

## Last Day

12-9-2003

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## Opening Discussion

- What is a greedy algorithm? Do they work for all problems? If not, why not? What is the expected order of a greedy algorithm.
- Do you have any questions about the assignment?
- Do you have any questions about the review sheet of the final?

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## More Greedy Information

- Creating a greedy algorithm.
  - Determine optimal substructure.
  - Develop recursive algorithm.
  - Prove one of the optimal choices is greedy.
  - Show that all but one of the subproblems we create is empty.
  - Develop a recursive algorithm.
  - Convert the recursive algorithm to an iterative one.

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## Huffman Codes

- Probably the most interesting example of a greedy algorithm is Huffman codes. These are variable length encodings used for compression. Huffman codes are prefix code which we can denote as binary trees where the encoded characters are leaves and more frequent characters have smaller depths.
- The approach builds from bottom up taking the least frequent elements and merging them into one subtree. Once merged they are a new element with frequency equal to the sum of the children.

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## Review of Course

- So let's go over what you have learned (or should have learned) during the course of this semester.
- C++
- Lists
  - Single and double linked, circular or not as well as the use of sentinels to simplify the coding logic.
- Binary/Direct Access Files
  - How to store data quickly and efficiently.

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## Some Data Structures

- Hash Tables
  - This includes both linked and open addressing as well as different ways of constructing hash functions.
- Trees
  - We covered a bunch of trees, starting with binary search trees then balancing them in two schemes. Then we expanded to look at trees with more than two children including spatial trees and B-trees.

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## Graphs and Such

- We closed the semester talking about graphs and various algorithms on them.
  - Breadth-first and depth-first traversals
  - Minimum spanning trees
  - Shortest path algorithms
  - Maximum flow algorithms
- We closed by looking at techniques for making more advanced algorithms like dynamic programming and greedy methods.

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## Course Objectives

- More important than just a list of topics is whether the course met with the objectives. For this course I retained my general course objectives, but I also had some very specific ones.
  - I always want to make you think. I want to expand your mind so you see things in new ways.
  - I wanted this course to force you to become a stronger coder.

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## Minute Essay

- For your minute essay I want you to tell me what times are good for you for having a review session for the final in this class. Basically, do you want it tomorrow or Wednesday and what times work.
- After that you get to do course evaluations. Keep in mind that these are important and feed back on them is taken seriously.

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