Operating Systems CMPSCI 377 Spring 2020

Mark Corner
UMass Amherst

Today’s Class

Organizational meeting

- Course Organization and outline
- Policies and grading

Why take this class?

Course Staff

Me: Mark Corner

TAs: Cole Smith

UCAs: Michael Lazzari, Shirui Cao

Prerequisites

230: Computer Systems Principles

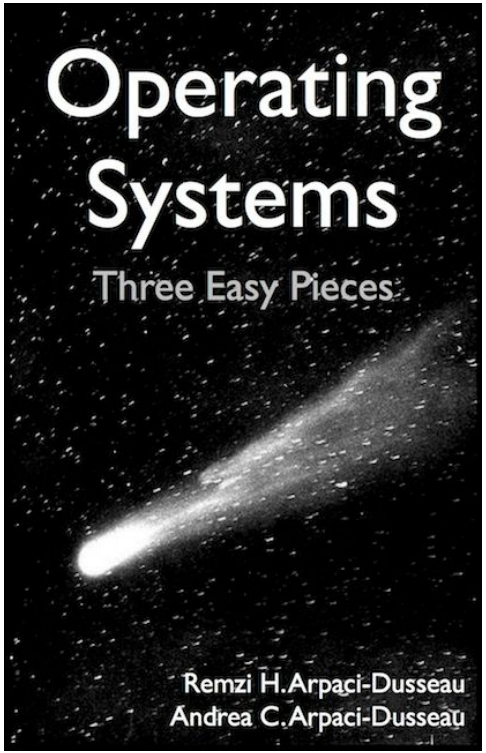
Strong skills with C/C++

- Project 1 will help you find out if you are prepared

Textbook

Textbook: Operating Systems: Three Easy Pieces

(Available for free online)



Grading

Percentage	Component
5%	iClicker
5%	Discussion
30%	6 Projects
20%	Midterm 1
20%	Midterm 2
20%	Final exam

Drop 2 lowest

Drop 1 lowest

In class

In class

Exam period, TBD

i-clicker2

Required

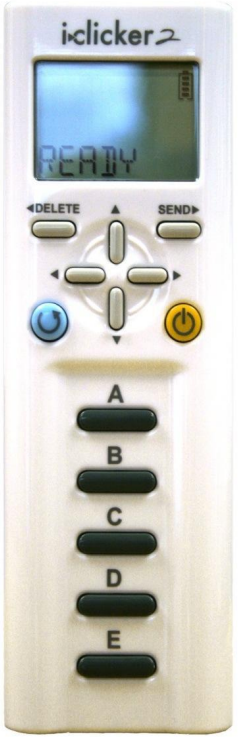
No excuses for not having it

Register in Moodle

Bring to every lecture (not discussions)

Questions start next class

Set to correct frequency (look at room poster)



Register in Moodle

COMPSCI377-SEC01 Operating Systems Fall 2019

Home > My courses > COMPSCI377-SEC01 FA19

COMPSCI 377 Operating Systems

In this course we examine the important problems in operating system design and implementation. The operating system provides a well-known, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The operating system is responsible for allowing resources (e.g., disks, networks, and processors) to be shared, providing common services needed by many different programs (e.g., file service, the ability to start or stop processes, and access to the printer), and protecting individual programs from one another. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years, and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), file systems, and operating system support for distributed systems. Prerequisites: COMPSCI 230. 4 credits.

iClicker

Student Registration
Instructor Report
Single Sign-On Security Key

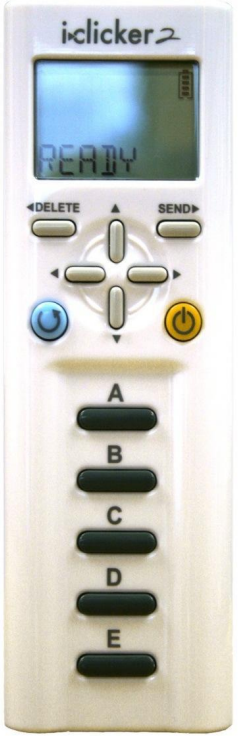
Activities

Forums

i-clicker – Let's try it out

What is the best OS?

A. Windows
B. Mac
C. Linux
D. None of the above



Moodle

Log in with your UMass username and password.

Only used for grade management

Log in soon and register your i>clicker2 in Moodle

- You won’t get credit until you do this!

Discussion Sections

Designed to help you with course concepts

Discussion section (Monday, led by TA)

- Bring a laptop.

HW designed to be completed in discussion, due at the end of the day

You may only ask questions about HW during discussion (not Gradescope)

Submit through Gradescope

Office hours

Instructor: Prof. Mark Corner mcorner@umass.edu

Office Hours: Tuesday 2:15(after class)-4PM CS338

TA: Cole Smith chsmith@umass.edu

Office hours: TBA

Check pinned post on Piazza.

Piazza

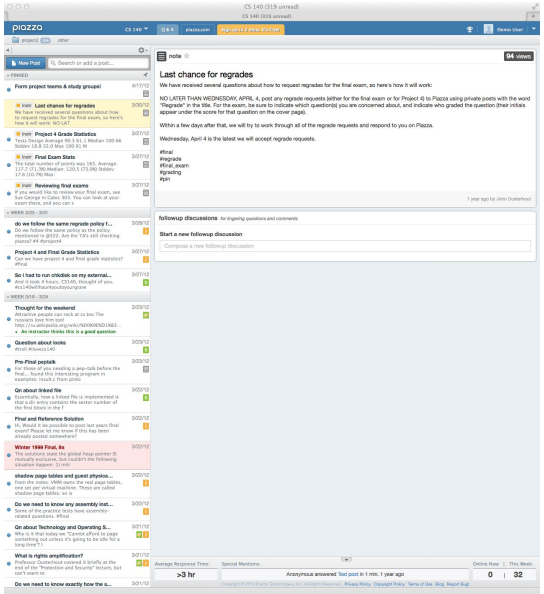
Almost all course communication will go through Piazza

Post your questions.

Contact instructors & TAs.

Answer other students' questions.

TAs and instructors will be monitoring closely.



Asking for help

Public posts to Piazza www.piazza.com	Any general questions that others could benefit from.
Private posts to Piazza	Any questions/issues not appropriate for Piazza. You can choose to send to only TAs and instructors.
Email your TA	Specific questions pertaining to discussion section.
Email instructor	Personal or serious issues that need the instructor's attention.

Projects

6 Projects

Focus on topics covered in the class

Projects will use C/C++

Fourth project is a “BETA” on real kernel hacking

Projects

Substantial programming problems, typically extending starter code provided to you.

Assignments come with automated tests your code should pass (these are the public tests).

When done, you submit your code to gradescope

You can submit prior to the deadline, as many times as you like..

First programming assignment is due next Thursday, 4:59PM

Gradescope

Submit to Gradescope: early and often

Do not wait until the last minute

- Something small has gone wrong

What if it doesn’t work at the last minute?

Deadlines are
non-negotiable

Academic honesty

We take this very seriously. It can have a negative impact on your course grade, your GPA, and your overall record at UMass and beyond.

You may discuss assignment problems with others in this course, however, your writing (including code) of solutions must be your own.

Copying any material directly from the web is considered dishonesty.

Copying or using sections of someone else's program or assignment, even if it has been modified by you, is not acceptable.

What’s An OS?

Interface between the user and the architecture

Implements a virtual machine that is (hopefully) easier to program than raw hardware.

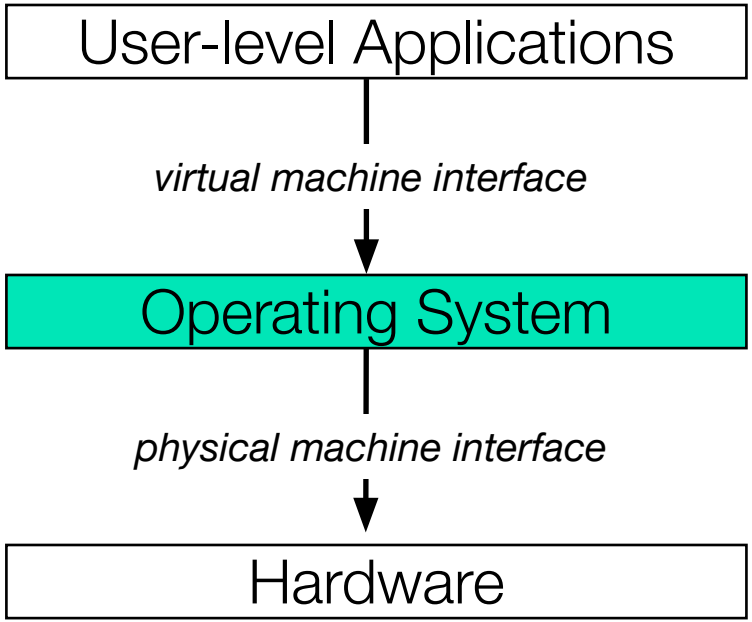
OS

Interface between user and architecture: Hides architectural details

Implements virtual machine: Easier to program than raw hardware

Illusionist Bigger, faster, reliable

Government: Divides resources, “Taxes” = overhead



Most Important Features

Services: The OS provides standard services (the interface) which the hardware implements.

- File system, virtual memory, networking, CPU scheduling, and time-sharing

Coordination: The OS coordinates multiple applications and users to achieve fairness and efficiency (throughput).

- Concurrency, memory protection, networking, and security.

Goal: Design an OS so that the machine is convenient to use (a software engineering problem) and efficient (a system and engineering problem).

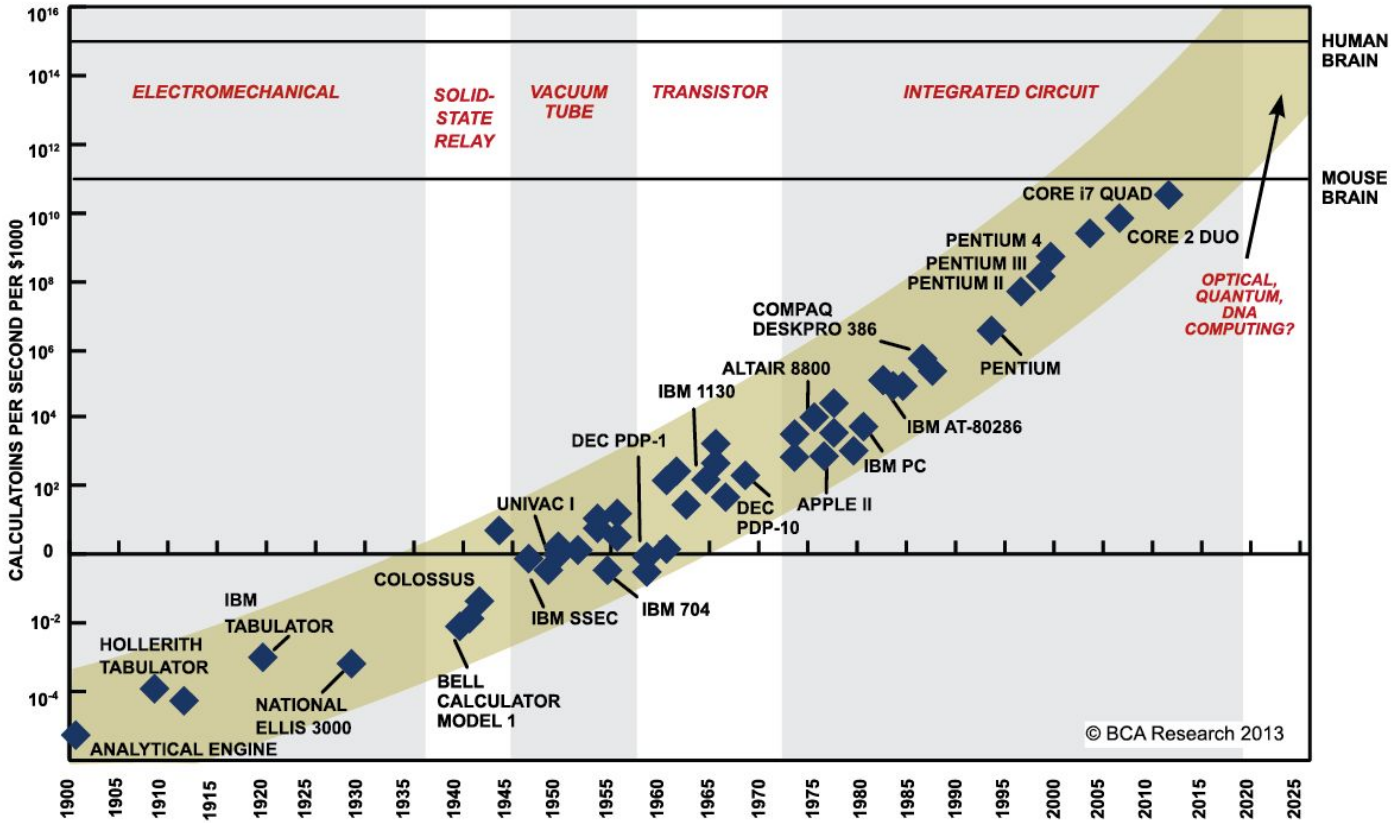
Why Study OS?

Hilariously: You are unlikely to get a job building an OS.

Understanding operating systems will enable you to use your computer more effectively.

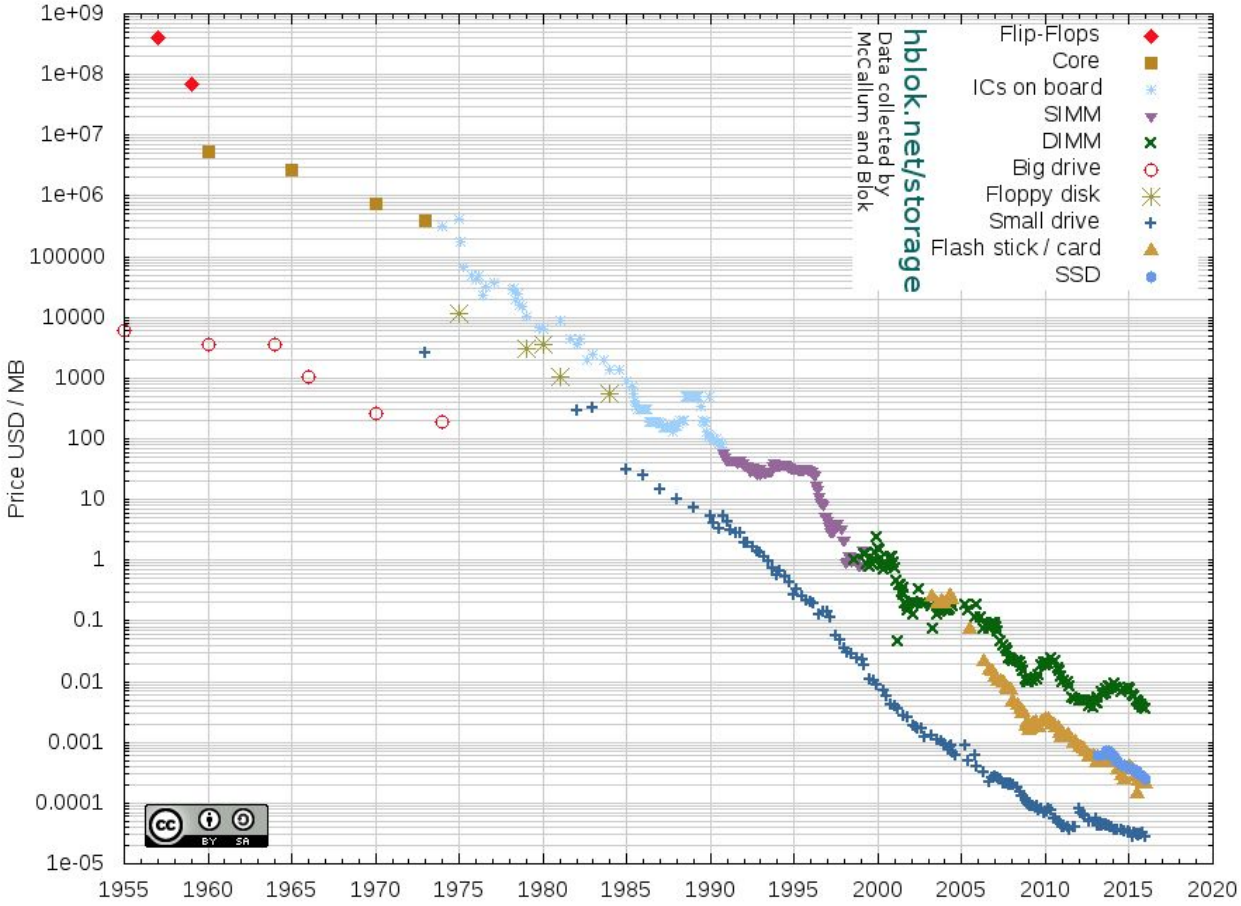
> Why does my application run slowly?
>
> How can I make my application cheaper to run?

Also serve as an excellent example of system design issues whose results and ideas you will apply elsewhere



SOURCE: RAY KURZWEIL, "THE SINGULARITY IS NEAR: WHEN HUMANS TRANSCEND BIOLOGY", P.67, *THE VIKING PRESS*, 2006. DATAPOINTS BETWEEN 2000 AND 2012 REPRESENT BCA ESTIMATES.

Historical Cost of Computer Memory and Storage



Also read this

https://www.usenix.org/system/files/1311_05-08_mickens.pdf

“When the revolution comes, I need to be prepared…”