Slide 1

Administrivia

- Reminder: Homework 5 due today. We need a “not accepted past” deadline for all assignments. (Consensus: Monday. 5pm.)
- Solutions to written problems in hardcopy — first two distributed before midterm, remaining ones shortly.
- Homework 2 and midterms almost graded. I will let you know via e-mail as I finish grading assignments.
- Extra-credit assignment to be on the Web soon too. Due day of final.
- Information about office hours this week and next coming by e-mail soon.

Slide 2

Administrivia

- Reminder: Final exam 12/18 at 3:30pm. Simplest if everyone just takes it then, but you can do it early if strongly motivated. 12/12 at 8:30am I have another final so that might be an okay time. Tell me . . . . (Minute essay question.)
- Review sheet for final will be on the Web.
- Solution to midterm also available in hardcopy.
- Should we have a review session? (Minute-essay question.)

Slide 3

Minute Essay From Last Lecture

- (Some good stories . . .)

Slide 4

Course Recap

- Four key areas (the gospel according to Pitts):
  - Process management.
  - Memory management.
  - I/O management.
  - Filesystem management.
- Two views of operating systems:
  - "Virtual machine" that provides useful abstractions for applications programs, end users.
  - Resource manager.
- Also a little about history, a little about security.

Slide 5

Process Management

- O/S as virtual machine — process abstraction, “concurrent” execution, IPC, concurrent algorithms.
- O/S as resource manager — implementation of above, including interrupts and context switches, CPU scheduling.

Slide 6

Memory Management

- O/S as virtual machine — memory protection, virtual memory, “multiprogramming”.
- O/S as resource manager — implementation of above, including page replacement algorithms.

Slide 7

Filesystem Management

- O/S as virtual machine — filesystem abstractions (files, file attributes, directory structures).
- O/S as resource manager — implementation of above, disk-space management, reliability and consistency.

Slide 8

I/O Management

- O/S as virtual machine — layered abstractions for working with I/O devices (user-level s/w, device-independent s/w).
- O/S as resource manager — implementation of above, plus a little about lower-level interaction with devices (programmed versus interrupt-driven I/O versus DMA).

Slide 9

Recap, Continued

- Some recurring themes:
  - Interaction between h/w and s/w — some h/w features are there to support o/s features; o/s influenced by what's available in h/w.
  - Trade-offs — often the answer to "which is best?" is "it depends".
- We didn't cover the whole book, but if you look at the ACM's guidelines for an undergrad o/s course — we pretty much did what they said.

Slide 10

Recap, Continued

- A very smart person I know once said the only interesting part of an o/s course was concurrent algorithms, and the rest is "just details".

  A student a few years ago said "a lot of this just seems like common sense" (once you understand the basic ideas).

  Both sort of right . . .
- Goal of this course is to learn/retain basic ideas. Details may help with that — and can be interesting in themselves — but should not be the focus.

Slide 11

Minute Essay

- I can return graded work by putting it in my (non-ASO) mailbox, or I can make it available only when I'm around. Default is the latter. Tell me if you want the former. (I can send grades by e-mail.)
- Are you interested in a review session? This Thursday or Friday afternoon might work for me. Or next week. What times could you *not* be there?
- Do you need to take the final at a time other than what's scheduled? What times work for you?