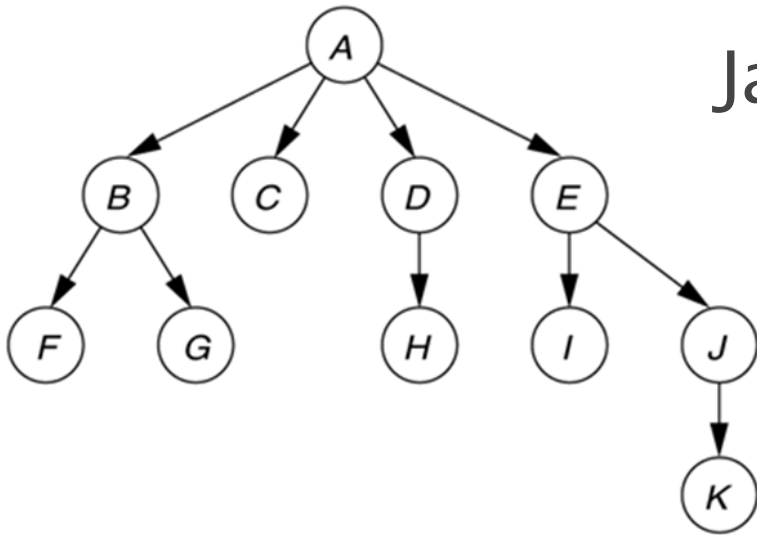


CSSE 230 Day 6

Java Collections Framework
Intro to Trees



Checkout BinaryTrees from SVN

Pay careful attention to the ACM Code of Ethics essay

- ▶ Part of written assignment 3
 - Examine the Code of Ethics of the ACM
 - Focus on property rights
 - Write a short reaction (up to 1 page single-spaced)
 - Details are in the assignment

Thoughts on Teaming

Two Key Rules

- ▶ No prima donnas
 - Working way ahead, finishing on your own, or changing the team's work without discussion:
 - harms the education of your teammates
- ▶ No laggards
 - Coasting by on your team's work:
 - harms your education
- ▶ Both extremes
 - are selfish
 - may result in a failing grade for you on the project

Grading of Team Projects

- ▶ I'll assign an overall grade to the project
- ▶ Grades of individuals will be adjusted up or down based on team members' assessments
- ▶ At the end of the project each of you will:
 - Rate each member of the team, including yourself
 - Write a short **Performance Evaluation** of each team member with evidence that backs up the rating
 - Positives
 - Key negatives

Ratings

Excellent—Consistently went above and beyond: tutored teammates, carried more than his/her fair share of the load

Very good—Consistently did what he/she was supposed to do, very well prepared and cooperative

Satisfactory—Usually did what he/she was supposed to do, acceptably prepared and cooperative

Ordinary—Often did what he/she was supposed to do, minimally prepared and cooperative

Marginal—Sometimes failed to show up or complete tasks, rarely prepared

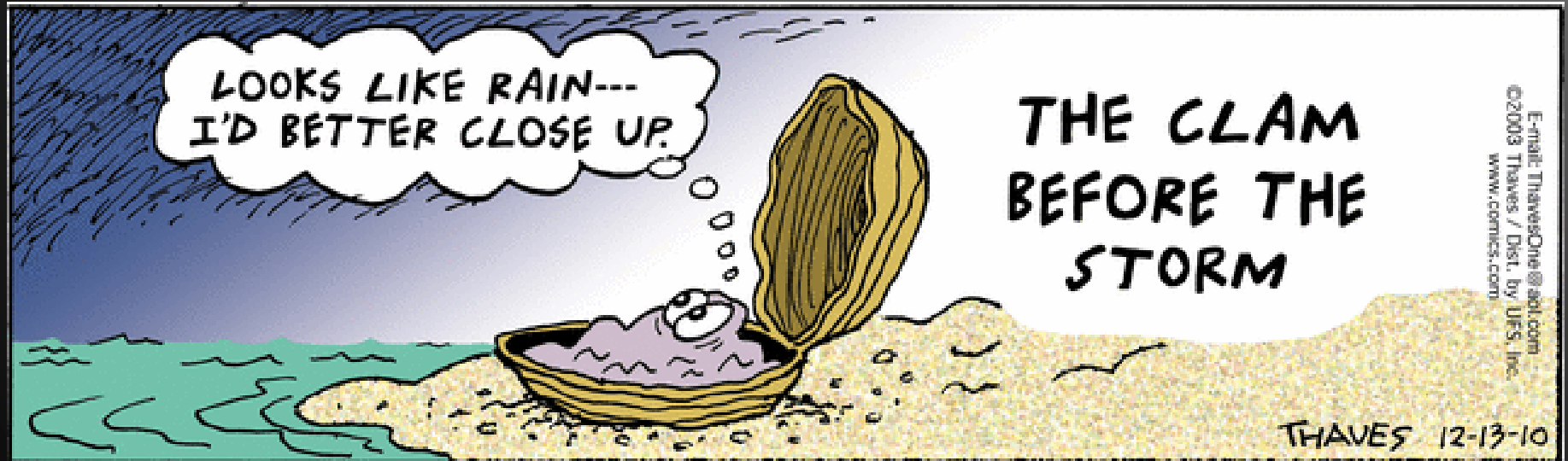
Deficient—Often failed to show up or complete tasks, rarely prepared

Unsatisfactory—Consistently failed to show up or complete tasks, unprepared

Superficial—Practically no participation

No show—No participation at all

Questions?



Reminder: Specifying an ADT in Java Q2

- ▶ Done with an interface, e.g., java.util.Collection

java.util

Interface Collection<E>

boolean **add**(E o)

Ensures that this collection contains the specified element (optional operation).

boolean **contains**(Object o)

Returns true if this collection contains the specified element.

boolean **isEmpty**()

Returns true if this collection contains no elements.

boolean **remove**(Object o)

Removes a single instance of the specified element from this collection, if it is present (optional operation).

int **size**()

Returns the number of elements in this collection.

Iterator<E> **iterator**()

Returns an iterator over the elements in this collection.

A “factory method”

Trees

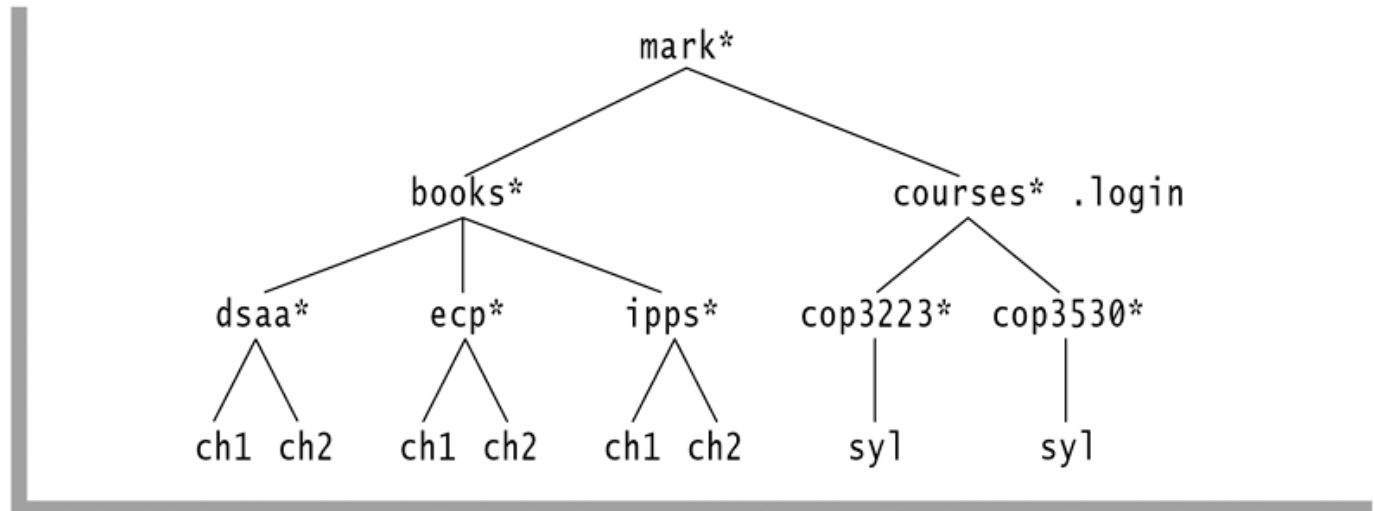
Introduction and terminology

Trees in everyday (geek) life

- ▶ Class hierarchy tree (single inheritance only)
- ▶ Directory tree in a file system

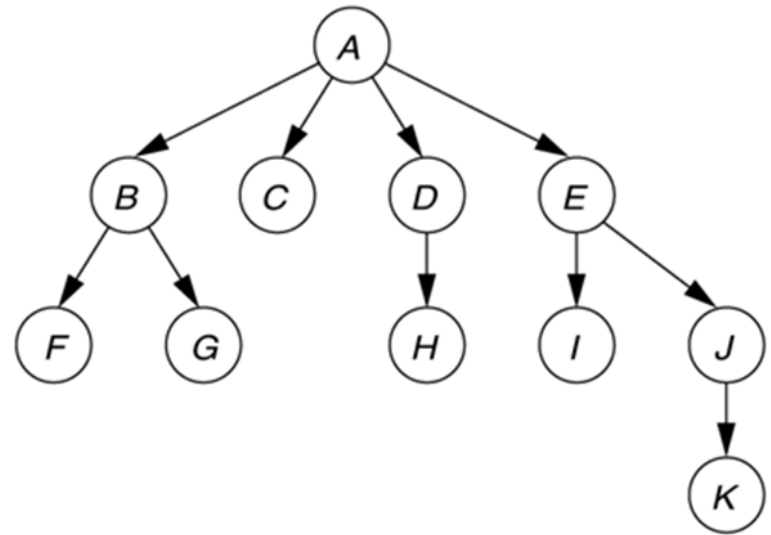
figure 18.4

A Unix directory



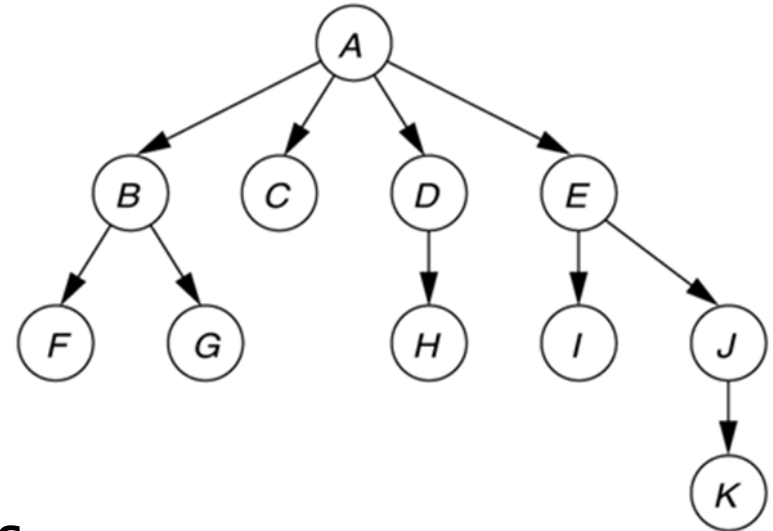
A General Tree—Global View

- ▶ A collection of **nodes**
- ▶ Nodes are connected by **directed** edges.
 - One special **root node** has no incoming edges
 - All other nodes have exactly one incoming edge
- ▶ One way that Computer Scientists are odd is that our trees usually have their root at the top!



Tree Terminology

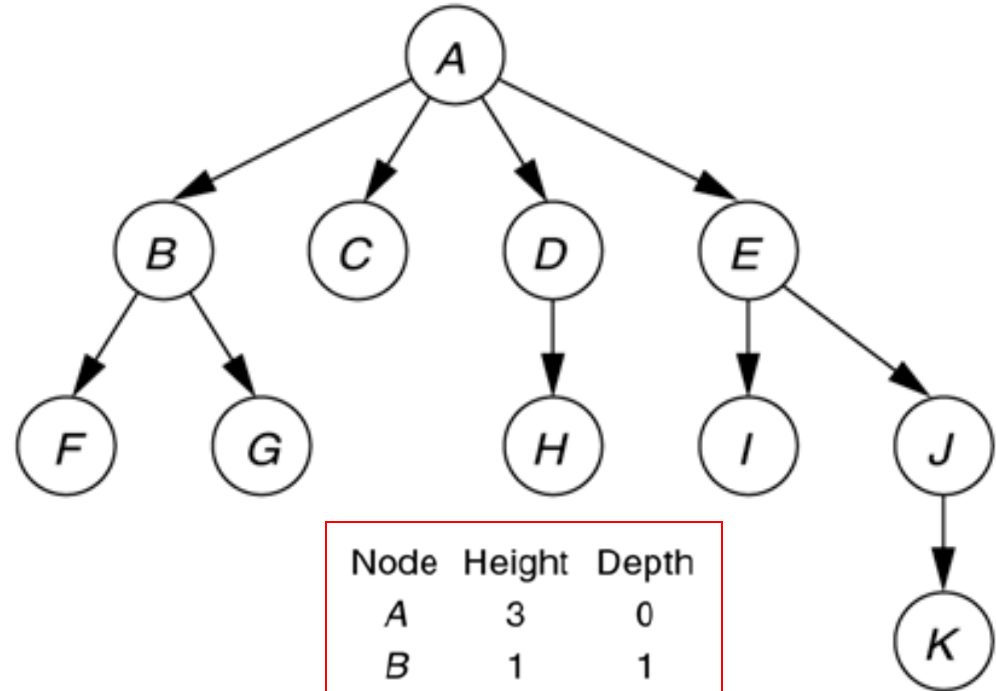
- ▶ Parent
- ▶ Child
- ▶ Grandparent
- ▶ Sibling
- ▶ Ancestors and descendants
- ▶ Proper ancestors, proper descendants
- ▶ Subtree
- ▶ Leaf, interior node
- ▶ Depth and height of a node
- ▶ Height of a tree



Node height and depth examples

figure 18.1

A tree, with height and depth information



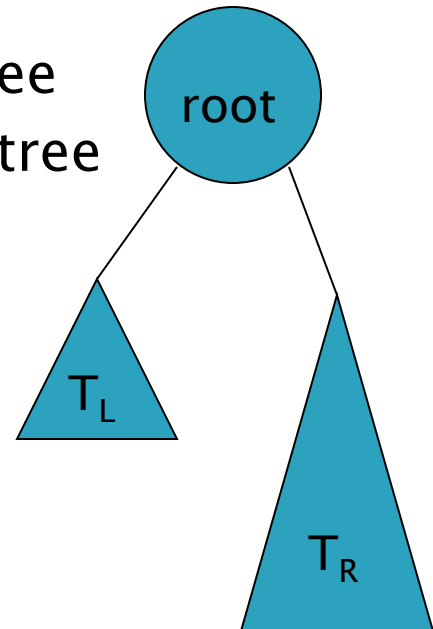
The height of a tree is the height of its root node.

Which is larger, the sum of the heights or the sum of the depths of all nodes in a tree?

Node	Height	Depth
A	3	0
B	1	1
C	0	1
D	1	1
E	2	1
F	0	2
G	0	2
H	0	2
I	0	2
J	1	2
K	0	3

Binary Tree: Recursive definition

- ▶ A Binary Tree is either
 - **empty**, or
 - **consists** of:
 - a distinguished node called the root, which contains an element, and
 - A left subtree T_L , which is a binary tree
 - A right subtree T_R , which is a binary tree



Growing Trees

Let's implement a *BinaryTree*<*T*> class including methods *size()*, *height()*, *duplicate()*, and *contains(T)*.