

ULK=“Understanding the Linux Kernel, 2nd edition” by Bovet and Cesati, O’Reilly Press, 2003.

OSCJ=“Operating System Concepts with Java, 6th edition” by Silberschatz, Galvin and Gagne, Wiley 2005.

USP= “UNIX System Programming, 2nd edition” by Haviland, Gray and Salama, Addison-Wesley 1999. The lecture number indicates when the assignment is DUE.

Lecture 4 ULK: p.8-10 (Concepts through processes), p.18-23 (Process overview), p.72-75 (Processes), p.34-35 (Basic memory), p.303-306 (Calling system calls), p.12-18 (Overview of Unix file support system calls).

USP: Chapters 1, 2 and 9 through sec. 9.3.6 (Use of system calls related to files for projects 0 and 1).

Project 0: Program in UNIX to read/write on standard input and output; count characters and words. Read: “Guidelines for Programming Project 1 and others”, and How to Use turnin”.

Homework 1: Create a glossary for italicized terms found in the ULK readings.

Lecture 7 ULK: p.28-46 (Memory overview, Memory addressing and hardware)

OSCJ: Sections 4.1 to 4.4 (Process concept, scheduling, operations and cooperation); p.331-333 (Basic paging), p.336-337 (Basic hardware support for paging), p.355 (80x86 or IA-32 or “Intel Pentium” address translation hardware, segmentation and paging); and all of Chapter 3 (Operating system structures.)

Homework 2 questions:

1. Compare (a) Figure 9.6, “Paging Hardware” on p.332 of OSCJ with (b) Figure 9.21, “Intel 80x86 address translation” on p.355 of OSCJ and with (c) Figure 2-6, “Paging by 80x86 processors” on p.45 of ULK.
 - (a) What important hardware register is missing from Figure 9.6? State its generic name and state which control register it is on the 80x86 (or IA-32).
 - (b) Hardware support for segmentation is one feature of IA-32 architecture not included in the generic hardware described by Figure 9.6. Briefly describe another difference between the generic hardware with the IA-32 hardware.
 - (c) Why are “logical addresses” different from “linear addresses” on the IA-32, but there is no difference between these and “virtual addresses” on generic hardware without hardware support for segments?
 - (d) What IA-32 hardware register is loaded with a new value in order to carry out the action of changing the interpretation of virtual addresses? This action is one of the major operations executed to perform a context switch.

Lecture 12 ULK: p.28-46 (Memory overview, Memory addressing and hardware)

OSCJ: Sections 4.1 to 4.4 (Process concept, scheduling, operations and cooperation); p.331-333 (Basic paging), p.336-337 (Basic hardware support for paging), p.355 (80x86

or IA-32 or “Intel Pentium” address translation hardware, segmentation and paging); and all of Chapter 3 (Operating system structures.)

Homework 3 questions: Draw with pencil or graphics software two neat sequence diagrams like Figure 4.3 in AOS to illustrate each history:

1. One process makes a non-blocking system call to the operating system. The operating system returns directly to that process after handling the system call.
2. One process makes a blocking system call. The OS runs a second (ready) process. This second process is interrupted by the event caused by the I/O device where this event enables the blocked system call to complete. (You must show a column for the I/O device and indicate when the I/O device sends an interrupt that interrupts the second process.) The OS reschedules the interrupted 2nd process because it has high priority. After a timer interrupt, the OS makes the second process be idle (in the ready state) and makes the previously blocked system call return to the original process.

Lecture 9 Programming Project 1: (1) A character translation and character/word counting filter. (2) Combine (1) with opening named files, and explore/answer questions about their differences and configuration changes of the terminal driver. (3a) Make (1) a TCP server and test it with telnet. (3b) Write your own client for (3a) which acts like (2); try to find and explore shortcomings.

Reading: Haviland 9.1, 9.2, up to (9.3.6).

Main Goal: Gain experience with blocking and concurrent activities.

Lecture 12 Readings: OSCJ Chapter 5; Section 6.1, 6.8; begin Chapter 7 including 7.1, 7.2, 7.3, then jump to section 7.8, then go back to unread sections.

ULK p.99-104, p.109-117

Lecture 14 Homework 4 Problem 1: Analyze all interleavings of 2 atomic steps performed by 2 threads.

Lecture 15 Homework 4 Problems 2-3: (2) Critical analysis of Peterson’s solution. (3) Critical analysis of solutions to the bounded buffer producer/consumer problem: (a) With semaphores; (b) With Java facilities (similar to monitors).