Exam Review

Adminstrivia

When: Dec 21 (Thu) Noon – 1:50 PM
WHERE: CANTOR 102
WHAT: EVERYTHING COVERED THIS SEMESTER
CHEAT SHEET: Two Letter Paper Sheets
DOUBLE SIDED
10pt font/legible

Slides mostly cover topics after midterm

But

- Please make sure you review concurrency
- Look at the Dahlin standard

① Fat from disk —
② Demand paging
③ MMIO & DMA

Virtual Memory
- Distinction b/w physical & virtual addresses
- Virtual address spaces & their relation to processes
- Page tables
  - Tree structure
  - Looking up virtual addresses
  - Valid/Dirty/RO/NX
- Page Faults
  - Demand paging & policies
- TLB
- Copy-on-write
  - How?
  - Why?

Context Switch
- What
- How
- User space switching

I/O
- Explicit I/O instructions
TRADE-OFFS

- MMIO
- DMA
- Interrupts
- Polling
- Device drivers
- Blocking vs non-blocking I/O

Disks
- Sectors, tracks, cylinders
- Interface
- Seek time
- Rotational delay
- Transfer time
- 7200 rpm
- Contribution to access time
- Sequential vs random access
File Systems

- Interface
  - Open
  - Read/Write
  - mmap
  - lseek

- Representing files
  - Metadata
    - Data layout & trade-offs
      - Contiguous allocation
      - Linked
      - Indexed
  - Inode
    - Direct blocks
    - Indirect blocks
    - Double indirect

- Directories
  - dircnt
  - link/lnk/link
  - hierarchy & how it is setup

- FFS & performance
- Cylinder groups
- Layout for performance
  \( \rightarrow \) Directories \& files

- Buffer cache

- Crash recovery
  - Metadata/data consistency

- ad-hoc/f8ck

- Copy-on-write

- Journaling
  \( \rightarrow \) Redo
  \( \rightarrow \) Undo

Security

- Stack smashing
  - Stack (from before midterm)

- Executable code

\( W^X \) \( \rightarrow \) Some defenses
\( W^X \) \( \rightarrow \) NX

- Unix security

- UID, GID
- file permission checks
- rebuilt
- TOCTTOU Bugs

Putting it all together
- execute
- loading executables