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CMSC216-030x (Fall 2024) Introduction to Computer Systems

Introduction

The goal of the course is to convey the fundamental concepts that enable programs to execute on real hardware. Those concepts include how the operating system virtualizes the hardware to provide basic services and abstractions to enable a user program to effectively use the available hardware resources. The course also addresses how different programming constructs and idioms work.

The basic abstraction of a program running as one or more threads of control in a single flat address space (a Unix process) is the key to the course. Emphasizing that abstraction as the underlying model for understanding how a program works, from both the user program and hardware perspective (with the OS in between), runs as a theme through all topics in the course. Examples include C pointers (to data and functions), function calls and runtime stack management, dynamic memory management in the heap, and the fork/exec system calls.

Prerequisites

Prerequisite → C- or better in CMSC132 and MATH 141
Credits → 4

Administrative Information

- **Instructor (Section 030x): Ilchul Yoon**
- **TAs:** Details will be available in Piazza. (Access code will be available in the first ELMS announcement)
- **Lecture schedule:**
  - First Lecture: Tuesday, August 27, 2024
  - Last Lecture:: Thursday, Dec 5, 2024
  - Time: **TuTh 12:30 pm - 1:45 pm**
  - Location: SKN 0200
  - **Lectures will be in-person.**
- **Lab (Discussion) schedule:**
  - First Lab: Monday, August 26, 2024
  - Last Lab:: Monday, Dec 9, 2024
  - Time/Location:
    - 0301: MW 8:00am - 8:50am (IRB 2107)
    - 0302: MW 9:00am - 9:50am (IRB 2107)
    - 0303: MW 9:00am - 9:50am (IRB 2207)
    - 0304: MW 10:00am - 10:50am (IRB 2107)
    - 0305: MW 11:00am - 11:50am (IRB 2107)
    - 0306: MW 11:00am - 11:50am (KEB 1200)
    - 0307: MW 12:00pm - 12:50pm (IRB 2107)
  - **Lab hours will be in-person.**

Textbooks

- C Programming: A Modern Approach, 2nd Edition by K.N. King
  Publisher: W. W. Norton & Company (Recommended)
  ISBN-13: 978-0393979503
  ISBN-10: 0393979504
- Computer Systems: A Programmer's Perspective, 3rd edition
  by R.E. Bryant and D. R. O'Hallaron (Recommended)
  Publisher: Pearson

ISBN-13: 978-0134092669
ISBN-10: 013409266X

Course Topics (Subject to Change)

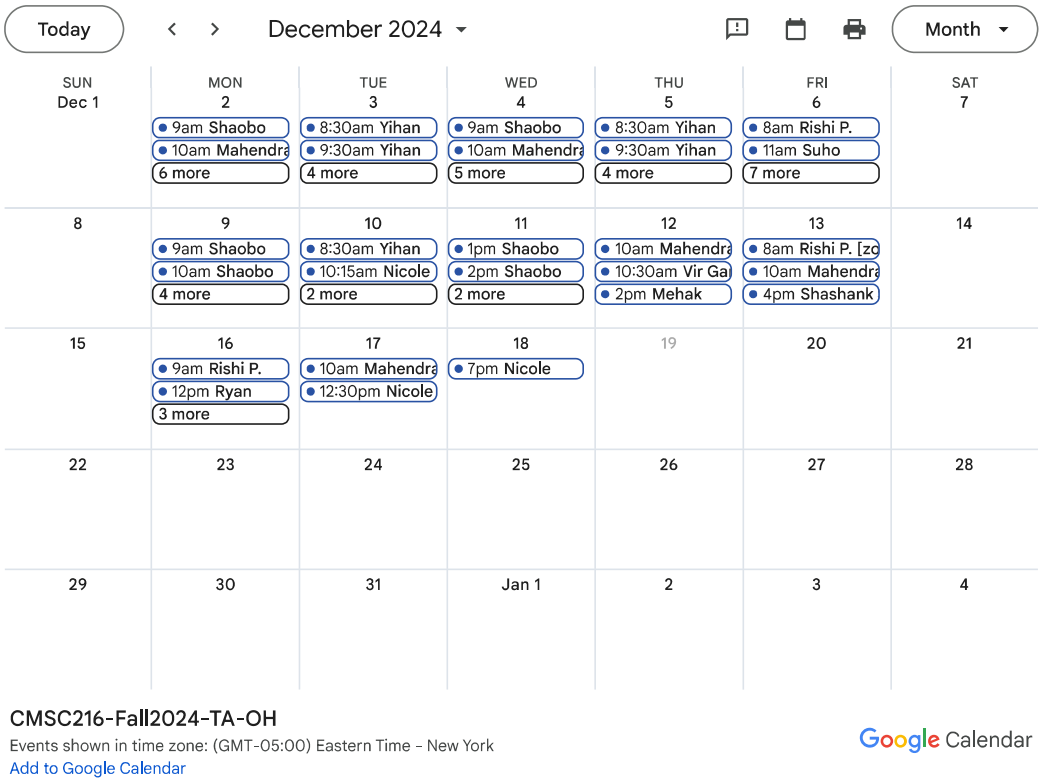
- Unix Memory Model
- Moving from Java to C
- Pointers and dynamic data structures in C
- I/O, standard libraries
- Testing
- Assembly Language (MIPS)
- Process control
- Systems programming
- Program measurement and optimization
- Multithreaded programming with pthreads
- Libraries and linking
- Dynamic memory management

Course Communication and Office Hours

- We will be using Canvas and Piazza for class communication (Piazza Guideline). You must frequently check announcements in both sites. We will also be using Quuly for office hour queue management. **Check Canvas for the Piazza and the Quuly sign-up code.** The TA email addresses will also be posted to Piazza. Please note that the approach to run OH could change during the semester, if needed, for better support.

- **Instructor Office Hours**
  - Instructor Office: **IRB 2246 (Ilchul Yoon)**
  - Office Hour:
    - Monday: 10:25 AM - 11:45 AM (IRB 2246)
    - Tuesday: 1:45 PM - 2:30 PM (outside classroom)
    - Wednesday: 10:25 AM - 11:45 AM (IRB 2246)
    - Thursday: 1:45 PM - 2:30 PM (outside classroom)

- **TA Office Hours**
  - TA office hour location: **AVW 4424**
  - TA OH Schedule (See the calendar below)



Programming Assignments

This is a very demanding course. You will need to complete many programming assignmenets. The dues for programming assignments are **11:00 PM on the day they are due**. They are to be submitted electronically according to instructions given with the assignments. Late submissions will be **strictly** penalized -- e.g., if you submit at 11:01 pm, it is a late submission. It is strongly encouraged to submit frequently instead of submitting once at the last minute. **Exceptional circumstances will be considered only if discussed with the instructor at least 48 hours before the assignment due.** Late submissions will have points deducted as follows:

- 15 percent late penalty (of the total points allotted to an assignment or a project, **not your earned points**) will be applied if you submit within 24 hours from the due.
- **No late submission will be accepted after 24 hours.**

You can submit your work multiple times to the submit server. **Once again, do not wait until the assignment due. We strongly encourage you to submit multiple times before the due date/time.**

Project descriptions will be shared in ELMS, and project starter files will be posted in a directory (folder) in the grace cluster (a set of connected computers that work together so that they can be viewed as a single system). In a lab, you will learn how to set up your work environment, how to access files on the cluster using *ssh*, and how to submit your work from your work directory to the submit server.

Good Faith Attempt Policy for class work for Projects

Every class project and the debugging quiz have a good faith attempt (GFA) requirement. The good faith attempt represents the minimum functionality you need to implement for a project. **For each project you don't satisfy the good faith attempt, your class letter grade will be reduced by at least one letter grade.** For example, if you have an A+, and missed GFA requirements for two projects, your class letter grade will be C+. The goal of the GFA is to guarantee you have the basic skills needed for upper level courses. You have until the last day of classes (Monday, Dec 9, 11:55 pm) to satisfy any missing GFA requirements.

Grading

Grades will be computed using the following weights:

Evaluation Components	Percentage (tentative)
Projects / Exercises	35%
Lab Work / Quizzes	15%
Exam 1 (Date: October 1, Tuesday)	16%
Exam 2 (Date: November 5, Tuesday)	16%

Exam 3 (Final)
• Date/Time: Thursday, December 12 (6:30pm - 8:30pm)
• Location:
  ◦ LEF 2205 (last name starts with A ~ K)
  ◦ HJP 0226 (last name starts with L ~ Z)
• See Fall 2024 FINAL EXAMINATION TABLES (**Common Final Exams**)
	18%

- **Exams and quizzes are cumulative and in-person.**
- Exams and Homeworks will be graded using GradeScope. We will synchronize the university roster with the course created in GradeScope. You should log in using your directory ID and password (Choose "School Credentials" in the login page). Before your grades are imported to the grade server, you will be able to check your grades in GradeScope.
- Once we complete grading any exams or paper-based assignments, we will publish grades in GradeScope (**except the final exam**) **It is your responsibility to check your grades and to submit regrade requests by the specified deadline; NO regrade requests will be processed afterwards.** If the regrade request deadline is not announced in Canvas or Piazza, it is **by default 5 days after the grades are published**.
- **The final exams won't be published** but the point details will be imported to the grade server, so you can see your earned points per question. If you need a detailed review of your final exam, we will set up an appointment after the letter grades are submitted. Note that your exam will be regraded from scratch.
- Score distribution will be reviewed at the end of the semester and the cutoffs will be set appropriately. Note that the guaranteed cutoffs for A-, B-, and C- are set at 90%, 80%, and 70%, respectively -- i.e., if you earn 80% or higher, you will receive at least B-, even if the class average exceeds 80%.

Academic Integrity

Note that academic dishonesty includes not only cheating, fabrication, and plagiarism, but also includes helping other students commit acts of academic dishonesty by allowing them to obtain copies of your work. ***In short, all submitted work must be your own.*** Cases of academic dishonesty will be pursued to the fullest extent possible as stipulated by the Office of Student Conduct.

It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. If the student is found to be responsible of academic dishonesty, the typical sanction results in a special grade "XF", indicating that the course was failed due to academic dishonesty. If you have any doubt as to whether an act of yours might constitute academic dishonesty, please contact your TA or the course coordinator.

The CS Department takes academic integrity seriously. Information on how the CS Department views and handle academic integrity matters can be found at Academic Integrity.

Projects/Labs

On any graded project or lab, you are NOT allowed to collaborate or exchange code. We compare each student's code with every other student's code to check for similarities. Every semester, we catch an embarrassingly high number of students that engage in cheating and we have to take them to the Honor Council.

GroupMe / Other Group Chats

We encourage students to talk about course material and help each other out for better understanding the course topics in group chats. However, this does NOT include graded assignments. For example, talking about implementation of the programming assignments or release tests is NOT okay.

There have been a couple instances in the past where students have posted pictures/source files of their code, or earlier sections have given away exam questions to later sections. Not only did this lower the curve for the earlier section because the later one will do better, the WHOLE group chat had to pay a visit to the Honor Council. It was an extremely ugly business.

Online source code repository (e.g., Github)

You may post your project code to **private** Github (or similar service) repository, only after the semester ends. The Honor Council can retroactively give an XF (even to students who have already graduated) if your code is then used by another student to cheat. So just be careful. Posting graded code to a public repo will give you a free ticket to the Honor Council.

Study Guides

Creating collaborative study guides on Google docs is OK. Encouraged, even. Just do this before the exam, and don't bring the study guide to the exam. Don't add exam questions to the study guide after the early section's midterm.

PRACTICE Exams/ Worksheets/ Lecture examples/ Ungraded Lab examples

Totally cool. Highly encouraged to co-create and share (with the same caveats as study guides).

A few examples of academic integrity violations

The following are just a few examples of academic integrity violations:

- Hardcoding of results in a project assignment. Hardcoding refers to attempting to make a program appear as if it works correctly (e.g., printing expected results for a test).
- Using any work available on the internet/web or any other source. For example, using work from StackOverflow, Sourceforge, or GitHub.
- Hiring any on-/off-line service to complete an assignment for you.
- Discussing project implementations (everything beyond clarifications) with your classmates.
- Sharing your work with any students.
- Providing ideas/suggestions on how to solve/implement a programming assignment.
- Looking at another student's work.
- Using online forums to ask for help regarding our assignments.
- Using auto-generated source code (e.g., ChatGPT, Gemini, ...)

Additional information can be found in the sections titled "Academic Integrity" and "Code of Student Conduct" available at Course Related Policies.

For more information on the Code of Academic Integrity or the Office of Student Conduct, visit https://studentconduct.umd.edu.

Disabilities Support Accommodations

In case academic accommodations are needed, you must provide a letter of accommodation from the Office of Accessibility and Disability Services (ADS) **within the first two weeks of the semester**. For details, see the section titled "Accessibility" available at Course Related Policies.

Excused Absences

If you need to be excused for an absence from a single lecture due to a medical reason, you shall make a reasonable attempt to inform the instructor of your illness prior to the class. Upon returning to the class, you will present with a self-signed note attesting to the date of your illness. Each note must contain an acknowledgment by the student that the information provided is true and correct. Providing false information to University officials is prohibited under Part 9(i) of the Code of Student Conduct (V-1.00(B) University of Maryland Code of Student Conduct) and may result in disciplinary action.

Missing a quiz or an exam for reasons such as illness, religious observance, participation in required university activities, or family or personal emergency (such as a serious automobile accident or close relative's funeral) will be excused so long as the absence is requested in writing in advance and the student includes documentation that shows the absence qualifies as excused;

A self-signed note is not sufficient for exams because they are Major Scheduled Grading Events. In the case of medical absence, you must furnish documentation from the health care professional who treated you. The documentation must clearly include verification of (1) treatment dates and (2) the time period for which the student is unable to meet academic responsibilities. In addition, it must contain the name and phone number of the medical service provider to be used if verification is needed. No diagnostic information will ever be requested. **Note that simply being seen by a health care professional does not constitute an excused absence; the document must clearly state that you were unable to perform your academic duties.**

For additional details, see the section titled "Attendance and Missed Assignments" available at Course Related Policies

Mandatory Reporting of Disclosures of Inappropriate Behavior

As a faculty member, I am considered as a Responsible University Employee, and I must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to UMD's Title IX Coordinator per University Policy on Sexual Harassment and Other Sexual Misconduct.

If you wish to speak with someone confidentially, please contact one of UMD's confidential resources, such as CARE to Stop Violence (located on the Ground Floor of the Health Center) at 301-741-3442 or the Counseling Center (located at the Shoemaker Building) at 301-314-7651.

You may also seek assistance or supportive measures from UMD's Title IX Coordinator, Angela Nastase, by calling 301-405-1142, or emailing titleIXcoordinator@umd.edu. To view further information on th above, please visit the Office of Civil Rights and Sexual Misconduct's website at ocrsm.umd.edu.

Course Evaluations

The department and faculty take student feedback seriously. At the end of the course visit https://www.courseevalum.umd.edu/ to complete your course evaluations.

Miscellaneous

- UMD Course related policies can be found at http://www.ugst.umd.edu/courserelatedpolicies.html

Copyright

Although every effort has been made to be complete and accurate, unforeseen circumstances arising during the semester could require the adjustment of any material given here. Consequently, given due notice to students, the instructor reserves the right to change any information on this syllabus or in other course materials.

Web Accessibility