

## Recursion and Trees

4-1-2002

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## Opening Discussion

- Any questions about the quiz?
- What did we talk about last class?
- Do you have any questions about assignment #4? What limitations have you found that you have had to place on the links that you find and traverse? Do you have a bit more respect for browser writers at this point?
- Assignment #5 is on the web.

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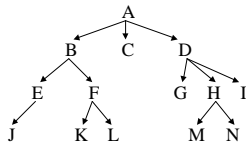
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## Minute Essay Answer

- Preorder - ABEJFKLCDGHMNI
- Postorder - JEKLFBCGMNHIDA



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## Why Recursion?

- Because in a tree every node can branch off to multiple other nodes just using a loop to go through the nodes becomes fairly difficult.
- Certain functions on trees are also most easily defined recursively in a manner that fits the recursive definition of a tree.
- Can you think of any examples of things other than traversals that are nicely defined recursively?

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## Simple Examples

- The book goes through the examples of height and size as things that are easily defined recursively for trees.
- Almost any example of a function that you want to define on a tree will turn out to be very easily defined/implemented recursively, but it will often be quite hard to define/implement without recursion.
- How would you define a leaf counting function?

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## Look Ahead - Sorted Binary Trees

- We have looked at binary trees for equation parsing. Your book also discusses general trees for file directories.
- The most generally used trees, however, are sorted trees. These can be done with different numbers of children, but a common format is the binary tree.
- In a sorted binary tree when you build it you put anything "less" to the left.

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## Code

- Now lets look at some code for a binary tree. We will focus in large part on how we can build recursive functions to calculate certain values.
- Keep in mind that you will be writing 2 trees for assignment #5. They will be slightly different from what we are doing today, but not too much so.

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## Minute Essay

- Write a method that we could use with today's code that returns the number of nodes in the tree that have only one child. This gives us a measure of how efficiently our tree is built. Lots of single child nodes makes it more like a linked list.
- Remember that assignment #4 is due today. Remember that the design for assignment #5 is due next Monday.

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