Section 10: Final Review

CSE 451 18SP

Announcements

- You made it to the end of the quarter! Yay!
- Lab X Due date is June 4th
  - No late days for this one
  - Demos are tomorrow, June 1st. Thank you to everyone who signed up!
- Final June 6th, 2:30 - 4:30
  - Open note/laptop, no internet connection

Lighting Quick Course review

- Everything from the course is fair game for the final. The lectures, the exercises, and the labs
- Have gone to lecture and done the labs is already good preparation for the final

Booting

- How does booting work?
- What does the BIOS do?
- How does JOS boot?
- Where is paging turned on?
- What is the difference between "real" mode and "protected" mode?

OS Organization

- What different kinds of Kernels are there?
- What are the differences between a big "monolithic" kernel and a small exokernel?
- What kind of kernel is JOS?

Addressing & Virtual Memory

- Why do we use virtual memory?
- How is it used for process isolation?
- What is paging?
- What does adding more levels of page tables give us?
- How do you translate a virtual address into a physical address?
- What is the difference between a virtual address and a physical address?

Interrupts and Exceptions

- Why would we ever trap into the kernel?
- What different kinds of traps are there?
- What is a Trapframe? What is it used for?
- What is the IDT? How does it work?
- What is IRQ_OFFSET for? What are hardware interrupts?

System Calls

- Why do we need system calls?
- How are system calls implemented in JOS?
- If a system calls in the forest, and no one is around to hear it, does it make a sound?

Multiprocessing

- Why would we ever want more than one cpu?
- How are the other cpus started up?
- How does JOS handle the process abstraction?
- What is COW fork? How does it work? Why would we want to use it?
- How can different processes share memory outside of COW fork?

Scheduling

- How does JOS decide when to run user processes?
- What is the difference between cooperative scheduling and preemptive scheduling?
- Why do we need preemptive scheduling?
- How are interrupts used for preemptive scheduling?

File Systems & On Disk Data Structures

- What is a disk?
- What is the difference between volatile and nonvolatile memory?
- How does JOS handle files on disk? How is the data stored?
- How does xv6 handle files on disk? What are some of the differences from JOS?
- What is the difference between a File and a Directory?
- How is the Disk laid out? What is a superblock? What is a bitmap?

Virtual Machines & Verification

- Dune paper and exercise
- What is a virtual machine?
- What are Hosts and Guests in a VM?
- How are faults and system calls handled?
- Hyperkernel paper and exercise on verification

Labs 1

- Looking back over the exercises will help you remember the earlier labs
- See: Booting

Lab 2

- How does the kernel handle physical memory? How does it set up the physical memory to be allocated?
- Where is address translation carried out?
- How are permission bits used? How many are there? What do they mean?
- What is the page directory and the page table? How do we access the permissions for a page?

Lab 3

- What is a JOS environment?
- How does JOS keep track of its environments>
- What state does the environment keep track of?
- How do we handle an interrupt? What is the process from when we enter the kernel to when we switch back to user space?

Lab 4

- How do we start the other CPUs?
- Why do we need locking? What would happen without it?
- Why do we need a page fault handler to implement COW fork? What should happen when we fault on a COW page?
- What is IPC? How is it implemented in JOS?

Lab 5

- How is the file system laid out on JOS? How do we read from disk?
- What is the block cache? What is it used for?
- What is the difference between a directory and a file?
- What is the difference between direct blocks and indirect blocks? Why would we not want to use only direct blocks?

That's it!

- These topics are also listed on the "Final Review Sheet" page on the website
- On the Schedule, under "final review"
  - https://courses.cs.washington.edu/courses/cse451/18sp/notes/quiz-review.html
- What next? Try the practice exams
  - Listed under "Exercises" on the course webpage