Syllabus for Advanced Operating Systems

Fall 2020

LECTURER:

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TEACHING ASSISTANT:

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COURSE DESCRIPTION:

This course forms a foundation for graduate-level operating systems. The course focuses on advanced concepts/features in operating system design and coverage of recent research directions. In this course, the students should learn how the advanced features work and how to make use of the features to complete your research work or advance your career. This course will not focus on how to design or implement a so-called "advanced" operating systems.

In this course, we will also study the research methods for computer science to help fresh graduate students to build the foundation for computer scientists.

Covered topics includes: research methods for computer science, distributed process management, virtual memory, parallel and distributed file system designs, persistent objects, process and data migration, load balancing, middleware for IoT, and robotic operating systems.

COURSE WEBSITE: HTTPS://COOL.NTU.EDU.TW/COURSES/3533

The course website will provide class announcements, course slides, hand-outs, reading materials, and discussion forum for the class. You should also submit your paper critics to the site.

PREREQUISITES:

作業系統,計算機網路, and 計算機結構, or consent of instructor.

TEXT BOOK:

There are three recommended text books:

Distributed Systems: Principles and paradigms by Tanenbaum
Distributed Operating Systems by Pradeep K. Sinha, IEEE Press, 1997.
Practical Linux Programming: device drivers, embedded systems, and the internet by Ashfaq A. Khan.
A PhD Is Not Enough!: A Guide to Survival in Science by P.J. Felbelman.

We will cover the most materials in the book "Distributed Systems: Principles and paradigms." Hence, it is recommended to own this book for your reference in the class and/or for the future. Additional materials will be provided on course website.

GRADING CRITERIA:

In this course, the grade consists of leading discussion/participation, paper critics, mid-term exams, and Final Exam. The leading discussion, paper critics, mid-term, and final exam count 20%, 20%, 30%, and 30% of your final grade, respectively.

Leading Discussion:

The leading discussion starts on the week of Oct. 14, 2020. In each week, we will have one leading discussion. The reading lists will be provided on September 30, 2020. Each student can

volunteer at most one discussion during the semester and each discussion lasts for at most 30 minutes.

In each discussion, we will discuss one selected paper. All the students are required to read the paper before the class and participate the discussions in the class. The discussion leaders should prepare the topics to be discussed, lead the students to discuss, and summarize the opinions. The purposes of leading discussion are two-folds:

- To know the pros and cons of the discussed algorithm or paper.
- To figure out the possible research directions, based on the discussed algorithm.

The discussion leader may (but are not required to) prepare a five minutes presentation at the beginning of the discussion for the background of the paper, leader's viewpoints, and discussion agenda. Note that it is not leader's responsibility to educate the students to understand the paper.

The leader will be graded based on the following criteria:
- The organization of the discussion, and
- The designated discussion topics.

The students will be graded based on the following criteria:
- The participation of the discussion, and
- The comprehension of the reading materials.

Paper Critics:

The students will be given papers to write critics during the semester. Each student has to write at least two critics. The critics can be written in either English or Chinese and are recommended to be edited by native speakers before submission. The detail for writing the critics will be given in the class. The critics have to be submitted before the paper is discussed in the class. Once the paper is discussed in the class, no critics for the discussed papers will be accepted.

The reading lists will be provided no later than September 30, 2020.

POLICY:

Late Assignment:

The assignments should be handed in via the provided web-based assignment submission system. All assignments must be handed in before 11:59PM at their corresponding due days. It is your responsibility to make sure that your assignments are handed in before the deadline. The TAs will not accept the assignments via emails or any other means. Check out the submission web site to see how to make sure your assignments are submitted successfully. So, do it as early as possible.

Only the assignments submitted before the deadline will receive full credit. 5% of your grade will be deducted for single day delay.

The presentation files and paper critics have to be submitted one day before the date scheduled for discussion. (For example, if the discussion is scheduled for March 6th, the presentation slides and paper critics have to be submitted before 11:59PM on March 5th to receive full credit.)

Plagiarism:

There is absolutely NO tolerance for plagiarism. We will follow the IEEE policies on authorship (Section 6.4.1.A) and plagiarism (Section 6.4.1.B.f) to ensure your homework/article meets all criteria for authorship and originality. (As an engineer, you should check out IEEE's code of ethics.) You should also check out **臺灣大學學生個人獎懲辦法** for your own rights.

SCHEDULE:

The schedule is tentative and subjected to change. However, any change will be announced in the class and the announcement section of the course web site.

Week	Date	Topic	Discussion
1	2020-09-16	Syllabus	
2	2020-09-23	Introduction for distributed operating systems	
3	2020-09-30	Communication for distributed systems and multicore systems	
4	2020-10-07	Distributed Shared Memory	Sample Discussion on distributed systems
5	2020-10-14	Distributed Shared Memory	Communication
6	2020-10-21	Synchronization	Distributed Shared Memory
7	2020-10-28	Synchronization	Synchronization
8	2020-11-04	Distributed Process Management	Synchronization for WSN
9	2020-11-11	Distributed File Systems	Distributed Resource Management
10	2020-11-18	Mid-Term Exam	
11	2020-11-25	Distributed File Systems	Distributed Process Management
12	2020-12-02	Middleware for IoT	Google File Systems
13	2020-12-09	Embedded operating systems	Memory-based File Systems
14	2020-12-16	Real-Time operating systems	Middleware for IoT
15	2020-12-23	Robotic Operating Systems	Embedded OS/ Android
16	2020-12-30	Virtualization for Real-time Systems	Robotic Operating Systems
17	2021-01-06	Virtualization for Real-time Systems	Real-Time Operating Systems
18	2021-01-13	Final Exam	

The lecture slides and handouts will be available on the course web site. Please check out the slides and handouts before the class. The handouts will NOT be distributed in the class.