Welcome!

COMS 4118
Operating Systems I
Spring 2022

http://www.cs.columbia.edu/~jae/4118/?asof=20220119
Teaching staff

- **7 Teaching Assistants (TAs)**
  - Hans Jr Montero hjm2133@columbia.edu – Head TA
  - Kent John Hall kjh2166@columbia.edu – Head TA
  - Tal Zussman tz2294@columbia.edu
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  - Kaiwen Xue kx2154@columbia.edu
  - Claire Liu cl3944@columbia.edu
  - Eilam S Lehrman esl2160@columbia.edu

- **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.
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
Lectures

• In-person lectures
  – May switch to online as needed (like these first two weeks)
  – Auditors are welcome to lectures & listserv, but no GitHub repos, no lab/exam submissions, no TA access

• Zoom lectures are recorded

• Recording in-person lectures are being worked out – no promises
Exam dates

• **Synchronous** and **in-person** exams for all sections
  – Exam 1: **Wednesday Mar 9, 4:20pm**
  – Exam 2: **Wednesday Apr 27, 4:20pm**

• May switch to online format if necessary

• All students must take the exams at those times; there are **no make-up and no alternate exams**
  – Please take OS next semester if you can’t make these times
  – If you receive extended time accommodation, you cannot have a class after this class

• **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
28.8 million lines of code

• Linux 5.12: 28.8 million lines of code across more than 60k files in 2021
  – 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


- 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
1. **Operating Systems: Three Easy Pieces**
   - Version 1.00, 2018 – by Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau

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
Let’s get to work

1. **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

2. **Read the following two documents:**

3. **HW0 (50 points) – due Fri, 1/21, 11:59pm**
4. **HW1 (100 points) – due Sun, 1/30, 11:59pm**
5. **Reading assignments**
   - See course home page for HW0, HW1, and reading assignments:

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