CS253

Module 1 - Introduction

Module Topics

- Review the course syllabus
- Review Blackboard
- Introduce git and the backpack system
- Flipped class intro - This class is a bit different that a traditional lecture
- What is Systems Programming?

Active Learning

- Evidence-based instructional practice proven to increase student motivation and comprehension.
- You are responsible for reviewing material before class.
- We make sure you have a basic understanding before we jump into more complicated material.
- You get instant feedback (Blackboard).
- Our class discussion is based on what you need.

What is Systems Programming

- Systems programming can encompass a broad spectrum of engineering activities.
- Given the broad spectrum we are going to focus on writing native programs that use features that are not defined in the C Standard Library.
    - Don’t worry we will still be using the C Standard Library but as you will see this semester the C Standard library is very small.
- Shell programming in Bash and Powershell are also a type of system programming and will be covert only briefly.

What is Systems Programming

- For this class we are going to define systems programming programming in the following ways.
    - **Code written in the C programming language**. Using C makes library linking, memory layout, system data types, and data marshaling easy because the OS is written in C
    - **Applications directly call the operating system API**. This is known as a system call.
        - Posix and Win32 are the two big system level API's that we will explore this semester.
    - Your code will not be portable between Linux, Windows, and OSX. Your code will work for one particular system (Ahhh now we can see the motivation behind Java and C# !!!)

Why C

- C is the most widely used systems programming language (followed by Java and C++)
- All production operating systems (non-research) are written in C and we will use the same language
- C is low-level and procedural while Java is high-level and object-oriented. Knowing these two languages gives you a strong basis for learning other languages down the road
- Overall, Java and C are the two most commonly used languages in the industry.
- Internship and job interview questions are mostly based on CS 121, 221, 253

Hello World

- Let’s write hello world in class!
- We will compile this program directly.
    - **All future programs will be compiled with a build tool** (make, cmake, etc.) Your code will not be graded if a Makefile is not submitted. Hello World is the only program that we will be compiling with gcc directly.
- The main prototype is more flexible than Java (all are valid)
    - main(){} // Don’t use really really old style C
    - int main() {} // Don’t use unspecified args
    - int main(void) // OK to use

Compiling manually

- gcc -Wall helloworld.c -o helloworld
  - The compiler is called gcc, which stands for the GNU C Compiler. It is a free, open source compiler that is widely used
  - Creates an executable named a.out
  - Type ./a.out to run the program
  - The option -Wall asks the compiler to provide all warnings about the code, which can save us a lot of effort later!
    - Remember that -Wall isn't actually ALL the possible warnings.

In class activities

- Get backpack setup - you have class time to do this in the lab :) The TA's and instructors will be here to help
- Start working on project 0 that was assigned in Blackboard. You will be writing hello world.
    - The purpose of this assignment is to make sure your system is setup correctly
    - Also we get to write our first program!
- Don't forget to push your code after you are done or your instructor will not see what you have done!