CS 2420 Test Study Guide

- C++ concepts:
  - Be able to read C++ code and know what it will do.
  - What is a class and what is an object. What are methods and data members.
  - How do you define a method outside of the class?
  - What are static data members, and what use do they have? (Not covered on test)
  - What are constructors and destructors. How to overload constructors. What are copy constructors. Can you call constructors and destructors directly?
  - How to overload methods.
  - How to overload operators.
  - What are template classes, and what are the rules associated with them?
  - Know what C++ arrays are, how to work with them, how they are managed, and how fast they are in comparison to other collections. How pointers and arrays are two ways of working with the same thing.
  - How to work with pointer arithmetic.
  - Know the differences among a regular pointer, a shared pointer, and a unique pointer.
  - What is an L-value and an R-value? How do you turn an R-value into an L-value?
  - What is pass by value, pass by reference, and pass by R-value reference.
  - Using move semantics, move constructors, and move assignment operators.
  - The difference between public, protected, and private. (Not covered on test)
  - What friend does. Are friended functions members of a class? (Not covered on test)
  - How inheritance works. Can you access public, protected, and private data from the base class? (Not covered on test)
- Know the difference between the stack and the heap. How the allocation and deallocation process works.
- Arrays and their strengths and weaknesses.
- Stacks. Common methods for stack objects, and how to implement stacks.
- Queues. Common methods for queue objects, and how to implement queues.
- Linked lists.
  - Their strengths and weaknesses
  - Know how to write methods to add, locate, and delete nodes.
  - Be prepared to write methods for singly linked lists and doubly linked lists.
- Explain what an iterator is, and why it is useful.
- Understand hash algorithms. What does hashing mean? What makes a good hash algorithm? What are hashing collisions?
- Hash tables.
  - Their potential speed and memory usage.
  - Differences between closed hashing (such as array-based) and open hashing (such as linked list-based). The full process for inserting and retrieving data.
  - What does it mean if there is a collision in a hash table?
  - What is the main benefit of Cuckoo hashing, and at what cost?
- Big O
  - Understand its overall purpose and “ranks”.
  - Identify Big-O complexity (speed) based on simple algorithms.