ITP30002

Operating Systems

Yunmin Go

School of CSEE

HANDONG GLOBAL UNIVERSITY

Introduction

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  - Office hours
    - Tue/Fri: 14:30~15:45

Course Objectives

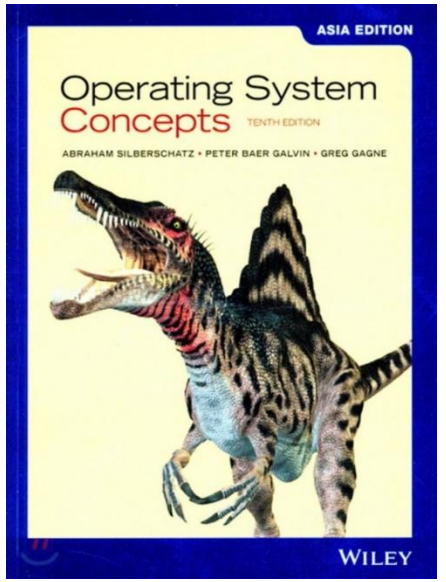
- Understand the key concepts and design principles of operating systems
- Have an overview of designs and implementations of contemporary operating systems
- Have essential experiences of system programming with Linux

Course Description

- In this course, we will study about the key concepts and design principles of operating systems. Through this course, we will understand basic knowledge of the mechanism and theories that are used to implement modern operating systems. Moreover, this course will give an in-depth understanding of the inner-workings of computer systems. This class is specially focused on the process management, process synchronization, memory management, storage management, and file system.

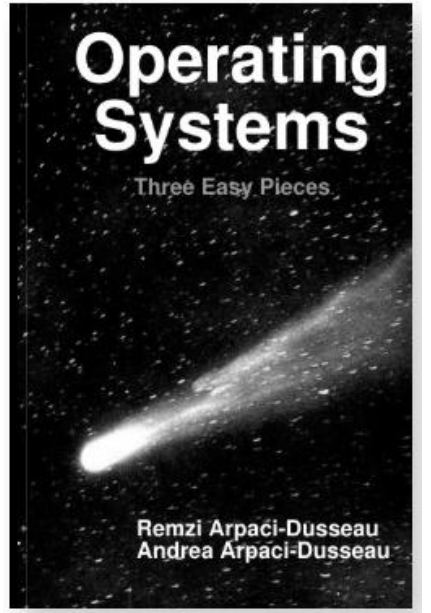
Course Operation Plan (1/6)

- Textbook
  - Abraham Silberschatz, Peter Bear Galvin, and Greg Gagne, "**Operating System Concepts**," 10th Edition, Wiley, 2019.



- Reference
  - **"Operating Systems: Three Easy Pieces," (OSTEP)**

    https://pages.cs.wisc.edu/~remzi/OSTEP/ (It is for free!)



- Prerequisites
  - C Programming
  - Computer Architecture (strongly recommended)

Course Operation Plan (2/6)

- Grading Policies

Category	Policy
Attendance	5%
Homework	15%
Quiz + Programming Test	20%
Midterm exam	30%
Final exam	30%

※ If you get 0 point on both the midterm and final exams, you will get F grade.

Course Operation Plan (3/6)

- Attendance
  - 0.5 point penalty is given for absence. (3 tardiness == 1 absence)
  - If you are absent more than 1/4, you will get F grade.

- Assignments
  - All assignments must be handed in before the due date.
  - If the assignment is late than due date, -1 pts penalty per day is given.
    - 1 day late: -1pts, 2 days late: -2pts, 3 days late: -3pts
    - Late submissions are allowed up to 3 days

- Honor code
  - We must comply with the Handong Honor Code.
  - Any kinds of cheatings will get 0 point.

※ Do not use Chegg and similar websites.
※ Do not copy your colleague's codes.
※ Do not copy from ChatGPT.

Course Operation Plan (4/6)

- Honor code
  - We must adhere to the Handong Honor Code.
  - Any form of cheating will result in a score of zero.
  - For programming assignments and tests, the use of AI tools such as ChatGPT and Copilot is strictly prohibited.
  - Copying code from colleagues is not allowed.

If you are caught cheating on any assignment, you will receive a score of 0 for all of your assignments, regardless of the points you've earned on other assignments.

Both the person who provides the code and the one who copies it will receive a score of zero.

Course Operation Plan (4/6)

- Basically, all students should participate offline lecture.

- However, online lectures are allowed only for infectious diseases that require quarantine, such as COVID-19.
  - If you want to participate in online lecture, please let me know 1 hour before the class by email
  - You should submit the test result certificate after quarantine

- All tests (quizzes, midterm exam, and final exam) will be offline only!

- Make-up lecture can be provided in online (ZOOM or LMS).

Course Operation Plan (5/6)

- The lecture topics are categorized into three levels: Basic, Intermediate, and Advanced.
- The final grade may be evaluated based on the level of achievement at each level.
  - Example: Advanced > 80 & Intermediate > 80% → A+
    Advanced > 30 & Intermediate > 80% → A0
    Basic > 50% → B0

Course Operation Plan (6/6)

- Questions
  - KakakoTalk open chat
  - E-mail
  - Q&A Sheet (TBA)
  - Office hours
    - Tue/Fri: 14:30~15:45

Weekly Schedule

- This semester, the course will follow the chapter order of the OSTEP textbook.

Intro	Virtualization		Concurrency	Persistence	Security
Preface	3 *Dialogue*	12 *Dialogue*	25 *Dialogue*	35 *Dialogue*	52 *Dialogue*
TOC	4 Processes	13 Address Spaces code	26 Concurrency and Threads code	36 I/O Devices	53 *Intro Security*
1 *Dialogue*	5 Process API code	14 Memory API	27 Thread API code	37 Hard Disk Drives	54 *Authentication*
2 Introduction code	6 Direct Execution	15 Address Translation	28 Locks code	38 Redundant Disk Arrays (RAID)	55 *Access Control*
	7 CPU Scheduling	16 Segmentation	29 Locked Data Structures	39 Files and Directories	56 *Cryptography*
	8 Multi-level Feedback	17 Free Space Management	30 Condition Variables code	40 File System Implementation	57 *Distributed*
	9 Lottery Scheduling code	18 Introduction to Paging	31 Semaphores code	41 Fast File System (FFS)	
	10 Multi-CPU Scheduling	19 Translation Lookaside Buffers	32 Concurrency Bugs	42 FSCK and Journaling	**Appendices**
	11 *Summary*	20 Advanced Page Tables	33 Event-based Concurrency	43 Log-structured File System (LFS)	*Dialogue*
		21 Swapping: Mechanisms	34 *Summary*	44 Flash-based SSDs	Virtual Machines
		22 Swapping: Policies		45 Data Integrity and Protection	*Dialogue*
		23 Complete VM Systems		46 *Summary*	Monitors
		24 *Summary*		47 *Dialogue*	*Dialogue*
				48 Distributed Systems	Lab Tutorial
				49 Network File System (NFS)	Systems Labs
				50 Andrew File System (AFS)	xv6 Labs
				51 *Summary*	

Weekly Schedule (Tentative) (1/2)

Week	Topic	Note
1	Part 1. Overview (Chapter 1 ~ 2)	
2	Part 1. Overview (Chapter 1 ~ 2)	
3	Part 2. Process Management (Chapter 3, 5)	
4	Part 2. Process Management (Chapter 3, 5)	Quiz#1
5	Part 2. Process Management (Chapter 3, 5)	
6	Part 4. Memory Management (Chapter 9 ~ 10)	Quiz#2
7	Part 4. Memory Management (Chapter 9 ~ 10)	
8	Mid-term Exam	

Weekly Schedule (Tentative) (2/2)

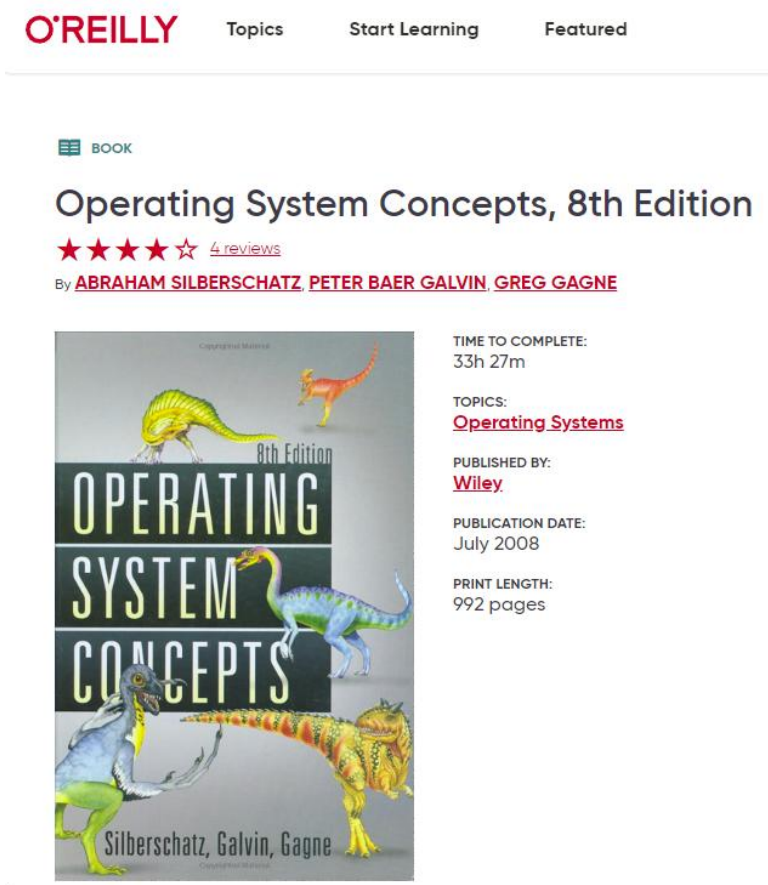
Week	Topic	Note
9	Part 4. Memory Management (Chapter 9 ~ 10)	
10	Part 3. Process Synchronization (Chapter 4, 6 ~ 8)	
11	Part 3. Process Synchronization (Chapter 4, 6 ~ 8)	
12	Part 3. Process Synchronization (Chapter 4, 6 ~ 8)	Quiz#3
13	Part 5. Storage Management (Chapter 11 ~ 12)	
14	Part 6. File System (Chapter 13 ~ 15)	Quiz#4
15	Part 6. File System (Chapter 13 ~ 15)	
16	Final Exam	

※ Above plans are subject to change depending on situations.

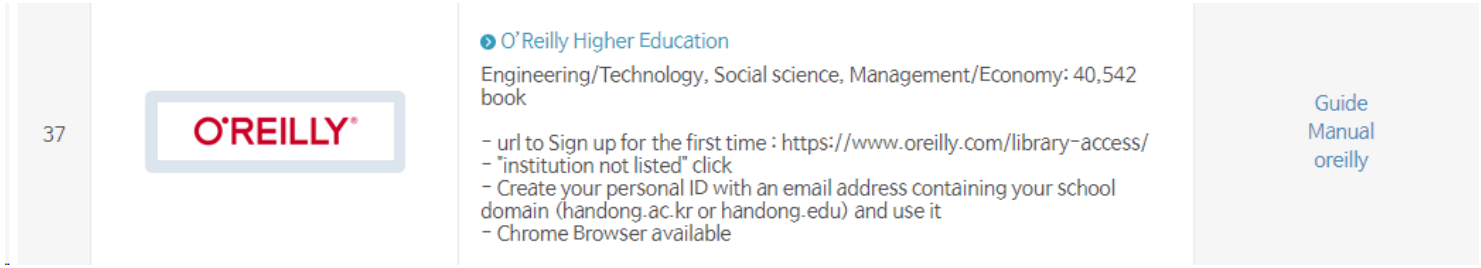
APPENDIX

O’Reilly Higher Education

- Handong students can use O’Reilly library access for free!
  - The 8th edition of our text book is also available!



- Guide and Manual
  - Go to ‘Academic Database (학술 DB)’ in the Handong library homepage
    - https://library.handong.edu/local/html/231
  - Find “O’Reilly Higher Education”



Recommended Book

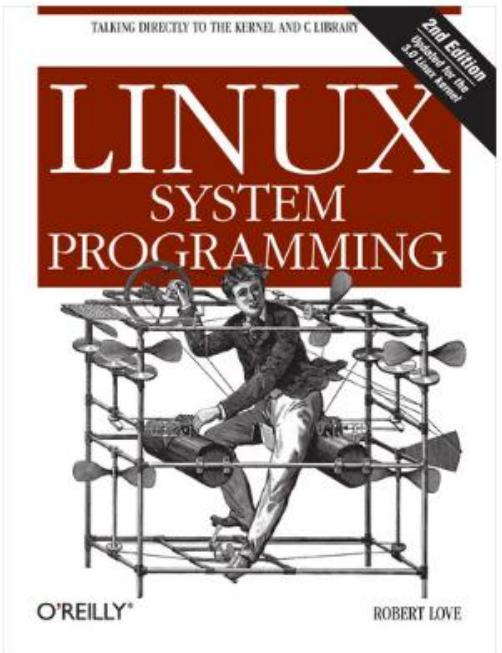
O'REILLY Topics Start Learning Featured

BOOK

Linux System Programming, 2nd Edition

★★★★★ 24 reviews

By Robert Love



TIME TO COMPLETE:
11h 56m

TOPICS:
Linux

PUBLISHED BY:
O'Reilly Media, Inc.

PUBLICATION DATE:
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PRINT LENGTH:
456 pages

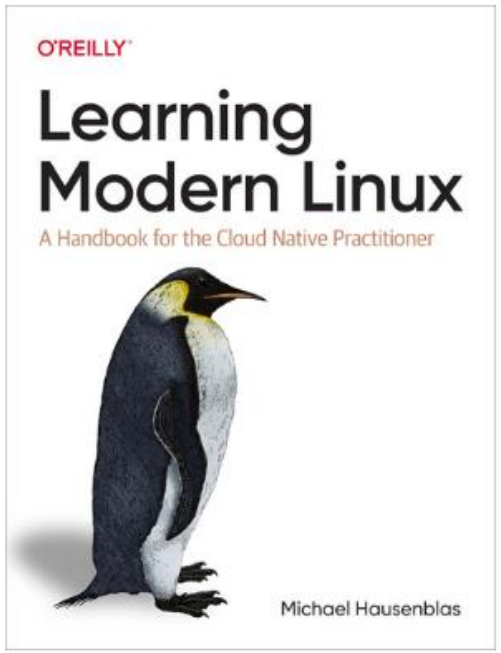
O'REILLY Topics Start Learning Featured

BOOK

Learning Modern Linux

★★★★☆ 6 reviews

By Michael Hausenblas



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