

Lecture Note 0: Course Introduction

March 2, 2022

Jongmoo Choi

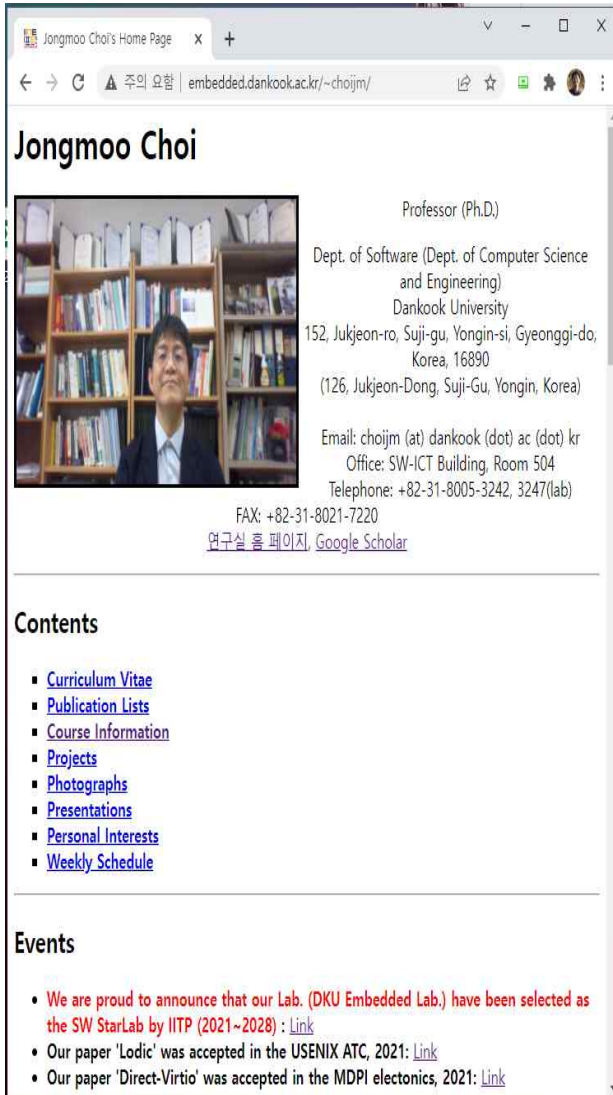
Dept. of software

Dankook University

<http://embedded.dankook.ac.kr/~choijm>

How to access lecture contents?

■ Lecture site



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[연구실 홈페이지](#), [Google Scholar](#)

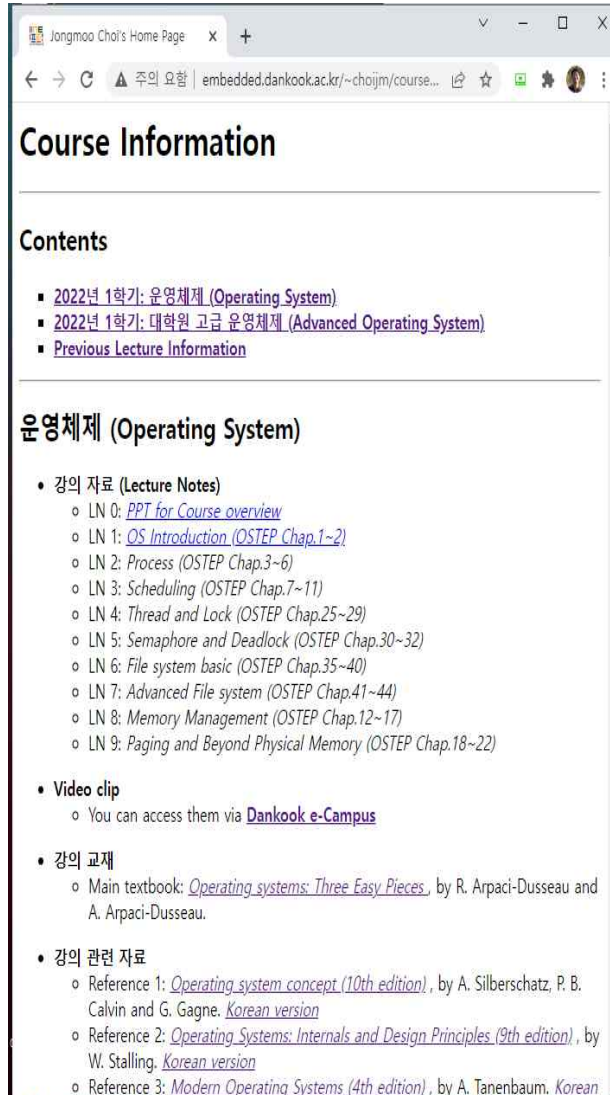
Contents

- Curriculum Vitae
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Events

- We are proud to announce that our Lab. (DKU Embedded Lab.) have been selected as the SW StarLab by IITP (2021~2028) : [Link](#)
- Our paper 'Lodic' was accepted in the USENIX ATC, 2021: [Link](#)
- Our paper 'Direct-Virtio' was accepted in the MDPI electronics, 2021: [Link](#)

(home page)



Course Information

Contents

- 2022년 1학기: 운영체제 (Operating System)
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- [Previous Lecture Information](#)

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 - LN 7: [Advanced File system \(OSTEP Chap.41~44\)](#)
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(lecture page)



강의콘텐츠

운영체제(SW) 2분반 > 운영체제(SW) 2분반

2022년 1학기

홈

수업 계획서

공지

강의자료실

열린게시판

문의게시판

과제 및 평가

시험 및 설문

토론

강의콘텐츠

ClassMix

사용자 및 그룹

성적

종합성적부

파일

페이지

성과

모듈

협업

루브릭

출결/학습 현황

학습설계진단

구글 클래스룸

설정

01 02 03 04 05 06 07 08 09 10 11 12 13

모든 주차 보기

주차 학습 기간 일괄 변경

주차 일괄 삭제

+ 주차 추가

01 | 1주차: 강의 소개와 운영체제...

시작일: 3월 1일 오전 00:01

강제

+ 차시 추가

1차시: 강의 소개

+ 페이지 추가

1페이지

내 콘텐츠 가져오기

새 콘텐츠 등록하기

과제 워드 다운로드

확장 강의

텍스트

2차시: 운영체제 정의, CPU 가상화 소개

+ 페이지 추가

1페이지

내 콘텐츠 가져오기

새 콘텐츠 등록하기

과제 워드 다운로드

확장 강의

텍스트

02 | 2주차: 운영체제 구조, 프...

시작일: 3월 1일 오전 00:01

강제

+ 차시 추가

1차시: 메모리 가상화, 병렬성, 영속성 소개, 운영체제 구조

+ 페이지 추가

1페이지

내 콘텐츠 가져오기

새 콘텐츠 등록하기

과제 워드 다운로드

확장 강의

텍스트

2차시: 프로세스 정의와 상태 전이

+ 페이지 추가

1페이지

(e-Campus (LMS))

What is Operating System?

■ Definition (from wikipedia.org)

Jongmoo Choi's Home x W Operating system - Wiki x

← → ↻ 안전함 | https://en.wikipedia.org/wiki/Operating_system

Operating system

From Wikipedia, the free encyclopedia

An **operating system (OS)** is system software that manages computer hardware and software resources and provides common services for computer programs.

Time-sharing operating systems schedule tasks for efficient use of the system and may also include accounting software for cost allocation of processor time, mass storage, printing, and other resources.

For hardware functions such as input and output and memory allocation, the operating system acts as an intermediary between programs and the computer hardware,^{[1][2]} although the application code is usually executed directly by the hardware and frequently makes system calls to an OS function or is interrupted by it. Operating systems are found on many devices that contain a computer – from cellular phones and video game consoles to web servers and supercomputers.

The dominant desktop operating system is Microsoft Windows with a market share of around 82.74%. macOS by Apple Inc. is in second place (13.23%), and the varieties of Linux are collectively in third place (1.57%).^[3] In the mobile (smartphone and tablet combined) sector, use in 2017 is up to 70% of Google's Android^[4] and according to third quarter 2016 data, Android on smartphones is dominant with 87.5 percent and a growth rate 10.3 percent per year, followed by Apple's iOS with 12.1 percent and a per year decrease in market share of 5.2 percent, while other operating systems amount to just 0.3 percent.^[5] Linux distributions are dominant in the server and supercomputing sectors. Other specialized classes of operating systems, such as embedded and real-time systems, exist for many applications.

Operating systems

```
graph TD; User[User] <--> Application[Application]; Application <--> OS[Operating System]; OS <--> Hardware[Hardware];
```

Common features

- Process management
- Interrupts
- Memory management
- File system
- Device drivers
- Networking
- Security
- I/O

V · T · E

Contents [hide]

- Types of operating systems

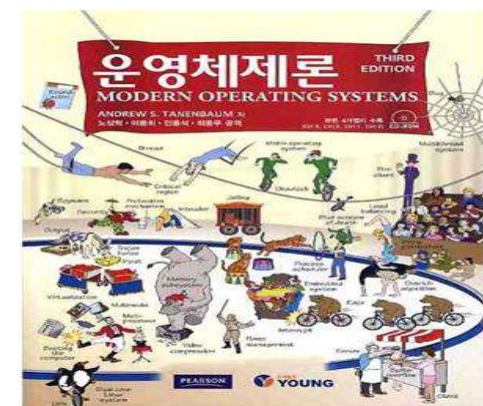
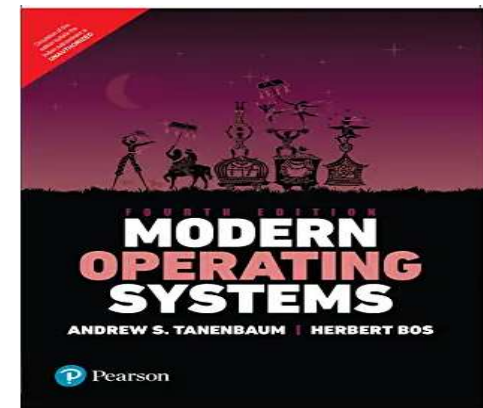
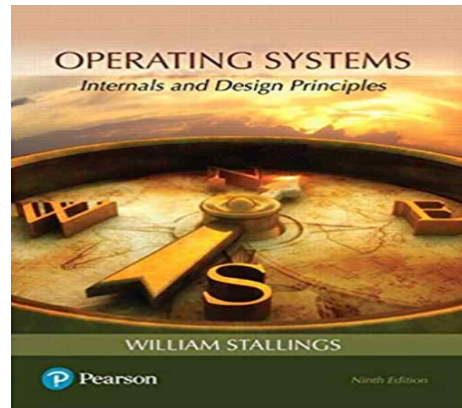
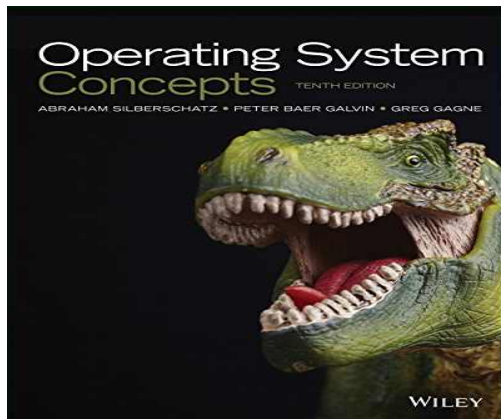
Course Objectives

- Understand the **definition**, role and goal of OS
 - ✓ Resource manager, computing environments, ...
- Know the existing operating systems
 - ✓ UNIX, Windows, Apple OS X, Linux, Android, iOS, WebOS, Mach, ...
- Learn the **internal structure** of OS
 - ✓ Process, Virtual memory, File system, Driver, Protocol, Interrupt, ...
- Comprehend the **policies** and **mechanisms** used by OS
 - ✓ CPU scheduling, Demand paging, LRU, inode, System call, ...
- Grasp the idea of abstraction
 - ✓ Information Hiding, Illusion, Interface, Layered architecture, ...
- **Demonstrate** what we have learned
 - ✓ Lab. project



Traditional Textbook

- Three representative textbooks for operating system course
 - ✓ Operating Systems Concepts (10th edition), by A. Silberschatz, P. Galvin and G. Gagne
 - ✓ Operating Systems: Internals and Design Principles (9th edition), by W. Stalling
 - ✓ Modern Operating Systems (5th edition), by A. Tanenbaum and H. Bos



Textbook in this course

■ Remzi's OSTEP (OS Three Easy Pieces)

✓ <http://pages.cs.wisc.edu/~remzi/OSTEP/>

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 - Reference 3: *Modern Operating Systems (4th edition)*, by A. Tanenbaum, *Korean version*

Another way to help the book out: cite it! Here is the [BiBTeX entry \(seen below\)](#); you can also link to the site on the market.

Operating Systems: Three Easy Pieces
 Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau
 Arpaci-Dusseau Books
 August, 2018 (Version 1.00)

And now, the free online form of the book, in chapter-by-chapter form (now with chapter numbers!):

Intro	Virtualization	Concurrency	Persistence	Security
Preface	3 <i>Dialogue</i>	25 <i>Dialogue</i>	35 <i>Dialogue</i>	52 <i>Dialogue</i>
TOC	4 <i>Processes</i>	26 <i>Concurrency and Threads</i> <i>code</i>	36 <i>I/O Devices</i>	53 <i>Intro Security</i>
1 <i>Dialogue</i>	5 <i>Process API</i> <i>code</i>	27 <i>Thread API</i> <i>code</i>	37 <i>Hard Disk Drives</i>	54 <i>Authentication</i>
2 <i>Introduction</i> <i>code</i>	6 <i>Direct Execution</i>	28 <i>Locks</i> <i>code</i>	38 <i>Redundant Disk Arrays</i> (RAID)	55 <i>Access</i> <i>Control</i>
	7 <i>CPU Scheduling</i>	29 <i>Locked Data Structures</i>	39 <i>Files and Directories</i>	56 <i>Cryptography</i>
	8 <i>Multi-level Feedback</i>	30 <i>Condition Variables</i> <i>code</i>	40 <i>File System Implementation</i>	57 <i>Distributed</i>
	9 <i>Lottery Scheduling</i> <i>code</i>	31 <i>Semaphores</i> <i>code</i>	41 <i>Fast File System (FFS)</i>	
	10 <i>Multi-CPU</i> <i>Scheduling</i>	32 <i>Concurrency Bugs</i>	42 <i>FSCCK and Journaling</i>	Appendices
	11 <i>Summary</i>	33 <i>Event-based Concurrency</i>	43 <i>Log-structured File System</i> (LFS)	<i>Dialogue</i>
		34 <i>Summary</i>	44 <i>Flash-based SSDs</i>	<i>Virtual</i> <i>Machines</i>
			45 <i>Data Integrity and Protection</i>	<i>Dialogue</i>
			46 <i>Summary</i>	<i>Monitors</i>
			47 <i>Dialogue</i>	<i>Dialogue</i>
			48 <i>Distributed Systems</i>	<i>Lab Tutorial</i>
			49 <i>Network File System (NFS)</i>	<i>Systems Labs</i>
			50 <i>Andrew File System (AFS)</i>	<i>xv6 Labs</i>
			51 <i>Summary</i>	

INSTRUCTORS: If you are using these free chapters, **please just link to them directly** (instead of making a copy locally); we make little improvements frequently and thus would like to provide the latest to whomever is using it. Also, we have made our own class preparation notes available to those of

Textbook in this course

■ TOC (Table of Contents) of OSTEP

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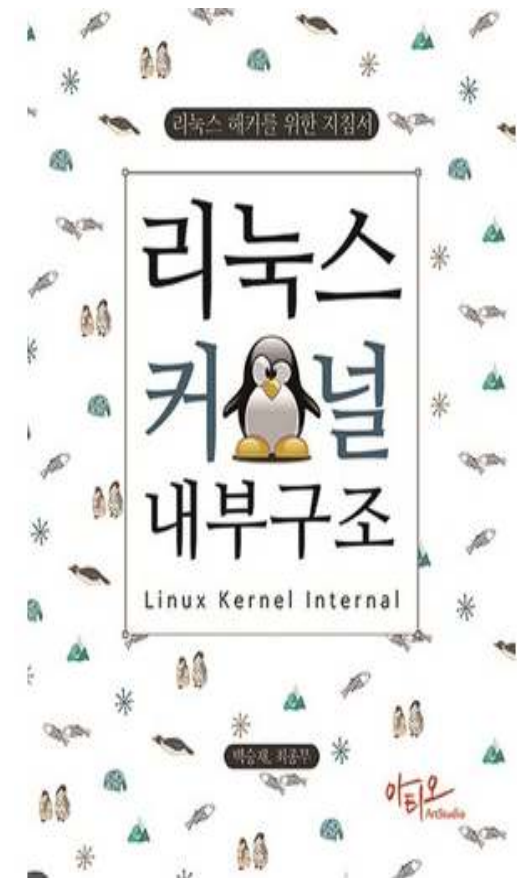
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■ Linux Kernel Internals (리눅스 커널 내부 구조)

- ✓ 1장. 리눅스 소개
- ✓ 2장. 리눅스 커널 구조
- ✓ 3장. 태스크 관리
- ✓ 4장. 메모리 관리
- ✓ 5장. 파일시스템과 가상 파일시스템
- ✓ 6장. 인터럽트와 트랩 그리고 시스템 호출
- ✓ 7장. 리눅스 모듈 프로그래밍
- ✓ 8장. 디바이스 드라이버
- ✓ 9장. 네트워킹
- ✓ 10장. 운영체제 관련 실습
- ✓ 부록1. 리눅스와 가상화 그리고 XEN
- ✓ 부록2. MTD와 YAFFS



Teaching Method

■ Mainly Lecturing

- ✓ Discussion (Q&A) during the course is quite important

■ Homework

- ✓ Reading assignment
 - 2 or 3 times
- ✓ Lab. Project (Programming or Analysis)
 - Lab1: scheduling
 - Lab2: concurrency
 - Lab3: file system



■ Grading

- ✓ Exam(45%) + Lab. Project (35%) + Assignment/Discussion (10%) + Attendance/Quiz/Discussion (10%) → can be changed later
- ✓ Absence more than 5 times or Mid or Final Exam. score below 20 or No lab. Project → F
- ✓ Roughly, 20% students are expected to get the A grade.

Discussion



➤ Any questions? Ask at “문의 게시판” or Send an email to me: choijm@dankook.ac.kr



Quiz for 1th-Week 1st-Lesson

■ Quiz

- ✓ 1. What are the difference between Operating Systems (e.g. MS Windows or Linux) and Applications (e.g. MS Word or Chrome)? Explain the difference using the word “mode”.
- ✓ 2. There is a Confucian philosopher, Xunzi, in Chapter 1, “A Dialog on the Book”, of the OSTEP (our main text book). Explain what he said.
- ✓ Due: until 6 PM Friday of this week (4th, March)



(Source: Google Image)

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2 Introduction code	6 Direct Execution	15 Address Translation	28 Locks code	38 Redundant Disk Arrays (RAID)
	7 CPU Scheduling	16 Segmentation	29 Locked Data Structures	39 Files and Directories
	8 Multi-level Feedback	17 Free Space Management	30 Condition Variables code	40 File System Implementation
	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 EFSCK and Journaling
	11 Summary	20 Advanced Page Tables	33 Event-based Concurrency	43 Log-structured File System (LFS)
		21 Swapping: Mechanisms	34 Summary	44 Flash-based SSDs
		22 Swapping: Policies		45 Data Integrity and Protection
		23 Complete VM Systems		46 Summary
		24 Summary		47 Dialogue
				48 Distributed Systems
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