Advanced Programming in C++

CPE 2.216

Mondays 7:00 to 8:00pm

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Office hours: TTH 1:00-2:00p.m - EER 2.628

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T 12:30-1:30p.m

F 12:00-1:00p.m - EER 2.628

Overview

In this workshop, we will introduce you to the C++ programming language, explore advanced programming techniques, work with fundamental data structures and algorithms, and apply these tools to solving complex problems.

Prerequisites

While everyone is welcomed to attend and participate in this workshop, it is recommended that students have a knowledge of basic programming concepts (in any programming language). If you've seen basic control structures (loops, if statements, etc.), variables, arrays, and program decomposition, then you should be ready to take this workshop.

Course Website + Slack

Course materials, handouts and relevant resources will be posted on the workshop's website located at **www.cadtexas.com/workshop/cplusplus**. In addition, we will be using Slack to post announcements and answer questions throughout the semester. You will be invited to join the Slack group after the first week of class.

Readings

The suggested textbooks for this workshop are:
* Primary: Eric Roberts' *Programming Abstractions in C++*
* Supplementary: Nicolai M. Josuttis' *The C++ Standard Library*

Note: Electronic versions will be posted on our website.

Required Software

This workshop will support all major platforms (Windows, Mac, and Linux). We will provide handouts describing how to get a C++ development environment set up on your machines. It is recommended that you bring your personal laptop to class as we will be working on programming assignments during lectures.

Assignments

There will be seven programming assignments over the course of the semester, each of which will give you a chance to apply the material from lecture and build progressively more complex pieces of software.

Course Schedule

Below is a tentative schedule for the workshop. Depending on how quickly we're able to make it through the material, we may end up spending more or less time on each of these topics. Readings should be done before the lecture for which they are assigned.

Date	Topics	Suggested Readings	Assignments
9/19	Introduction	Ch. 1	HW 0
9/26	C++ Basics: Functions, Strings	Ch. 2, 3	
10/3	C++ Basics: Vectors, Grids; Stanford Library	Ch. 4, 5.1, 5.2	HW 1
10/10	Data Structures: Stacks, Queues	Ch. 5.2, 5.3	HW 2
10/17	Data Structures: Sets, Maps	Ch. 5.4 - 5.6	
10/24	Recursion: Introduction, Fractals	Ch. 7, 8.4	HW 3
10/31	Recursion: Backtracking, Memoization; Sorting	Ch. 8.2, 8.3, 9, 10.1, 10.2	HW 4
11/7	OOP: Structs/Classes, Pointers	Ch. 6, 12	
11/14	OOP: Dynamic Allocation, Linked Lists, Implementing Vector	Ch. 11, 14.4	HW5
11/21	**THANKSGIVING BREAK**		
11/28	Trees: Introduction, Binary Search Trees, Binary Heaps	Ch. 16.1 – 16.3	HW 6
12/5	Graphs, Search Algorithms: DFS, BFS, Dijkstra, A*	Ch. 18	HW 7