CS 4410
Operating Systems

Introduction & Logistics

Summer 2016
Cornell University
Welcome!
Welcome!
Why are we here?
Why do we need Operating Systems?

- To manage HW resources for applications.
- To provide abstractions of HW resources to applications.
Why learn Operating Systems?

- Apply OS ideas to other contexts.
- Better understanding of computer systems.
- Learn open problems.
What is an Operating System?

- A *program* that manages the computer hardware.
- An operating system (OS) provides an abstract interface on top of hardware that is more convenient than the raw hardware interface.
What is an Operating System?

Users
- Mary
- John

Applications
- Web-browser
- Word Processor
- Video Game

Operating System
- Scheduler
- Monitor Driver
- Network Driver
- Memory manager
- Disk manager

Hardware
- CPU
- Memory
- Disk
- Network card
- Monitor
Operating systems may be huge (???) but they are based on simple, intuitive ideas.
An OS exists in:

- Personal computer
- Smartphone
- Wearable devices
- Car
- Servers
- MRI machines
- ...

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A modern OS exists in:

- Personal computer
- Smartphone
- Wearable devices
- Car
- Servers
- MRI machines
- ...
Evolution of OS

Support for:

One program at a time.
Multiple programs at the same time.
Interactivity with the user.

From 9 operating systems in 1950s to ??? operating systems in 2010s!
In this course, we will learn how an OS:

- enables interaction between user and hardware,
- manages hardware resources, focusing on:
  - processor,
  - memory,
  - storage, and
  - network.
References

- http://sigops.org/sosp/sosp15/history/
- https://ecommons.cornell.edu/handle/1813/40564
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- Instructor: Elisavet Kozyri
- Teaching Assistant: Kevin Sekniqi
- Office hours: Every day! Great for answering questions!
- Email: For short clarifications.

Prerequisites:
- Programming experience
- Computer architecture: CS3410/ECE3140
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- Course Objectives:
  - Emphasis on ideas, not on technical details.
  - We will not build an operating system.
  - We will understand main principals used in most operating systems.

- Course format:
  - Interactive lectures.
  - Weekly assignments.
    - Synchronized with lectures
    - Theoretical + practical
    - Individual and within deadlines!
  - Weekly in-class exams.
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- Final Exam
  - August 16\textsuperscript{th}, Bard Hall 140
- Course Reading
  - Operating Systems: Principles and Practice
- Slides: become ready shortly before the corresponding lecture.
- Follow the schedule of the course on the webpage, for:
  - slides, readings, and assigned exercises.
- CMS
  - All students should have received an invitation.
- Class Attendance
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- Grading
  - from A+ to F
  - non-curved, approximately:
    - 10% at instructor's discretion (participation, etc)
    - 40% assignments
    - 20% in-class exams
    - 30% final exam
  - **Remember**: The target is the knowledge, not the grade!
- Academic Integrity
Coming up:

- Tomorrow’s lecture:
  - HW-OS and OS-App interface
- Get familiar with Python 2.7
- HW1:
  - Released tomorrow
  - Due on Monday, 10pm
- No in-class exam for next week.
  - First in-class exam on Monday, July 18th.