

Cornell University

Operating Systems

CS 4410

Spring 2021

Lorenzo Alvisi & Robbert van Renesse

[Alvisi, Bracy, Schneider, Sirer, van Renesse]

Welcome

- We strive to make CS4410/CS4411 welcoming, safe, equitable, and respectful environments, consistent with Cornell's commitments
- We recognize that the society with live in is none of those things, that we have implicit biases, and that we have to work hard every day to counter those biases to create an inclusive environment
- If you witness a bias incident or have been the victim of one, please file a confidential report with Cornell
- If you have any suggestions (improvements to the web site, syllabi, slides etc) feel free to email us at cs4410-prof@cornell.edu

Emotional Help

Engineering Advising	www.engineering.cornell.edu/resources/advising	Academic advising for engineering students
Arts College Student	as.cornell.edu/advising	Listing of general support services for a variety of
Gannett	www.health.cornell.edu	Cornell University Health Service
CAPS	health.cornell.edu/services/mental-health-care	If you experience emotional stress, contact Counseling and Psychological services
Student Disability Services	sds.cornell.edu	Ensures that all aspects of student life are accessible, equitable, and inclusive of those with disabilities. Send accommodation letters to Ms. Coralia Torres (ct635), by Feb. 23.

Get help. Get documentation. The earlier, the better
And look out for each other!

A green-bordered sign with the text "RESERVED FOR ADMINISTRATION" in green capital letters. The sign has a white background and a green border. It is mounted on a dark surface with two screws visible at the top and bottom.

**RESERVED
FOR
ADMINISTRATION**

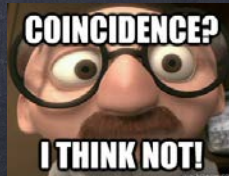
- Who is Who
- Before you take this class..
- Communication
 - Lectures, OHs, FAQ, etc.
 - Getting help
- Homework, exams
- Grades & Policies

About RVR

- Ph.D. C.S., Vrije Universiteit Amsterdam
 - Amoeba Distributed Operating System
- Industry: Research Scientist @ AT&T Bell Labs
 - Unix, Plan 9
- Serial entrepreneur
 - Reliable Network Solutions (IP → Amazon)
 - D.A.G. Labs (acquired by FAST, then by Microsoft)
 - Exotanium (ongoing)
- Interests: scalable and fault tolerant distributed systems
- Non geek: musician (trad. jazz) swing dance, unicycling

About Lorenzo

- Ph.D. C.S., Cornell University
 - Fault-tolerant distributed computing
 - Physics MS from University of Bologna
- UT Austin: 1996–2015
 - Academy of Distinguished Teachers
- Serial:
 - Consumer of dark chocolate
 - Motorcycle owner (4 currently)
- Interests: scalable and fault tolerant distributed systems
- Non geek: classical music, literature, hiking, riding



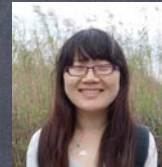
Who are the TAs?



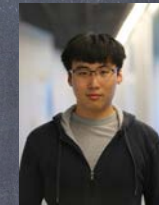
Michael Chin
CS B. Sc.
he, him, his



Minghao Li
CS B. Sc.
she, her, hers



Youer Pu
CS Ph.D.
she, her, hers



Xinwen Wang
CS Ph.D.
he, him, his



Jack Ding
CS B. Sc.
he, him, his



Simon Huang
CS B. Sc.
he, him, his



Freya Ryd
CS B. Sc.
she, her, hers



Nicholas Zahabiun
CS M.Eng.
he, him, his



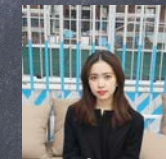
Ziwei Gu
CS M.Eng.
he, him, his



Yu-Ju Huang
CS Ph.D.
he, him, his



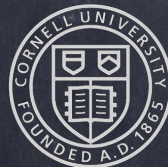
Nikhil Saggi
CS M.Eng.
he, him, his



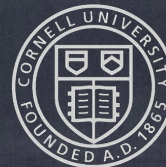
Jiejun Zhang
CS M.Eng.
she, her, hers



Mindy Lee
CS M.Eng.
she, her, hers



Kartikay Jain
CS B. Sc.
he, him, his



Haocheng Shen
CS B. Sc.
he, him, his



Yunhao Zhang
CS Ph.D.
he, him, his



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Prerequisites

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

Course Content

- Four Components

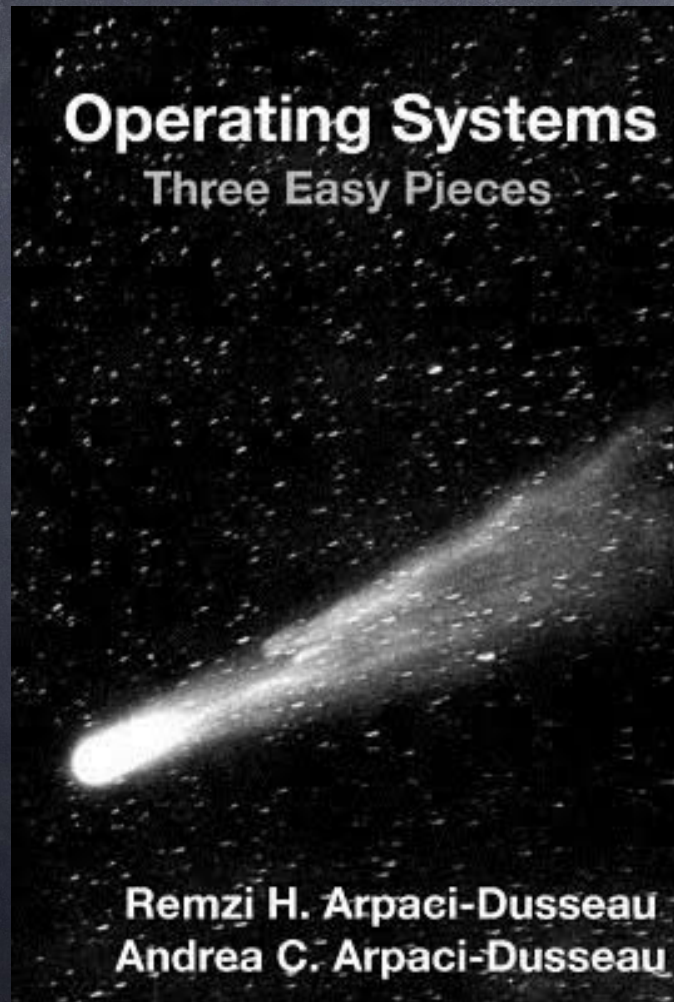
- Lectures
- Readings
- Assignments
- Exams

- You are expected to keep up with all four

Draft Syllabus

- Introduction
- Architectural Support for OSs
- Processes and Threads
- Synchronization
- Scheduling
- Memory Management
- File systems
- Networking
- Security

Textbooks



- Free online
- Can buy PDF or printed copy

Textbooks

Concurrent Programming with Harmony

Robbert van Renesse
Cornell University

• Free online

• Linked from CS4410 web
site



/ new typo



/ new program
bug

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Communications

- 👁 Largely virtual

- need for more communication!

- ▶ Web page
 - ▶ Lectures
 - ▶ FAQ
 - ▶ Office Hours
 - ▶ Study Groups
 - ▶ CMS

Course Web Page

- Schedule, exam & due dates
- Homework release and due dates
- Slides posted before each lecture
- Evolving

FAQ & CMSX

- FAQ: sites.coecis.cornell.edu/cs4410faq/

- Linked from course web page
- You can post questions here and find answers at some later time

- CMSX: <https://cmsx.cs.cornell.edu>

- Assignments
- Grades & Regrades

Lectures

- Tues/Thurs 1:00–2:15 pm live from Bailey Hall and on Zoom.
 - Lectures will be recorded, but attendance in person or on line is expected

Office Hours

- There are 210 20 minute slots each week
 - All days of the week (but Sunday), including evenings
 - Slots posted on line
- All OHs are over Zoom
 - We'll consider special requests for in-person meetings
- You have to register for a slot
 - Please specify NetID and include topic

Email

- cs4410-staff@cornell.edu: time sensitive matters
 - Goes to profs and TAs
- cs4410-prof@cornell.edu: sensitive matters
 - Goes to Robbert and Lorenzo only

Please no email to personal email accounts

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Homework

- Assigned approx. once a week
- Individualized, fillable PDFs
 - (slight)randomization of problem parameters, multiple choice questions, etc.
 - Fully auto-graded (no TAs involved)
 - Regrade requests due within a week
- Max. 6 slip days total
 - Max. 2 slip days per assignment
 - 10% deduction/day after that

Study Groups: Connect and Learn

- Five/six students per group
 - randomized for each homework
- Each group is assigned a leader (chosen randomly) and a dedicated TA
 - leader organizes at least one meeting for the group
 - ▶ <http://lsc.cornell.edu/studying-together/studying-together-online/>
- You are allowed to discuss the homework with the members of your study group
 - each student must submit own work though...
 - ...and remain fully responsible for their own submission

Myths about study groups

- Study groups work better with one's own friends
- Study groups may be good for weaker students but not for me!
 - <https://academia.stackexchange.com/questions/9393/effectiveness-of-grouping-students-to-balance-skills>

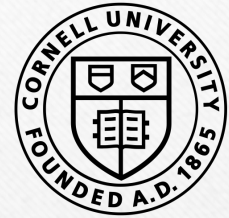
Study Group

Code of Conduct

- Each student should feel safe, welcome, respected
- Participate, but don't dominate
- Be patient
- Respect diverse talents and ways of learning
- Fight your implicit biases



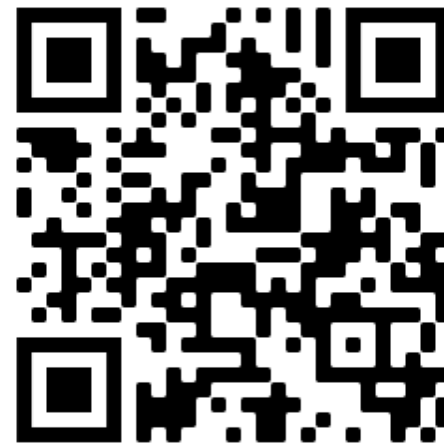
Find Study Partners!



Studying with peers is a great way to connect with other Cornell students and is a powerful tool for learning.

Cornell's Learning Strategies Center ([LSC](#)) helps match you with study partners.

To learn more, visit the LSC's [Studying Together webpage](#) or scan the code →



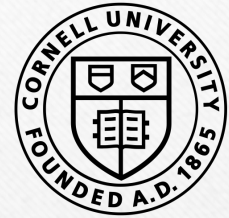
Scan the QR code to find out more about Study Partners

or visit <http://lsc.cornell.edu/studying-together/>

lsc.cornell.edu



Find Project Partners!



Taking a CS class? Looking for a friend? Searching for a partner? If so, this CIS Partner Finding Social is for you!

This is a virtual event where you'll have the chance to meet and interact with other students in your CS classes!

This is the PERFECT opportunity to find a partner, so come join us on **2/11**

from 7:30 ~ 9:00pm if you're taking CS
1000~2000 level classes,

from 9:00pm ~ 10:30pm if you're taking 3000+
level classes!

RSVP here:

<http://bit.ly/cisSP21>

CIS Partner Finding Social

2/11/2021 • 7:30PM–10:30PM ET

All majors and
gender identities
welcome!



Academic Integrity and Honor Code

All submitted work must be your own

- ❑ OK to discuss concepts with any other student
- ❑ Student in a study group can submit the same code
- ❑ Different study groups are not allowed to share code

Violations will be prosecuted

Exams

- Randomized, fillable PDFs

- Same as homework
- Exam questions are versions of homework questions
- Include questions about lectures, homework, books

- Must be done individually

- Open-book
- Internet as “read-only” resource: don’t ask questions

- Cumulative

Exams

- Cumulative
- Timed
 - 2 hours from download to submission
 - Can be done any time in 48-hour period
- 3% penalty each 15 minutes late, up to 1 hour
- Fully auto-graded
- Regrade requests due within one week

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A white rectangular sign with rounded corners and a thick green border. The sign has two small grey dots, one near the top center and one near the bottom center, resembling mounting holes. The text "RESERVED FOR ADMINISTRATION" is written in a bold, green, sans-serif font, centered on the sign.

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Semester Grades

- 50% Assignments
- 50% exams
- No curving
 - CS4410 is not a competition
 - Your grade reflects your learning objectives
 - ▶ not how well you compared with others
- Weighing of individual assignments and exams TBD

Practicum: CS4411

- CS4410 assignments are “small”
- In CS4411, you’re going to have 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