CS 5600
Computer Systems

Lecture 1: Logistics
(a.k.a. The boring slides)

Hello!

- Welcome to CS 5600
  - Are you in the right classroom?
- Who am I?
  - Professor Christo Wilson
  - cbw@ccs.neu.edu
  - West Village H 248
  - Office Hours: Mondays, 3-5pm

Anti-Social Media

- Don’t friend me on Facebook
  - It’s nothing personal
- Twitter: @bowlinearl
- LinkedIn: if you pass the class, you can add me

Everyone say Hi to the TA

- Tinu Gautam
  - gautam.t@husky.neu.edu
- Office Hours
  - TBA

Why Take This Course?

- Computers are everywhere
  - In your pocket
  - In your microwave
  - Up in space
- We take hardware and OS features for granted
  - Double click and your program loads
  - Devices just work (most of the time…)
  - Buggy apps can’t crash your machine
- … but very few people truly understand how computers really work, at a low-level

Goals

- Fundamental understanding about computer hardware and operating systems
  - From the moment a PC boots up
  - … to managing devices and memory…
  - … up to loading complex, threaded applications
- Focus on software and systems
  - Not hardware
  - No theory
- Project-centric, hands on experience
  - You will build a bare-bones OS in this class
  - This will be a **huge** amount of work
  - But you will also learn a **huge** amount

At the end of this course…

- You will understand low-level details of computer hardware and modern CPUs
- You will know the key functions of OSes
  - Managing I/O devices and memory
  - Loading programs
  - Scheduling the CPU and isolating processes
- You will understand that designing systems is an art, not a science
  - Building systems is about managing tradeoffs

What About the Other 5600 Class?

Similarities

- Both cover the fundamentals of OSes
- Both use the same textbook
- Both include 4 projects with (roughly) the same goals
  - E.g. build a filesystem

Differences

- This class will cover more material
  - Garbage collection, OS security, exploits, GPUs
- The projects will be **harder**

- Basically, my class will be faster paced and more challenging
- You will learn more, but you will work for it

Online Resources

- http://www.ccs.neu.edu/home/cbw/systems.html
- Class forum is on Piazza
  - Sign up today!
  - Install their iPhone/Android app
- When in doubt, post to Piazza
  - Piazza is preferable to email
  - Use #hashtags (#lecture2, #project3, etc.)

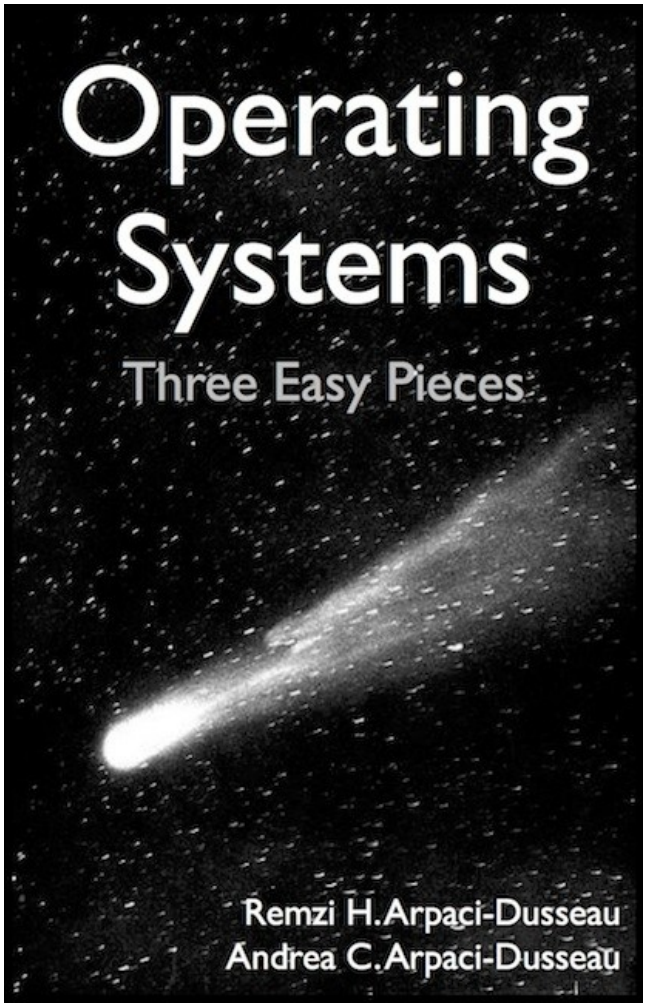
Sept. 3	PC Hardware, CPUs, and OS Basics
Sept. 10	Processes and Threads
Sept. 17	Synchronization and Deadlock
Sept. 24	Scheduling
Oct. 1	Address Translation and Virtual Memory
Oct. 8	Memory Management and Garbage Collection
Oct. 15	**Midterm**
Oct. 22	Storage, Disks, and SSDs
Oct. 29	Files and Directories
Nov. 5	Virtual Machine Monitors
Nov. 12	Authorization and Access Control
Nov. 19	Exploit Prevention
Nov. 26	**Thanksgiving Holiday!**
Dec. 3	General Purpose GPU Programming
Dec. ???	Final Exam

Teaching Style

- 3 hour lectures
  - Breaks every hour. Other suggestions?
- I have been working with systems for a long time
  - Things make sense to me may not make sense to you
  - I talk fast if nobody stops me
- Solution: ask questions!
  - Seriously, ask questions
  - Standing up here in silence is very awkward
  - I will stand here until you answer my questions
- Please help me learn your names :)

Textbook

- Operating Systems: Three Easy Pieces
  - Remzi and Andrea Arpaci-Dusseau
- Free, PDFs available online at http://pages.cs.wisc.edu/~remzi/OSTEP/



Workload

Projects (4)	15% each
Midterm	15%
Final	20%
Participation	5%

Projects

- This course is project-centric
  - You will be building an operating system
  - Start early!
  - Seriously, start early!
- 4 projects
  - Due at 11:59:59pm on specified date
  - Use turn-in scripts to submit your code, documentation, etc.
  - **Working code is paramount**

Project Groups

- Projects will be completed in groups of three
- You may choose your own partners
  - You may switch partners between projects
  - Do not complain to me about your lazy partner
    - Hey, you picked them
- Can’t find a partner?
  - Post a message on Piazza!

Late Policy for Projects

- Each student is given 4 *slip days*
  - May be used to extend project deadlines
    - Example: 1 project extended by 4 days
    - Example: 2 projects each extended by 2 days
  - **You don't need to ask me**, just turn-in stuff late
  - All group members must have unused *slip days*
    - i.e. if one member has zero *slip days* left, the whole group is late
- Assignments are due at 11:59:59, **no exceptions**
  - 20% off per day late
  - 1 second late = 1 hour late = 1 day late

Participation

- This is a masters level course
  - I’m not taking attendance
  - I don’t care if you skip lecture
- However, 5% of your grade is participation
  - Be active on Piazza
  - Ask questions in lecture
  - Answer questions that I ask in lecture
- Ideally, I want to know everyone’s name by the end of the semester

Exams

- Midterm and Final
  - 3 hours each
  - The final will be **cumulative**
- All exams are:
  - Closed book, closed notes, leave the laptop at home
  - If I see a smartphone, I will take it and sell it on ebay

Grade Changes

- Each student is given 2 *challenges* to use as they see fit
  - *Challenges* can be spent asking for regrades
- If you think there has been a grading error, come to my office hours
  - If the grade is incorrect, you keep your *challenge*
  - If the grade is correct, you lose your *challenge*
- **When your *challenges* are exhausted, you cannot ask for regrades**

Grade Changes (Continued)

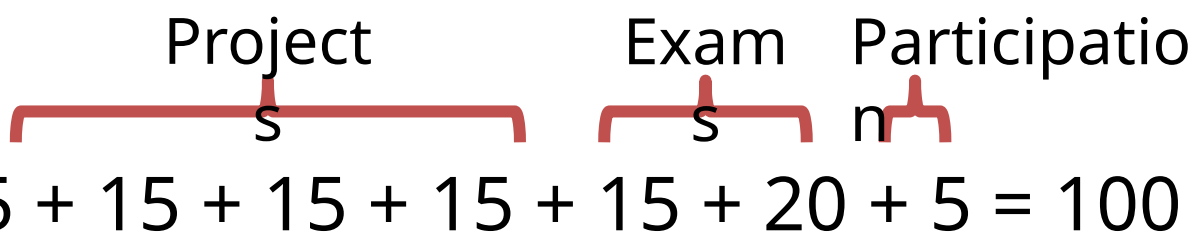
- *Challenges* may be used for:
  - Projects and tests
- *Challenges* may not be used for:
  - Late assignments, use of slip days
- If you want to *challenge* a project grade, **all group members must have an available *challenge***
  - Your *challenge* succeeds or fails as a group

Cheating

- **Do not do it**
  - Seriously, don't make me say it again
- Cheating is an automatic zero
  - Will be referred to the university for discipline and possible expulsion
- For projects: code must be original, written by you and your groupmates only
  - Starter code obviously doesn't count
  - StackOverflow/Quora/Github are not your friends
  - If you have questions about an online resource, ask us

Final Grades

- At the end of the semester, all of your grades will sum to 100 points



- Final grades are based on a simple scale:
  - A >92, A- 90-92, B+ 87-89, B 83-86, B- 80-82, …
- I don’t curve grades

QUESTIONS?