CSE3320 Operating Systems

Spring 2021, Credit Hrs: 3, Section 002, CSE Dept./College of Engineering

Instructor: Dr. Jia Rao   Time: T/Th 12:30pm-1:50pm
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`http://ranger.uta.edu/~jrao/CSE3320/spring2021/index.html`

Course Description

An operating system is the most important software in a computer system. It manages computer hardware resources and provides common services for computer programs. This course examines the basic operating system concepts and design principles. In this course, We will discuss the performance and engineering trade-offs in the design and implementation of operating system mechanisms. Topics include:

- Processes and threads

- Concurrency and synchronization

- Multi-threaded programming

- Processor scheduling

- Memory management

- I/O and file systems

Prerequisites

- CSE 2312 and CSE 3302

- Knowledge of UNIX/Linux systems, high-level language C, and computer organization and architecture

- If you want to take the class without the prerequisite, you have the get the permission from the instructor. If approved, if is your responsibilities to make up for the required background

Text and Reference Books

The material presented in this course will be complemented by the following required textbook:

Andrwe S. Tanenbaum, *Modern Operating Systems*, 4thd edition, 2014, Prentice Hall

The following reference book on Linux may help you understand how the concepts and design principles are implemented in a real OS:

Bovet and Cesati, *Understanding the Linux Kernel*, 3rd edition, 2005, O'Reilly

Homework Assignments

There will be 2 homework assignments focusing on basic concepts, algorithms, and design principles. Submissions should follow:

- Homework assignments are to be completed individually, no teamwork is allowed

- Submit homework assignments in class on the due day

- Submit only hard copies (printed copies are preferred). No email submission, keep your own record.

Project Assignments

There will be 4 team project assignments based on Linux kernel programming and multi-threaded programming. The project policies are:

- Project assignments are to be completed in teams. 2-person teams are required, though 1-person or 3-person teams are possible. If you want to work on your own or to form a 3-person team, you need instructor's permission. No bonus will be granted for working on your own (i.e., 1-person team)

- Projects may have different turn-in requirements, which will be announced when released

- In class demo of project results are required for some project(s)

Exams

Both the midterm and final exams are close-book and close-note exams. However, you are allowed to carry one letter-size double-sided hand-written cheat sheet. The exam schedule is:

- Midterm exam: in class, Thursday, March 11, 2021

- Final exam: 8:00AM - 10:30AM Thursday, May 6, 2021

NO MAKE-UP EXAMS. Please make arrangements to meet the schedule. If you miss an exam or quiz due to unavoidable circumstances (e.g., health), you must notify the instructor via email or meeting with him as soon as possible and request a makeup approval. PLEASE let the instructor know ahead of time! Do NOT ask for make up exams or other components if you missed an exam or a project due to travel (except when you are required to travel to represent the university or the department).

Tentative Schedule

- Introduction, readings: Section 1.1-1.2

- Operating System Overview, readings: Section 1.3-1.7

- Processes and Threads, readings: Section 2.1-2.2

- CPU Scheduling, readings: Section 2.4

- Multiprocessor Scheduling, readings: Section 8.1

- Synchronization, readings: Section 2.3-2.5

- POSIX Threads Programming, readings: 2.2.3

- Deadlocks, readings: Chapter 6

- Memory Management, readings: 3.1-3.3

- Page Replacement Algorithms, readings: 3.4-3.7

- File Systems and Implementation, readings: 4.1-4.3

- File Systems Optimization, readings: Section 4.4

- Distributed File Systems

- I/O Devices, readings: Section 5.1-5.5, 5.8

Grading

Grading scale

- A: $[90, 100]$

- B: $[80, 90)$

- C: $[70, 80)$

- D: $[60, 70)$

- F: below 60

Distribution of Points

- In-class discussion: 5%

- Homework assignments: 10%

- Projects: 35%

- Midterm exam: 18%

- Final exam: 32%

Course Policy

Americans with Disabilities Act

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112 – The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans With Disabilities Act - (ADA), pursuant to section 504 of The Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, I am required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.

Academic Integrity

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)

Please acknowledge the following Honor code in all submissions:

- *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence. I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

Drop Policy

Students may drop or swap (concurrently add and drop) classes through MyMav self-service throughout the registration period. After the late-registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw, if he/she does not plan to attend after registering.

Emergency Exit Procedures

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities. How best to exit the building will be explained on day one. (See also `http://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_Buildings.php` and `http://www.uta.edu/police/EvacuationProcedures.pdf`.)

Student Support Services

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at `http://www.uta.edu/universitycollege/resources/index.php`.