CS 3411 Systems Programming

Department of Computer Science
Michigan Technological University

Introduction
CS 3411 Systems Programming

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Office Hours: By appointment only. E-mail me with the subject “CS-3411” and indicate the times/days that won’t work you. I will get back to you with a Zoom meeting invite.

Class attendance is mandatory. Attendance will be taken.

No electronic devices can be used during lectures and exams (unless required for health reasons).

If we go back to remote teaching, only the device providing connectivity can be used.
Operating Systems

We all use operating systems
Operating systems interact with devices directly
Provides programmer friendly interface by:
- Masking low level hardware interface
- Supplying abstractions
- Exporting a *system call* interface for user interaction with system resources

Different for each operating system!

We will see each of these aspects in the context of programming.
Operating Systems

Operating systems also protect resources
  Data of one user from other users
  Memory of one program from another
  Keeps the processor from being monopolized.

How?
What is Systems Programming?

Not a very well defined term!
Part systems administration
Includes:
  Creating and maintaining a platform for users
  Use the system call interface
  Code that operates in a privileged mode
Course Topics

1. O/S fundamentals
   1. Program-O/S interaction
   2. Program image in memory
   3. Process abstraction
2. Unix file system interface
3. Processes
4. Linking, Libraries
5. Inter-process communication
6. Signals, pipes, sockets
7. Terminal I/O
8. Additional tools if time allows!

Review C Programming Language.
Course Text


We’ll be using slides, notes, manual pages and sample programs during class

Other useful references:
  ► C: A Reference Manual, (5th ed.), Harbison and Steele
Grading

Programs (5) - 60%

Earlier programs will be worth less in terms of points overall
   2 late days across all assignments
   You may use at most one late day per assignment
   After slip days used, 20% per day (including Saturday and Sunday)

Tests (2) - 40% (20%, 20%)
Programming Expectations

Work independently!
  Don’t show your code to anyone
  Don’t look at code from anyone (including on the Internet!)
  Can have ’empty hands’ discussions

No copying code from Web unless explicitly stated.

Make an effort to design and debug your own code!

Read manual pages!
  You may use code found in examples from class
  You may also use code that appear on manual pages
Programming Expectations

For program assignments to get full points, it must:

- Perform specified function correctly
- Always terminate normally (except on certain signals)
  
  Program is responsible for checking the sanity of input!
- Avoid internal errors, e.g., memory leaks, buffer overflows, etc.
- Reasonably efficient
- Well documented and well formed

Unless otherwise specified, assignments must be done in C and will be graded on a Linux system

- You may use your own machine for development, but make sure your code runs on the lab machines!
- Be especially wary of OSX computers!