



Cornell University

Operating Systems

CS 4410

Spring 2019

Lorenzo Alvisi

[Bracy, Sirer, van Renesse]



- Who is who
- Before you take this class..
- Lecture
- Getting help
- Grades & Policies

Where I am from



Where I studied





Where I studied



Street Cred



👁️ Cornellian wife

- ❑ Teaches FWS in Romance Studies

👁️ Two daughters

- ❑ One born in Ithaca
- ❑ The other a junior

Street Cred



CS 4410

👁️ Cornellian wife

- ❑ Teaches FWS in Romance Studies

👁️ Two daughters

- ❑ One born in Ithaca
- ❑ The other a junior

👁️ Research

- ❑ scalable and dependable distributed systems

👁️ Fellow of ACM, IEEE

👁️ Chair of SOSP '18

Who are the TAs?



Who are the TAs?

- ③ Zachary Bamberger
- ③ Matthew Burke
- ③ Swathi Chakrapani
- ③ David Chu
- ③ Juan Garcia
- ③ Paul Howard-Flanders
- ③ Patrick Finley
- ③ Abraham Ghanimah
- ③ Daniela Gottesman
- ③ Trevor Jamison
- ③ Jiwon Kim
- ③ Peter Li
- ③ Matthew Lombana
- ③ Brandon Quinian
- ③ Rosalie Ross
- ③ Christine Shen
- ③ Khyati Sipani
- ③ Stephen Stover
- ③ Florian Suri-Payer
- ③ Siyi Tu
- ③ Kun Wang
- ③ Ziyun Wei
- ③ Xinzhe Yang
- ③ Andy Zhang
- ③ Yunhao Zhang
- ③ Evan Zhao

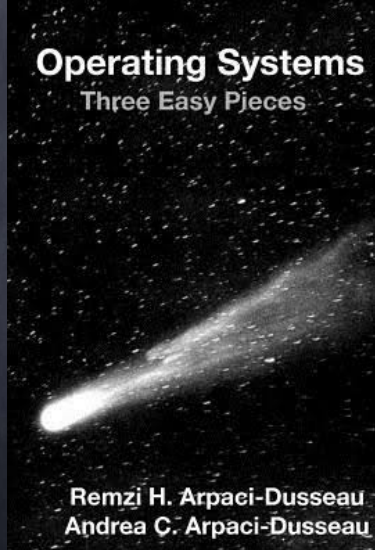
Who are you?



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Prerequisites

- ③ CS 3410, CS 3420 or equivalent
- ③ Otherwise (or if in doubt):
 - Come and talk to me; explain your situation and request permission



Textbook

- Free online
- Can buy PDF (\$ 10) or printed copy

Lectures



[Journal of Computing in Higher Education](#)
September 2003, Volume 15, Issue 1, pp 46-64 | [Cite as](#)

The laptop and the lecture: The effects of multitasking in learning environments

Authors

Authors and affiliations

Helene Hembrooke 1
[Email author](#)

Geri Gay 1

1. Human Computer Interaction Laboratory, Cornell University, USA

pick up a pen

Susan M. Dynarski · Thursday, August 10, 2017



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Office Hours

- Professor Alvisi
 - T/TH: 9:30 - 10:30
 - Gates 413a
- Course Staff
 - Office hours daily from about 10am to 10pm

Online Resources

- 📧 **Webpage:** <http://www.cs.cornell.edu/courses/cs4410/>
 - ❑ Schedule, exams, and due dates
 - ❑ Lecture notes
 - ❑ Evolving
- 📧 **Github** for code: <https://github.coecis.cornell.edu>
- 📧 **CMS** for assignments: <https://cmsx.cs.cornell.edu>
 - ❑ Autogrades, grades, and regrades
- 📧 **Gradescope** for exams
 - ❑ Grades and regrades

Online Help

- 📧 **Webpage**
 - 📧 **Piazza**
 - ❑ For 99% of all communication
 - ▶ Private posts should be visible to all course staff
 - ▶ Do not contact staff by other means (FB, texts...)
 - 📧 **cs4410-staff@cornell.edu: time sensitive matters**
 - ❑ Goes to Prof. Alvisi and staff leads
 - 📧 **cs4410-prof@cornell.edu: sensitive matters**
 - ❑ Goes to Prof. Alvisi
- Please no email to personal email accounts

Other Resources

Engineering Advising	www.engineering.cornell.edu/resources/advising
Arts College Students	https://as.cornell.edu/academic-advising
Gannet	https://health.cornell.edu
CAPS	https://health.cornell.edu/services/counseling-psychiatry
Student Disability Services	sds.cornell.edu

Email cs4410-prof@cornell.edu
Get help. Get documentation. The earlier the better.
Also, please **look out for each other**



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Course Content

Three Components

- Lectures and Readings
- Exams
- Assignments

You are expected to keep up with all three

Draft Syllabus

- Introduction
 - Architectural Support for OSs
 - Processes and Threads (A1)
 - Synchronization (A2)
 - Deadlocks
 - Scheduling
 - Memory Management
 - Virtual Memory (A3)
 - File systems
 - Security
 - Networking
 - Distributed Systems
- 3/14: Prelim 1
- 4/25: Prelim 2
- 5/18 Final Exam

Grading Policies

Late Policy

- Each person has a total of 4 "Slip days"
- Max of 2 slip days for any assignment
 - ▶ Cannot ever submit later than 48 hours late
- I really do not budge

Regrade policy

- Within 1 week of assignment (or exam's) return

Homework

- 3 programming assignments
 - build a "shell"
 - "easy" synchronization problems
 - "hard" synchronization problems
- 4 or so reading assignments
 - easy but seminal papers in systems
 - together counts as much as a programming assignment

Practicum: CS 4411

- Little programming in CS 4410
- In CS 4411, hands-on C development experience with an almost-real operating system: EGOS
 - Write a queue
 - Write a threading package
 - Write a scheduler
 - Write a file system cache
 - Write a file system
- Teams of two programmers

Semester Grades

- 40% Assignments, 10% each
- 60% Exams (best 2 of 3)
- Not curved: Goal is to give everyone an A
- Help us achieve this!

Academic Integrity and Honor Code

**All submitted work must be your own
(CS 4410) or your group's (CS 4411)**

- Project groups submit joint work
 - All programming assignments must be your own independent work
 - Group projects must represent solely the work of the two members of the group
 - OK to study together (with the Game of Thrones rule) but never look at someone else's code (fellow student, or online, or...)

Violations are easy to detect & will be prosecuted

- Closed book exams, no calculators

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THE BELL SYSTEM TECHNICAL JOURNAL
Vol. 57, No. 4, July-August 1978
Printed in U.S.A.

The UNIX Time-Sharing System†

by D. M. RITCHIE and K. THOMPSON
(Manuscript received April 3, 1978)

UNIX* is a general-purpose, multi-user, interactive operating system for the larger Digital Equipment Corporation PDP-11 and the Interdata 8032 computers. It offers a number of features seldom found even in larger operating systems, including:

- (i) A hierarchical file system incorporating detachable volumes,
- (ii) Compatible file, device, and inter-process I/O,
- (iii) The ability to initiate asynchronous processes,
- (iv) System command language selectable on a per-user basis,
- (v) Over 100 subsystems including a dozen languages,
- (vi) High degree of portability.

This paper discusses the nature and implementation of the file system and of the user command interface.

I. INTRODUCTION

There have been four versions of the UNIX time-sharing system. The earliest (circa 1969-70) ran on the Digital Equipment Corporation PDP-7 and -9 computers. The second version ran on the unpro-

† Copyright 1978, Association for Computing Machinery, Inc., reprinted by permission. This is a revised version of an article that appeared in Communications of the ACM, 17, No. 7 (July 1974), pp. 365-375. That article was a revised version of a paper presented at the Fourth ACM Symposium on Operating Systems Principles, New Thomas J. Watson Research Center, Yorktown Heights, New York, October 13-17, 1973.

* UNIX is a trademark of Bell Laboratories.

First reading assignment

- Due next week
- Write 200-300 word report
 - What did you like/learn?
 - What did you dislike (or didn't understand)?
- Be thoughtful