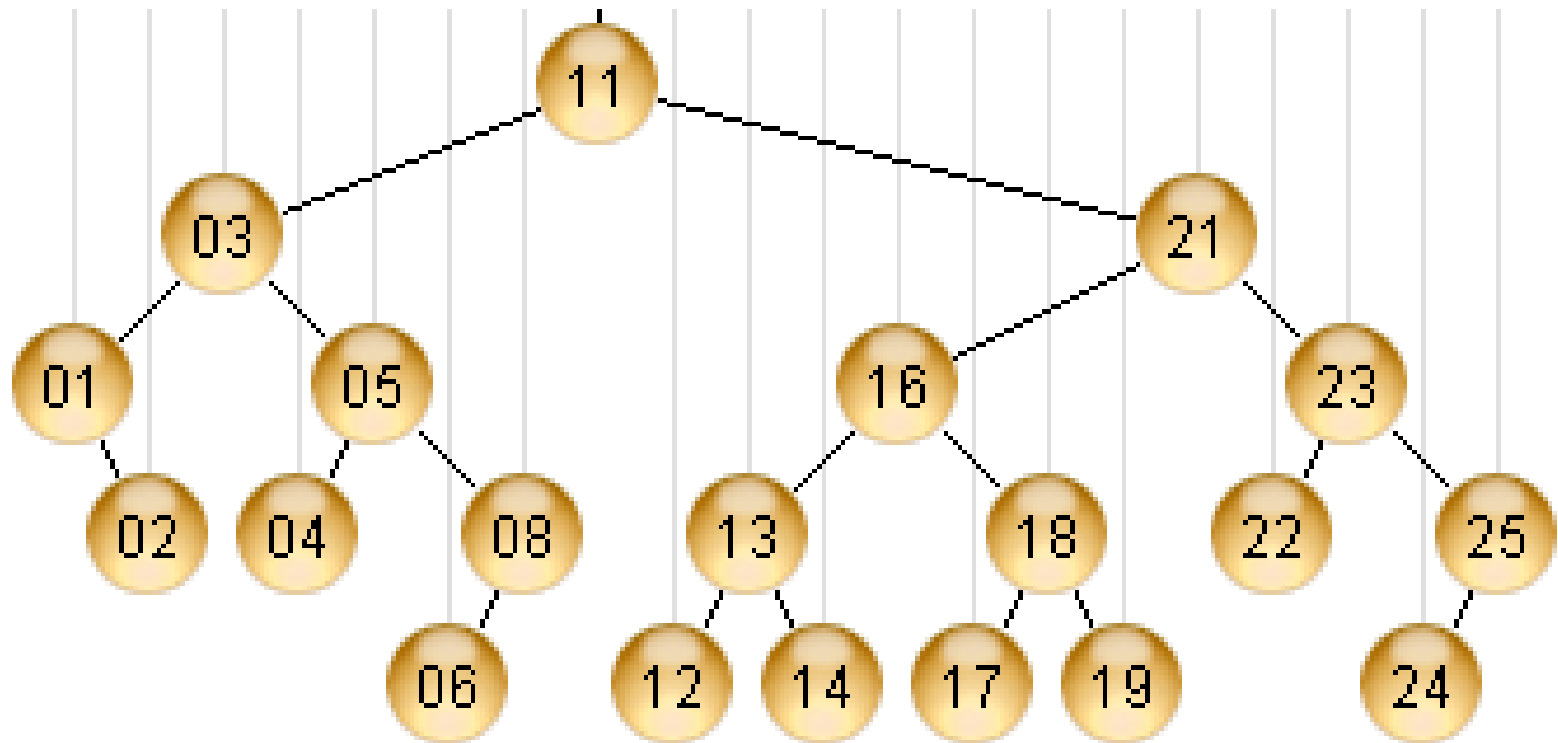
Delete 9 and Rebalance



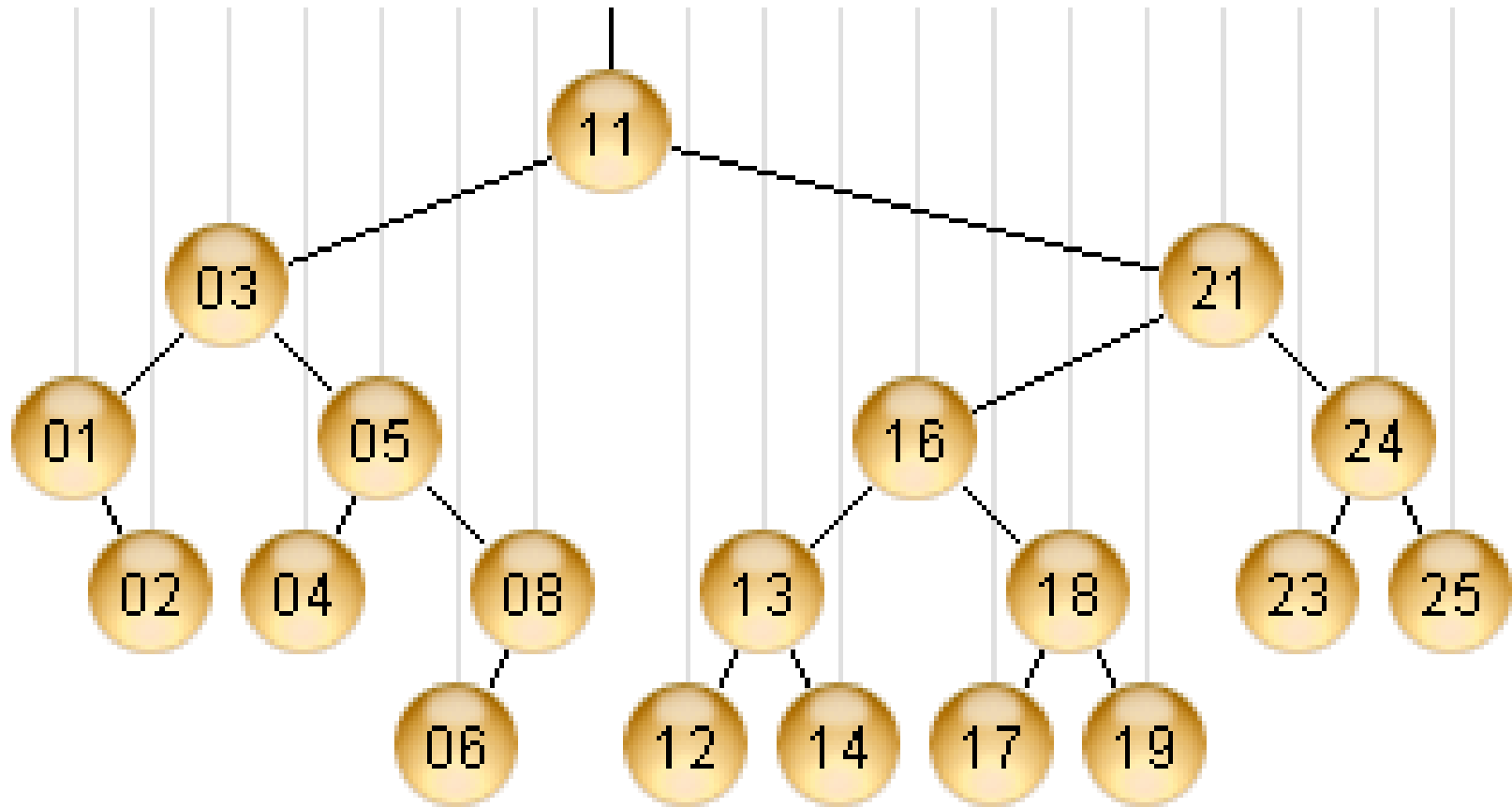
Delete 10 and Rebalance



Delete 22 and Rebalance



Final result



If you have time after the test

- ▶ Do today's in-class quiz silently while others finish the test
 - Check your work using the demo website at the given URL
 - It is due tomorrow.
 - Try to finish before then, but you may ask questions during class if needed.
 - If you finish the worksheet early, you may leave.