README

Tuesday, August 11, 2020 2:14 PM

HOW WE RUN THIS CLASS

Expectation:

Most of your time (like >80%) will be spent on projects (four of them).

Offline preparation:

Purpose: understand context for online discussion

The day before, you should:

- Read all provided materials on the schedule.
- Go through the provides slides (some key slides are narrated).

Post any questions that you wanted to be answered to MS Teams

Online meetings:

When: Twice a week (in general). MoWe 2:00pm - 3:00pm (1 hour)

See SCHEDULE for details

Purpose: clarify key questions in the course materials & projects.
Format:
whirlwind tours of lecture slides
grouped discussions (as Zoom breakout rooms)
Q&A for projects
Etiquette:
Video is highly appreciated but not required.
Be prepared for verbal discussion using audio.
Recordings:
Linked on the SCHEDULE of each online session

Virtual office hours (added Sept 7th):

Instructor - Prof. Felix Lin	Tue/Thu 2:00pm - 3:00pm	**Appointment via email.** felixlin@
TA - Liwei Guo	Mon 3-4pm, Fri 2-3pm	**Appointment via email.** lg8sp@

Use the same Zoom link as the online session.

PROJECTS

This course centers on a series of *projects*, each offering its own set of experiences:

Project	You will build ...	Experience
kernel	A tiny, modern kernel for Raspberry Pi 3	roll-your-own kernel, baremetal programming, Armv8, SoC hardware
concurrency	Scaling up data structures on multicores	programming a large number of cores, profiling, performance debugging
TEE	A machine learning service secured by Arm TrustZone	security, hardware-based isolation, embedded AI
persistence (the Lite version)	Filesystem image forensics	reverse engineering, binary data structures, working with hexdumps

Access the course server

Using your CS credentials (not UVA). See wiki page. Contact felixlin@ if you do not have CS credentials.
First SSH to **portal.cs.virginia.edu**. From there SSH over to **labsrv06**
Note:

1. Avoid typing password everytime! Enable SSH key authenatication and do ssh-copy-id. (Google this)
2. You have to take two hops. i.e. SSH proxy won't work. I tried. They turned off SSH forwarding on portal.

(Aug/31: we are in the processing of getting a server with MORE cores for p2. Stay tuned)

Turn in assignments

Turn in via the MS teams assignment page. There are two types of assignments.

1. Answer questions: upload your answer in docx or PDF.
2. Coding:
   - Create a tarball of your code and upload it
- Guidelines for what's included in your code tarball:
  - Name format: [computingid].**tar.gz**
    - E.g. lg8sp.tar.gz
    - It is recommended you use the command 'tar -czvf' as suggested in the link above to generate `.tar.gz`.
  - Content:
    - Your code obviously. You can name your source files however you want but make sure you include two files:
      - Makefile: so that TA can build your code and try it out
      - README: anything you want to address to TA (e.g. any caveats of your code that TA shall be aware of, extra build instructions)
    - Do not include any binaries (e.g. *.elf, *.o, *.bin) in the tarball. 10% penalty if you do so.

OVERVIEW

This is a fun & intensive class! We will:

- cover the core & modern OS concepts (e.g. virtual machines) and leaves out old ones (e.g. disk scheduling)
- teach via first-hand, real-hardware programming experience more than lectures

This course does NOT:

- prepare you for OS research
- focus on paper reading

Who is this for?

Students 1) who want to be informed programmers or 2) who are interested in systems programming.

Prerequisites

Needed: C programming; being able to login over SSH; using gcc;2- basic *Nix commands

- For students who have NOT taken undergrad OS: although this is called a "graduate" OS course, I do not expect students to have OS background.
- For students who have taken undergrad OS: this course will offer sufficient new challenges and contents.

Course objective (more formally)

This course will cover the fundamentals of operating systems. It will focus on key operating systems concepts and components, including process, virtual memory, concurrency, and file system. It will also introduce modern operating system designs as response to emerging hardware trends — manycore, energy efficiency, security, etc.
This course will convey useful techniques in system software construction through hands-on projects, as well as important design principles commonly seen in system software, including abstraction, modularity, policy vs mechanism, interface vs implementation, etc.

STAFF

- Instructor: Prof. Felix Lin <felixlin@, http://felixlin.org>, office TBD
- TA: Liwei Guo <lg8sp@>, office TBD

READINGS

You will have enough things to read. There is no official textbook. If you insist on having one, here you go:
Operating Systems: Three Easy Pieces by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau

GRADING

I'd rather spend more time on teaching (i.e. giving you the OS experience) than grading.

POLICIES

Honor

I trust every student in this course to fully comply with all of the provisions of the University's Honor Code. By enrolling in this course, you have agreed to abide by and uphold the Honor System of the University of Virginia.

Disabilities

The University of Virginia strives to provide accessibility to all students. If you require an accommodation to fully access this course, please contact the Student Disability Access Center (SDAC) at (434) 243-5180 or sdac@virginia.edu. If you are unsure if you require an accommodation, or to learn more about their services, you may contact the SDAC at the number above or by visiting their website at http://studenthealth.virginia.edu/student-disability-access-center/faculty-staff.

Your wellbeing

The Computer Science Department and SEAS aims to promote their students' wellbeing. If you are feeling overwhelmed, stressed, or isolated, there are many individuals here who are ready and wanting to help. If you wish, you can make an appointment with me and come to my office to talk in private.

Alternatively, there are also other University of Virginia resources available. The Student Health Center offers Counseling and Psychological Services (CAPS) for its students. Call 434-243-5150 or 434-972-7004 for after hours and weekend crisis assistance) to get started and schedule an appointment. If you prefer to speak anonymously and confidentially over the phone, call Madison House's HELP Line at any hour of any day: 434-295-8255.

If you or someone you know is struggling with gender, sexual, or domestic violence, there are many community and University of Virginia resources available. The Office of the Dean of Students, Sexual Assault Resource Agency (SARA), Shelter for Help in Emergency (SHE), and UVA Women's Center are ready and eager to help. Contact the Director of Sexual and Domestic Violence Services at 434-982-2774.

Diversity

It is the instructors' intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

Religious accommodations

It is the University's long-standing policy and practice to reasonably accommodate students so that they do not experience an adverse academic consequence when sincerely held religious beliefs or observances conflict with academic requirements. Students who wish to request academic accommodation for a religious observance should submit their request in writing directly to me by email as far in advance as possible. Students and instructors who have questions or concerns about academic accommodations for religious observance or religious beliefs may contact the University's Office for Equal Opportunity and Civil Rights (EOCR) at UVAEOCR@virginia.edu or 434-924-3200. Accommodations do not relieve you of the responsibility for completion of any part of the coursework missed as the result of a religious observance.

one, here you go:
Operating Systems: Three Easy Pieces by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau

GRADING

I'd rather spend more time on teaching (i.e. giving you the OS experience) than grading. Nevertheless, the breakdown will be:

Total	**100%**
Projects	4 x 22.5%
Participation	10%

Update: project 4 becomes optional. If you only do project 1-3, the breakdown will be:

Total	**100%**
Projects	3 x 30%
Participation	10%

Project 4 lite, as a bonus project, is worth half of a normal project.

TODO: guidelines for determining the final grades.
I reserve the rights to adjust your final grade.

should submit their request in writing directly to me by email as far in advance as possible. Students and instructors who have questions or concerns about academic accommodations for religious observance or religious beliefs may contact the University's Office for Equal Opportunity and Civil Rights (EOCR) at UVAEOCR@virginia.edu or 434-924-3200. Accommodations do not relieve you of the responsibility for completion of any part of the coursework missed as the result of a religious observance.