Welcome!

COMS 4118
Operating Systems I
Fall 2021

http://www.cs.columbia.edu/~jae/4118/?asof=20210915
Teaching staff

- 8 Teaching Assistants (TAs)
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- TA email & office hours
  - Emails to cucs4118-tas@googlegroups.com go to all teaching staff

- Instructor: Jae Woo Lee
  - Email: jae@cs.columbia.edu
  - Office: 715 CEPSR
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/
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

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**Columbia courses:**
For 1 & 2:
- W3157 Advanced Programming

For 3:
- W3827 Fundamentals of Computer Systems

For 4:
- W3134, W3136, or W3137 Data Structures
Lectures

• SEC 001 vs. SEC H01: no real difference
• Lectures will be recorded and uploaded to CourseWorks
• CourseWorks open to Columbia first few weeks – search on Vergil
Exam dates

• Two SYNCHRONOUS exams for all sections
  – Midterm exam: Wednesday Nov 10, 4:10pm
  – Final exam: Wednesday Dec 22, 4:20pm
• Probably online but possibly in-person (TBD)
• 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
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
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
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

3. Advanced Programming in the UNIX Environment

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

Get them wherever you usually get your textbooks from...
Equipment

• You need a computer that has:
  – 64-bit CPU with multiple cores
    • All computers manufactured within the last five years should have this
  – At least 8GB RAM

• You must run one of the following platforms:
  – Windows on x86 CPU (i.e. Intel or AMD)
  – MacOS on x86 CPU
  – MacOS on Apple M1 chip
  – Linux on x86 CPU

• You will receive VMware for your platform
  – VMware for Apple M1 is in beta – choose x86 if you have both
Let’s get to work

1. Fill out platform survey:
   • [https://forms.gle/fAwAUNAyRm9UU9dV9](https://forms.gle/fAwAUNAyRm9UU9dV9)

2. Subscribe to 4118 ListServ TODAY
   • 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

3. Read the following two documents:

4. HW0 (50 points) – due Fri, 9/17, 11:59pm

5. HW1 (100 points) – due Thu, 9/23, 11:59pm

6. Reading assignments
   • See course home page for HW0, HW1, and reading assignments:

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