CS110 Practice Midterms

Midterm Details

- Date: Tuesday, July 23rd
- Time: 6pm - 8pm
- Location: Hewlett 201

The exam is closed book, closed note, closed electronic device. I will provide you with all of the C function prototypes and C++ classes that might be relevant to a particular problem, and you can always ask a CS110 staff member during the exam if you want to use a core C function or C++ class we didn’t provide. Caveat: You are permitted to populate both sides of a single 8.5” x 11” sheet of paper with as much material as you can cram into it.

The exam will, of course, focus on the concepts we’ve learned up to and including the material taught on July 17.

Material

Here’s the impressive list of topics you should be familiar with:

- You should understand how `open`, `read`, `write`, `close`, `dup`, `dup2`, `stat`, and `lstat` all work.
- You should understand file descriptor tables, the file entry table, the vnode table, and what type of information is stored in each.
- You should understand the UNIX v6 file system concepts, data structures, and layers you coded against for Assignment 1.
- You should be familiar with `fork`, `waitpid`, all of the various status macros, `execvp`, `signal`, signal handlers, signal blocking and unblocking, `kill`, `raise`, process ids and process groups, `pipe`, `pipe2`, and pipes.
- You should be familiar with the various concurrency issues that can come up as a result of a single code base controlling multiple processes.
- You should understand threading and the related concurrency issues that may arise.
- You should have a basic understanding of how virtual-to-physical memory mapping works and how it’s used to allow all processes to operate under the illusion that each owns its full virtual address space.
- You should have a basic understanding of how the OS scheduler works.
- You should understand your implementations of `pipeline`, `subprocess`, `farm`, and `stsh` from Assignments 2 and 3.
- You should understand all of the material in the lab handouts (although I will not test you on anything regarding tools —i.e. `g++`, `gdb`, `valgrind`, `info`, the `/sys/proc` pseudo filesystem, etc. will not come up).

Practice Midterms

I’m presenting a collection of problems across four sample midterms that represent the type I might give on your midterm. I’ll write the exam with the idea that it can be completed in a little over an hour, but I’ll allow you 2 hours with the hope that there’s virtually no time pressure.
Understand that we're under no obligation to replicate the structure of these practice midterms while writing yours, as I'm only trying to give you a sense of what some CS110 midterm problems have looked like in the past. In fact, your midterm will likely be very different from these (less handwritten code required). Note that some of the problems from the practice exams have been cannibalized to contribute to your lab handouts. Even though lab is optional this quarter, I should be able to ask you any of those questions again and hold you responsible for their answers.

Here are links to the four practice midterms and their solutions:

- Practice Midterm 1 [solution]
- Practice Midterm 2 [solution]
- Practice Midterm 3 [solution]
- Practice Midterm 4 [solution]