

Lecture Note 0: Course Introduction

February 25, 2021
Jongmoo Choi

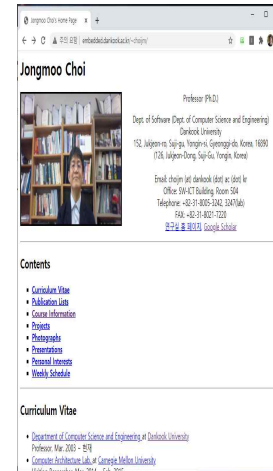
Dept. of software
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<http://embedded.dankook.ac.kr/~choijm>

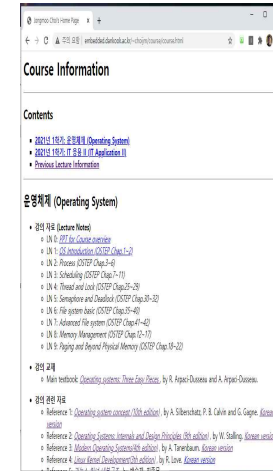
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Who am I?

Lecture site



(home page)



(lecture page)



(e-learning campus)

2

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What is Operating System?

Definition (from wikipedia.org)

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.

Contents (hide)

- 1 Types of operating systems

3

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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

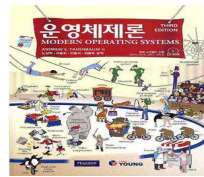
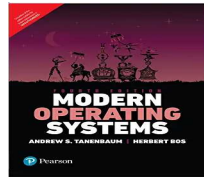
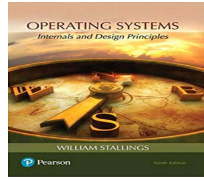
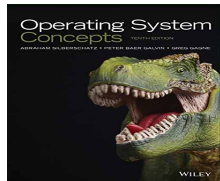


4

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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



5

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Textbook in this course

- Remzi's OSTEP (OS Three Easy Pieces)
 - ✓ <http://pages.cs.wisc.edu/~remzi/OSTEP/>

Operating Systems: Three Easy Pieces

Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau
 Arpaci-Dusseau Books
 August, 2018 (Version 1.00)

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.

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


Intro	Virtualization	Concurrency	Persistence	Security
Preface	1 Dialogue	15 Dialogue	35 Dialogue	52 Dialogue
TOC	2 Processes	16 Concurrency and Threads code	36 I/O Devices	53 Intro Security
1 Dialogue	3 Process API code	17 Thread API code	37 Hard Disk Drives	54 Authentication
2 Introduction code	4 Direct Execution	18 Locks code	38 Redundant Disk Arrays (RAID)	55 Access Control
	5 CPU Scheduling	19 Locked Data Structures	39 Files and Directories	56 Cryptography
	6 Multi-level Feedback	20 Condition Variables code	40 File System Implementation	57 Distributed
	7 Lottery Scheduling	21 Semaphores code	41 Fast File System (FFS)	58 Appendices
	8 Multi-CPU Scheduling	22 Translation Lookaside Buffers	42 Concurrency Bugs	43 Log-structured File System (LFS)
	9 Summary	23 Advanced Page Tables	44 Event-based Concurrency	45 Flash-based SSDs
		24 Swapping Mechanisms	46 Summary	47 Data Integrity and Protection
		25 Swapping Policies	48 Dialogue	49 Virtual Machines
		26 Complete VM Systems	49 Dialogue	50 Distributed Systems
		27 Summary	50 Dialogue	51 Network File System (NFS)
			51 Dialogue	52 Android File System (AFS)
			52 Dialogue	53 Labs
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Teaching Method

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

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- Homework
 - ✓ Reading assignment

- ✓ 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%)

- ✓ Exam(45%) + Lab. Project (35%) + Assignment/Discussion (10%) + Attendance/Quiz/Discussion (10%)
- ✓ 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 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. Find out the philosopher who appears in Chapter 1, “A Dialog on the Book”, of the OSTEP (our main text book).
- ✓ Due: until 6 PM Friday of this week (5th, March)



(Source: Google Image)

Another way to help the book out is if there is the <https://www.it-ebooks.info> you can also link to the site of the [best free e-books website](https://www.it-ebooks.info) on the web.

Operating Systems: Two Easy Pieces

Ronald R. Arpaci-Dusseau and Andrea A. Arpaci-Dusseau
August 2019 (Version 1.00)

And now, the five columns of the book: in regular chapters (from with chapter numbers):

Index	Introduction	Chapters 1-5	Chapters 6-10	Chapters 11-15
Index	Chapter 1: Introduction	Chapter 2: Processes	Chapter 3: Memory	Chapter 4: File Systems
Chapter 1: Introduction	Chapter 2: Processes	Chapter 3: Memory	Chapter 4: File Systems	Chapter 5: Virtualization
Chapter 2: Processes	Chapter 3: Memory	Chapter 4: File Systems	Chapter 5: Virtualization	Chapter 6: Operating Systems
Chapter 3: Memory	Chapter 4: File Systems	Chapter 5: Virtualization	Chapter 6: Operating Systems	Chapter 7: Networking
Chapter 4: File Systems	Chapter 5: Virtualization	Chapter 6: Operating Systems	Chapter 7: Networking	Chapter 8: Security
Chapter 5: Virtualization	Chapter 6: Operating Systems	Chapter 7: Networking	Chapter 8: Security	Chapter 9: Advanced Topics
Chapter 6: Operating Systems	Chapter 7: Networking	Chapter 8: Security	Chapter 9: Advanced Topics	Chapter 10: Appendixes
Chapter 7: Networking	Chapter 8: Security	Chapter 9: Advanced Topics	Chapter 10: Appendixes	Chapter 11: Index
Chapter 8: Security	Chapter 9: Advanced Topics	Chapter 10: Appendixes	Chapter 11: Index	
Chapter 9: Advanced Topics	Chapter 10: Appendixes	Chapter 11: Index		
Chapter 10: Appendixes	Chapter 11: Index			
Chapter 11: Index				

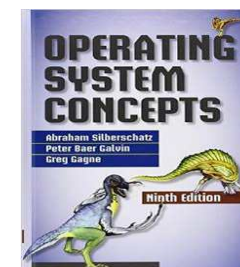
INSTRUCTORS: If you are using these five chapters, **please link to them directly** (instead of making a copy locally) so we make life impossible

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Reference

- Operating Systems Concepts
 - ✓ Chapter 1: Introduction
 - ✓ Chapter 2: Operating System Structure

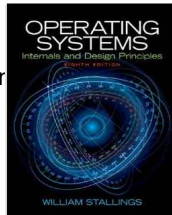
- ✓ Chapter 1: Introduction
- ✓ Chapter 2: Operating System Structure
- ✓ Chapter 3: Processes
- ✓ Chapter 4: Threads
- ✓ Chapter 5: Process Synchronization
- ✓ Chapter 6: CPU Scheduling
- ✓ Chapter 7: Deadlocks
- ✓ Chapter 8: Main Memory
- ✓ Chapter 9: Virtual Memory
- ✓ Chapter 10: Mass-Storage Structure
- ✓ Chapter 11: File System Interface
- ✓ Chapter 12: File System Implementation
- ✓ Chapter 13: I/O Systems
- ✓ Chapter 14: Protection
- ✓ Chapter 15: Security
- ✓ Chapter 16: Virtual machine
- ✓ Chapter 17: Distributed Systems
- ✓ Chapter 18: The Linux System
- ✓ Chapter 19: Windows 7
- ✓ Chapter 20: Influential OSes
- ✓ Appendix: Mach, BSD



Reference

■ Operating Systems: Internals and Design Principles

- ✓ Chapter 1. Computer system overview
- ✓ Chapter 2. Operating system overview
- ✓ Chapter 3. Process description and control
- ✓ Chapter 4. Threads
- ✓ Chapter 5. Concurrency: Mutual exclusion & synchronization
- ✓ Chapter 6. Concurrency: Deadlock & Starvation
- ✓ Chapter 7. Memory management
- ✓ Chapter 8. Virtual memory
- ✓ Chapter 9. Uniprocessor scheduling
- ✓ Chapter 10. Multiprocessor and RT scheduling
- ✓ Chapter 11. I/O management and disk scheduling
- ✓ Chapter 12. File management
- ✓ Chapter 13. Embedded operating system
- ✓ Chapter 14. Virtual machine
- ✓ Chapter 15. Operating system security
- ✓ Chapter 16. Distributed processing, Client/Server, and Cluster
- ✓ Appendix and Online chapter



Reference

■ Modern Operating Systems

- ✓ Chapter 1. Introduction
- ✓ Chapter 2. Process and Thread
- ✓ Chapter 3. Memory Management
- ✓ Chapter 4. File Systems
- ✓ Chapter 5. Input/Output
- ✓ Chapter 6. Deadlocks
- ✓ Chapter 7. Virtualization and Cloud
- ✓ Chapter 8. Multiple Processor Systems
- ✓ Chapter 9. Security
- ✓ Chapter 10. Case Study 1: UNIX, Linux, & Android
- ✓ Chapter 11. Case Study 2: Windows 8
- ✓ Chapter 13. Operating System Design
- ✓ Chapter 14. Reading List and Bibliography

