CptS 122 – Data Structures

Final Exam Review Guide

This document will serve as a guide to help you prepare for the final written exam in CptS 122. You will find information about the exam format and topics you are expected to review within this guide.

What to Bring?
- Your WSU ID
- Two sharp pencils
- Calculators and other notes may **not** be used during the exam!

Exam Timeframe

The final exam is scheduled for **MON, Apr 28, 8:00 – 10:00 am**. It will be held in our normally scheduled classroom location. Note that, when you hand in your exam, you will be required to present your WSU ID to the exam proctor.

Exam Format

Expect the final exam to look a lot like the two midterms, except that it will be longer, because **you will have a full two hours** to take the exam, rather than one hour. There will be a mix, of true-false, fill-in-the-blank, multiple-choice, and short answer/code questions that test your knowledge of key concepts. Expect also to supply short code snippets, and to trace through C/C++ code segments and specify their output.

Exam Coverage

The exam is comprehensive, covering all the material we have explored in this course.

Topics that are fair game from midterm #1:

- See the midterm #1 exam review for a list of topics that are fair game. In other words, all of the material covered in the first five weeks of the course is fair game.

Topics that are fair game from midterm #2:

- See the midterm #2 exam review for a list of topics that are fair game. In other words, all of the material covered in the second five weeks of the course is fair game.

The following is a list of exam topics covered in the final five weeks of the course:

Chapter 11: Object-Oriented Programming: Inheritance

- What is inheritance? When should we apply it?
  - Recall inheritance applies a "is-a" relationship
- Define, implement, and apply *base* and *derived* classes
  - Other terms include: subclass, superclass
- Describe when to apply the *protected* access specifier
- Describe the different inheritance access specifiers of C++ (i.e. public, protected, and private)
- What is *single, multiple, hierarchical, multilevel,* and *hybrid* inheritance?
- Describe the *diamond* problem

Chapter 12: Polymorphism

- Define the term *polymorphism*
- What is a *virtual* function? What is a *pure* virtual function?
- Provide an example of when/how polymorphism should be applied
- Define *abstract* class and *concrete* class
- What is a virtual function table or *vtable*?
- Implement and apply polymorphism
- How does polymorphism apply to computer game creation?

Chapter 17: Exception Handling

- Define what is an *exception*
- Implement and apply exception handling to C++ programs
- List and identify standard library exception classes (i.e. logic_error, runtime_error, etc.)
- Discuss when to apply exception handling

Chapter 20: Searching and Sorting

- What is Big-O notation?
- What is the meaning of constant, linear, and quadratic runtime?
- Identify the runtimes for linear and binary search, and insertion, selection, and bubble sorts in the best, average, and worst-case
- Identify the runtimes for operations applied to lists, stacks, queues, and BSTs; these include both array and linked implementations of these data structures; what is the runtime for insertFront (), insertEnd (), insertInOrder (), deleteFront (), deleteEnd (), deleteN (), etc.

Other Material

- What is *UML*?
- When should we *apply* UML diagrams?
- Construct and apply UML *class* diagrams
- What is the Standard Template Library (STL)? (Chapter 15.1 – 15.5)

Recommended Strategy for Preparing for the Exam

I recommend that you use the following activities and materials to prepare for the exam:

- **Review quizzes and lab exercises**: These may well be your best resource. An excellent learning activity would be to retake the quizzes and review the lab exercises.
- **Lecture slides and example code**: Study the lecture slides and example code. Continue to complete extra coding examples on your own time.
- **Read the textbook:** Read or re-read chapters 1 – 3, 6, 7, 9 - 12, 14, 15, 17 - 19, and 20 in your textbook. Solve the end-of-chapter exercises.