Programming Languages and Techniques (CIS120e)

Lecture 5
Sep 15, 2010

Binary Trees
Announcements

• Homework 2 is on the web pages.
  – On-time due date: Wednesday 22 Sept. at 11:59:59pm
  – Get started early, and seek assistance if you get stuck!
Recap: User-defined Datatypes

• Programming languages provide mechanisms that let you define new datatypes
  – Used to capture the abstractions of a problem domain (e.g. nucleotides, helices, phylogenetic trees)

• In OCaml:
  – Enumeration-style simple datatypes
  – Tuples
  – Nested (i.e. data carrying) datatypes
  – Recursive datatypes

• Today: more practice with recursive datatypes
  – Trees
A binary tree is either empty, or a node with at most two children, both of which are also binary trees.

A leaf is a node whose children are both empty.
Another Example Tree
Basic Tree Concepts

- **Height**: the length of the longest path from the root to a leaf
- **Size**: the total number of nodes in the trees

- **Traversal**: A pattern of visiting the nodes of the tree.
  - In order: left-child, node, right child
  - Pre order: node, left-child, right child
  - Post order: left-child, right child, node
  - Level order: in order of distance from the root
Demo: Binary Trees