CSE 306 Operating Systems

Spring 2024

Course Description:
Students are introduced to the structure of modern operating systems. Topics include virtual memory, resource allocation strategies, concurrency, and protection. The design and implementation of a simple operating system are performed.

Class hours: TuTh 12:30pm ~ 1:50pm
Classroom: B205
Office hours: TuW 3:30pm ~ 4:30pm

Prerequisites: C or higher: CSE216 or CSE 219 or CSE260; CSE320 or ESE 380; CSE Major or ECE major.

Instructor:
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Course Website:
http://www3.cs.stonybrook.edu/~youngkwon/cse306/

Textbook and References:
Main text book: "Operating Systems Internals and Design Principles," 9th Ed., William Stalling, Pearson, ISBN: 978-0-13-467095-9 (https://www.amazon.com/Operating-Systems-Internals-Design-Principles/dp/0134670957/ref=sr_1_1?ie=UTF8&qid=1503882076&sr=8-1&keywords=9780134670959)
Optional text book 1: "Linux Kernel Development," 3rd Ed., Robert Love, Addison Wesley, ISBN: 978-0-672-32946-3 (https://www.amazon.com/Linux-Kernel-Development-Robert-Love/dp/0672329468/ref=sr_1_1?ie=UTF8&qid=1503882100&sr=8-1&keywords=9780672329463)
Optional text book 2: "Understanding the Linux Kernel," 3rd Ed., Daniel P. Bovet and Marco Cesati, O'Reilly, ISBN 978-0-596-00565-8 (https://www.amazon.com/Understanding-Linux-Kernel-Third-Daniel/dp/0596005652/ref=sr_1_1?s=books&ie=UTF8&qid=1503882167&sr=1-1&keywords=9780596005658)
Optional text book 3: "Operating Systems Principles & Practice," 2nd Ed., Thomas Anderson and Michael Dahlin, Recursive Books, ISBN: 978-0-9856735-2-9 (https://www.amazon.com/Operating-Systems-Principles-Thomas-Anderson/dp/0985673524/ref=sr_1_1?crid=5NG3ORN73A8I&keywords=operating+systems+principles+and+practice&qid=1551073554&s=gateway&sprefix=Operating+Systems+principles%2Caps%2C318&sr=8-1)

Grading:
Midterm exam 1: 15%
Midterm exam 2: 15% (might be replaced by a project)
Final exam: 20%
Programming Assignments: 45%
Attendance: 5% (Missing more than 20% of the class will fail the course)

Major Topics Covered in the Course:

- Computer architecture
- Memory management
- I/O subsystem
- Resource allocation strategies
- Concurrency
- Threads and processes
- CPU Scheduling

Course Learning Outcomes:

- Understanding of fundamental concepts underlying modern operating systems, including virtual memory and multiprogramming.
- Working knowledge of the components of operating systems, including file systems, the I/O subsystem, and the CPU scheduler.
- An ability to design and implement simplified versions of the main modules of operating systems.

Academic integrity:
Students should pursue their academic goals in an honest way that does not put you at an unfair advantage over other students. You are responsible for all work you submitted and representing other's work as yours is always wrong. Faculty is required to report any suspected instance of academic dishonesty to the school. Regarding your homework, you are encouraged to discuss it with others, but you should write your own code. For more information please refer to http://www.stonybrook.edu/commcms/academic_integrity/index.html

Students with disabilities:
If you have a physical, psychological, medical or learning disability that may impact your course work, please let the instructor know. Reasonable accommodation will be provided if necessary and appropriate. All information and documentation are confidential.

Critical incident management:
The University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Tentative Course Schedule:

Date	Topics
Week1	Welcome, Ch1: Computer System overview
Week2	Ch2: Operating System overview * Linux & QEMU install, Linux install on VM * Kernel source code download, build, launch
Week3	LKD Ch5: System calls
Week4	LKD Ch6: Kernel data structure
Week5	Ch3: Process LKD Ch3: Linux process management
Week6	Ch4: Threads Midterm exam 1
Week7	Ch5: Synchronization
Week8	LKD Ch10: Kernel Synchronization, Wait queue Ch6: Deadlock
Week9	Ch9: Scheduling LKD Ch4: Linux process scheduling, Schedule(), sched_class
Week10	Ch7: Memory Management Ch8: Virtual Memory
Week11	Ch8: Virtual Memory Midterm exam 2
Week12	ULK Ch8: Memory Management: Zone, Slab allocator (may skip) ULK Ch9: Process address space Ch12: File Management
Week13	Ch12: File Management LKD Ch13: Virtual file system
Week14	LKD Ch13: Virtual file system Ch11: I/O Management and Disk scheduling