

- ☒ 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
- TWO two-sided sheets allowed

Material

- Readings
- Labs
- HWs
- Classes

[see midterm topic list]

→ see l13.txt

(not guaranteed to be necessary or

Post-midterm topics (should be sufficient)

virtual memory, continued

page faults: mechanics, costs, uses

page replacement policies

FIFO, LRU, CLOCK, OPT

thrashing

mmap()

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)

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, undo logging, undo + redo)
WAL

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 $\text{init}(1)$ (or $\text{init}(8)$)

$\text{init}(1)$ invokes $\text{login}(1)$ → (or $\text{init}(8)$)

$\text{login}(1)$ lets you get a shell and begin executing programs



Operating Systems - Spring 2025, Lecture (SP25:CSCI-UA:202:1:001)

Students

<https://go.blueja.io/09icdyX6t0KAwwaotUA9nw>