Welcome!

COMS 4118

Operating Systems I

Fall 2020

Teaching staff

- 5 Teaching Assistants (TAs)
  - Hans Jr Montero hjm2133@columbia.edu – Head TA
  - Lucie le Blanc ll3163@barnard.edu
  - Dave Dirnfeld dd2912@columbia.edu
  - Kent John Hall kjh2166@columbia.edu
  - Evan T Mesterhazy etm2131@columbia.edu

- TA email & office hours
  - Emails to cucs4118-tas@googlegroups.com go to all teaching staff
  - TA office hour calendar: http://bit.ly/4118-cal

- Instructor: Jae Woo Lee
  - Email: jae@cs.columbia.edu
  - Office: 715 CEPSR
  - Jae's office hour calendar: http://bit.ly/jae-cal
  - Home page: http://www.cs.columbia.edu/~jae/

Who am I?

- Jae Woo Lee
  - Senior Lecturer in Computer Science
    - Teaching first, research second
  - Just call me Jae (pronounced 'Jay')
    - Note that this is NOT a general rule – address instructors as Professors unless told otherwise
- My background
  - Undergrad in Columbia College
  - Many years of professional experience
    - Designing and coding large-scale software systems
    - Running a start-up company
  - Came back to Columbia for Ph.D.
  - More info at http://www.cs.columbia.edu/~jae/
- I'm not an OS researcher
  - Interested in possibly joining OS research group?
  - Then take OS with Prof. Jason Nieh

Prerequisites

1. PLEASE PLEASE DO NOT TAKE THIS COURSE IF YOU DON'T KNOW C COLD

2. UNIX
   – Must be comfortable at command line
   – Don't take the course if you never worked on UNIX

3. Computer architecture
   – Basic knowledge of computer hardware: register, cache, bus, etc.
   – Should be able to read simple assembly code: load, store, add, jmp, etc.

4. Data structures
   – Nothing fancy, but must be solid on the basics: list, tree, stack & queue

Columbia courses:

For 1 & 2:
   W3157 Advanced Programming

For 3:
   W3827 Fundamentals of Computer Systems

For 4:
   W3134, W3136, or W3137
   Data Structures

Exam dates

- Two **ONLINE** but **SYNCHRONOUS** exams
  - **Wed 10/28, 4:10pm**: Midterm exam
  - **Wed 12/23, 4:10pm**: Final exam
    - Sorry, this is the time slot assigned by the registrar ☹
- There are **no make-up and no alternate exams**
  - Please take OS next semester if the exam times do not work for you
- Your overall grade
  - HW 40%, Midterm 30%, Final 30%
  - Grading policy may change later

Mode of instruction

- Lectures
  - All online – zoom links on CourseWorks
  - All lectures will be recorded
    - Please do not login too early
- Possible in-person recitations
  - Would qualify this course as hybrid for international students who must take this course as in-person
  - Will poll the class later

Office hours

- Jae's office hours
  - All online
    - Zoom link posted on my cal right before it starts
  - In-person meetings generally not available
    - Even for those who are in NYC (for equity reasons)
    - But will make exceptions for those in need
- TA office hours
  - All online

Topics

- **General OS theory**
  - Throughout the whole semester
- **Advanced UNIX programming**
  - First 1/3 of the semester
  - UNIX from outside
    - Processes, threads, networking, concurrency, signals, non-blocking & async I/O
- **Linux kernel implementation**
  - Later 2/3 of the semester
  - UNIX from inside
    - Syscalls, wait queues, scheduler, file systems, virtual memory

15 million lines of code

- "As of 2013, the Linux 3.10 release had 15,803,499 lines of code"
  - Learn to navigate a large code base
  - Learn to read code rather than documentations that are often vague, out-of-date, or flat-out wrong
- You are likely to encounter a large existing code base at work

Homework

- 7 assignments (not including hw0)
  - Some are individual, some are group assignments
  - Some are short & light, some are long & heavy
  - Assignments carry different weights
- Some assignments may not be graded
  - But you won't know until after the deadline
  - HWs picked for grading will be 40% of your grade
- Late policy
  - 20% penalty after deadline up to 24 hours; zero afterwards

Zero tolerance on cheating

- **REQUIRED READING:**
  http://www.cs.columbia.edu/~jae/honesty.html
- You are cheating if you:
  - Take code from friends, or search for code on the Internet
  - Look at solutions that your friend has from previous semester
  - Upload any class materials (including your own code) to public repository (ex. GitHub) during or after this semester
- We can tell
  - We compare you submissions to CURRENT AND PREVIOUS submissions
  - You submit work history – minimum 5 commits required

Textbooks

1. **Operating Systems: Three Easy Pieces**
   - Version 1.00, 2018 – by Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau
   - Free in PDF form: http://pages.cs.wisc.edu/~remzi/OSTEP/

2. **Linux Kernel Development**
   - 3rd Edition, 2010, Addison-Wesley – by Robert Love

3. **Advanced Programming in the UNIX Environment**
   - 3rd Edition, 2013, Addison-Wesley – by W. Richard Stevens, Stephen A. Rago

4. **And a few other online materials that will be assigned**

Get them wherever you usually get your textbooks from…

Class ListServ

- Communication between all of us, including official announcements
  - Do:
    - Ask & answer questions – 1st place to go for non-personal questions
    - Provide helpful tips & links for your classmates
    - Be considerate & friendly
  - Don't:
    - Ask questions without first trying to solve it on your own
    - Post code or critical info that leads directly to solution
    - Be impatient & rude
  - Learn to manage high volume
    - [ANN] in email subject for announcements – set up Gmail filter
- Please use class listserv rather than TA mailing list
  - General questions to the TAs may be redirected to class listserv with your ID removed
  - Never send a same question individually to multiple TAs
- There will be an ongoing anonymous feedback form

Let's get to work

1. **Subscribe to 4118 ListServ TODAY**
    - https://lists.cs.columbia.edu/mailman/listinfo/cs4118
    - In the textbox "Your name (optional)" put Your Full Name (UNI)
        - For example: Jae Woo Lee (jwl3)
    - **You must reply to the confirm email (which might be in your spam folder)**
    - Then receive "Welcome to the "Cs4118" mailing list"
        - This email contains your password for accessing archives of past postings

2. Read the following two documents:
    - http://www.cs.columbia.edu/education/honesty
    - http://www.cs.columbia.edu/~jae/honesty.html

3. **HW0 (50 points) – due Fri, 9/11, 11:59pm**

4. **HW1 (100 points) – due Sun, 9/20, 11:59pm**

5. Reading assignments
    - See course home page for HW0, HW1, and reading assignments:
      http://www.cs.columbia.edu/~jae/4118/?asof=20200908

6. Start forming groups of 3 – feel free to advertise on listserv