

- 1. Last time
 - 2. Final exam
 - 3. Your questions
 - 4. Wrap-up
-

2. Final exam

- 110 minute exam
- stay seated at 100 mins
- closed book
- ONE two-sided sheet allowed
 - no lab code, must be in English

Material

- Readings
- Labs
- HWs
- Classes

[see midterm topic list]

→ see L14.txt

Post-midterm topics (not guaranteed to be necessary or sufficient)

I/O

architecture

how CPUs and devices interact

mechanics

polling vs. interrupts

DMA vs. programmed I/O

device drivers

synchronous vs. async I/O

context switches

User-level threading

Disks

geometry

performance

interface

scheduling (skipped in class, covered in book)

SSDs

File systems

basic objects: files, directories, metadata, links, inodes

how does naming work?

types of file layout

- extents/contiguous, linked, index

- classic Unix + FFS are variants of indexed

analogy between inode and top-level page directory (aka L1 page table)

tradeoffs

performance

Crash recovery

ad hoc

~~copy-on-write (cow)~~

journaling (redo logging)

ptrace() and debugging internals

protection and security

stack smashing/buffer overflow

Unix security model

access control, privileges, setuid, attacks

trusting trust

boot up, from power-on

static linking + loading is a key tool

bootstrap process

HW copies firmware into read/write mem

firmware is mini OS

runs bootloader program, which ultimately begins kernel

kernel invokes init

init(1) invokes login

login lets you get a shell and begin executing programs

