143A: Principles of Operating Systems

Lecture 1: Introduction

Anton Burtsev
September, 2019

Class details

- Undergraduate
  - 240 students
- Instructor: Anton Burtsev
- Meeting time: 11:00am-11:50am (Mon/Wed/Fri)
  - Discussions: TBD
    - Regular discussion sections
    - Feel free to stop by my office with questions (DBH 3066)
- 4 TAs
- Web page
  - http://www.ics.uci.edu/~aburtsev/143A

Who am I?

- I build operating systems (since 2000)

- Bits of L4 microkernel, micro-ITRON, E1OS, XenTT, LCDs, LVDs, RedLeaf

  - https://www.ics.uci.edu/~aburtsev/

This course

- Inspired by
  - MIT 6.828: Operating System Engineering
    https://pdos.csail.mit.edu/6.828/2016/
  - Adapted for undergraduate students
- We will use xv6
  - Relatively simple OS kernel (only 9K lines of code)
  - Reasonably complete UNIX kernel
  - https://pdos.csail.mit.edu/6.828/2016/xv6.html
- xv6 comes with a book
  - https://pdos.csail.mit.edu/6.828/2016/xv6/book-rev9.pdf
- And source code printout
  - https://pdos.csail.mit.edu/6.828/2016/xv6/xv6-rev9.pdf

More details

- 5-6 homeworks
    - Several small ones (designed to help you)
        - Create a simple Makefile, simple UNIX programs
        - Become familiar with gdb
        - Learn what's inside the program (how it gets linked and loaded)
    - Several big ones
        - Implement a shell
        - Implement a system call
        - Build POSIX threads

More details

- Midterm

- Final

- Grades are curved

  - Homework: 60%, midterm exam: 15%, final exam: 25% of your grade.

  - You can submit late homework 3 days after the deadline for 60% of your grade

Another Book

"Operating Systems: Three Easy Pieces" (OSTEP) Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau

- Free online version http://pages.cs.wisc.edu/~remzi/OSTEP/

Course organization

- Lectures
  - High level concepts and abstractions
- Reading
  - Xv6 book + source code
  - Bits of OSTEP book
- Homeworks
  - Coding real parts of the xv6 kernel
- Design riddles
  - Understanding design tradeoffs, explaining parts of xv6

Prerequisites

- Solid C coding skills
  - Xv6 is written in C
  - You need to read, code and debug
  - All homeworks are in C
  - Many questions will require explaining xv6 code
- Be able to work and code in Linux/UNIX
- Some assembly skills
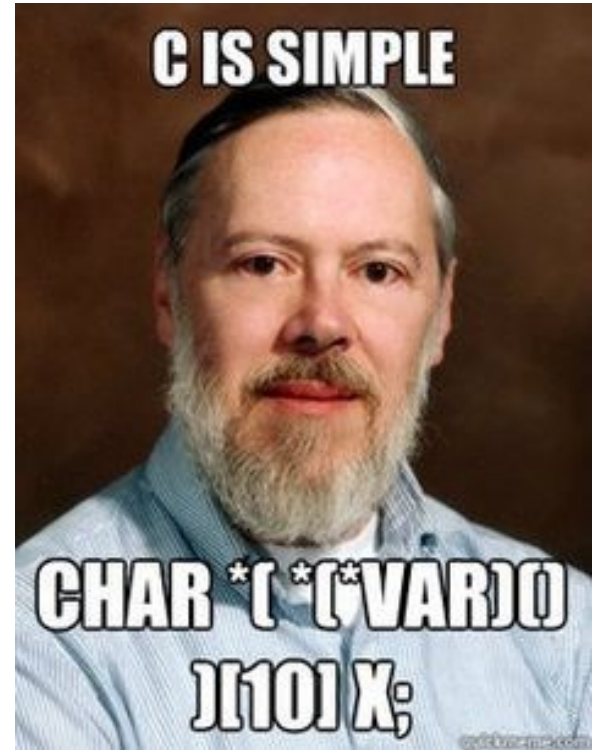
How to succeed?

- Read the source

How to succeed (2)?

- Don't get scared
    - The class is hard
    - The goal is to teach you how real OS works, and it's non-trivial
    - Homeworks and exams are challenging
        - We're very generous graders
        - 4 Fs, 5 Ds…

What is an operating system?

Hello world

```
printf("Hello world\n");
```

Hello world!
Demo

Thank you!