The Final Exam will be 8 to 9:50 AM on Tuesday, May 4, in our normal classroom. It will be closed book and notes, except for **three** 8.5" x 11" sheet of paper (front and back) with notes. The exam will be comprehensive, but the majority of the points (65%+) will be from material since Test 2. The review topics for the Final since Test 2 are:

Chapter 20. Trees
Terminology: node, edge, root, child(ren), parent, sibling, leaf, subtree, path, branch, level, height
Binary Tree implementations: pointer-based vs. array implementations and performance tradeoffs
Applications/Usage: parse tree, evaluation of parse tree
Tree traversals: preorder, inorder, postorder

Binary Search Trees (BSTs): implementation of search (`searchNode` method), insertion (`insertNode` method), deletion (`remove` method) and traversals (`displayInOrder`, etc. method) plus their corresponding theta notation for each operation
Be able to draw the BST tree resulting from a sequence of insertions and deletions of keys.

AVL Trees: height-balanced property, balance factors (TL, EQ, TR), pivot node, left rotation, right rotation, double rotation
implementation of search (`searchNode` method), insertion (`insertNode` method), and traversals (`displayInOrder`, etc. method) plus their corresponding theta notation for each operation

Be able to draw the AVL tree resulting from a sequence of insertions of keys.

Hash Table
hashing terminology: hash function, hash table, collision, load factor, chaining/closed-address/external chaining, open-address with some rehashing strategy: linear probing, quadratic probing, double hashing
hashing implementation of dictionaries

File Structures
We talked about how the in memory data structures need to be adapted for slow disks.
From this discussion you should understand the general concepts of Magnetic disks:
- layout (surfaces, tracks/cylinders, sectors, R/W heads)
- access time components (seek time - moving the R/W heads over the correct track, rotational delay - disk spins to R/W head, data transfer time - reading/writing of sector as it spins under the R/W head)

Hash Table as a useful file structure

<u>B+ trees as a useful file structure - see web resources:</u>

http://www.sci.unich.it/~acciaro/bpiutrees.pdf

http://en.wikipedia.org/wiki/B%2B_tree

http://www.ceng.metu.edu.tr/~karagoz/ceng302/302-B+tree-ind-hash.pdf

Graphs
Terminology: vertex/vertices, edge, path, cycle, directed graph, undirected graph
Graph implementations: adjacency matrix and adjacency list
Graph traversals/searches: Depth-First Search (DFS) and Breadth-First Search (BFS)
Algorithms/applications utilizing graph searches: word ladder transformation, Dijkstra's algorithm (single-source, shortest path), Prim's algorithm (determines the minimum-spanning tree)
Other Graph algorithms: strongly connected component, topological sort
You should understand the graph implementations and algorithms listed above. You should be able to trace the algorithms on a given graph.