Knowledge and Skill Outcomes for CS163 Data Structures

Nodes and labels in the diagram:

- C++ Syntax: Classes, New/Delete, Linear Linked Lists
- Exposure to: Recursion
- Fluency with: Pointers and Dynamic Memory
- CS163
- Skill_Outcomes
- Knowledge_Outcomes

Skill Outcomes:
- B8_Assess_New_Developments
- B7_Perform_Quantitative_Analysis
- B3_Use_Analytical_Techniques
- A5_Manage_Persistent_Data
- B10_Technical_Documentation
- B6_Debug_and_Test
- B2_Develop_Program_Designs
- B4_Adapt_Algorithms_and_Data_Structures

Knowledge Outcomes:
- A3_Programming_Languages
- A4_Algorithms
- A9_Computing_and_Society
- A10_Ethical_and_Legal_Responsibilities

Numbered Outcomes:
1. Apply data abstraction in a C++ programming problem.
2. Become proficient at evaluating the benefits and drawbacks of their design in terms of memory and run time efficiency.
3. Select the proper sorting algorithm for a problem.
4. Design solutions using Data Structures
5. Apply Data Abstraction.
6. Evaluate both static and dynamic implementations of lists, stacks, queues, hash tables and trees.
7. Evaluate the performance tradeoffs between binary search, 2-3, 2-3-4, red-black, B-trees, and AVL trees.
8. Build and traverse data structures to manage a simple graph using non-linear data structures.
9. Apply recursion and key transformations.
10. Make judgments about the practical and social application of algorithm concepts as they apply to large scale programming projects.

List ADTs:
- Ordered Lists
- Stacks
- Queues

Table ADTs:
- Binary Search Trees
- Hash Tables
- Graphs

- Recursive Sorting Algs.
- Iterative Sorting Algs.
- Merge Sort
- Quick Sort
- Insertion, Selection, Shell, Radix, Exchange
- Balanced Trees

- Design and Implement classes using linear linked lists, circular linked lists, doubly linked lists
- Design and Implement classes using pointer based (non-linear) binary search trees, arrays of linear linked lists.

- Social
- Ethical

Right-side nodes:
- Implement Data Structure
- Implement Non-Linear Linked Lists
- Evaluate Tradeoffs: Memory and Run time Efficiency
- Apply Key Transformations
- Implement Arrays of LLL
- Implement Adjacency Lists
- Apply Recursion
- Explain Overview of Algorithms
- B-Trees
- 2-3 Trees
- 2-3-4 Trees
- AVL Trees
- Red-Black Trees

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