CDA0017: Operating Systems

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NOSLab (https://noslab.github.io)
Changwon National University

Introduction

- When
  - Tuesday
    - #00: 12:00 – 13:30
    - #01: 13:30 – 15:00
  - Thursday
    - #00: 13:30 – 15:00
    - #01: 12:00 - 13:30

- Where
  - Lecture room #55110, 55 Engineering Bldg.

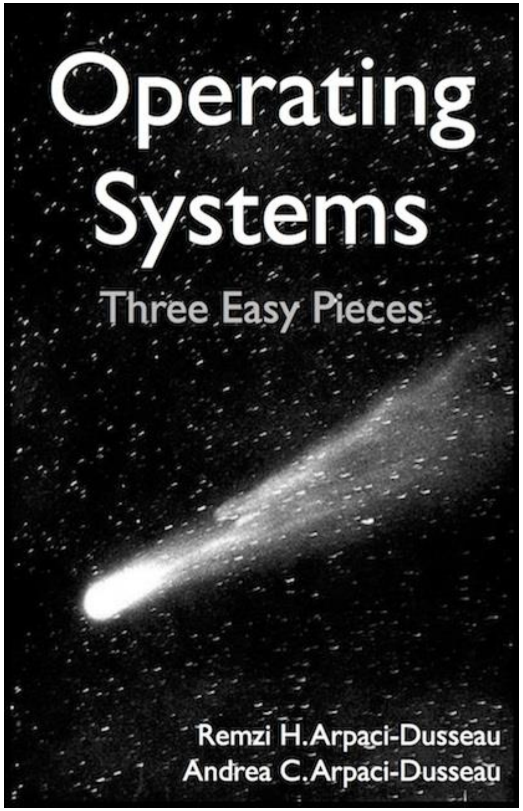
- Course homepage
  - https://noslab.github.io/pages/teaching/os.html

About me

- Donghyun Kang (강동현)
  - Professor @ CE Dept.
  - NOSlab (Next-generation Operating Systems Laboratory)
    - Operating systems, storage systems, distributed systems, embedded systems, …
  - Email: donghyun@changwon.ac.kr
  - URL: https://noslab.github.io/
  - Tel: 055-213-3811
  - Office: #55412(4th floor), 55 Engineering Bldg.
  - Office hours: Monday - Friday
  - The best way to contact me is by email

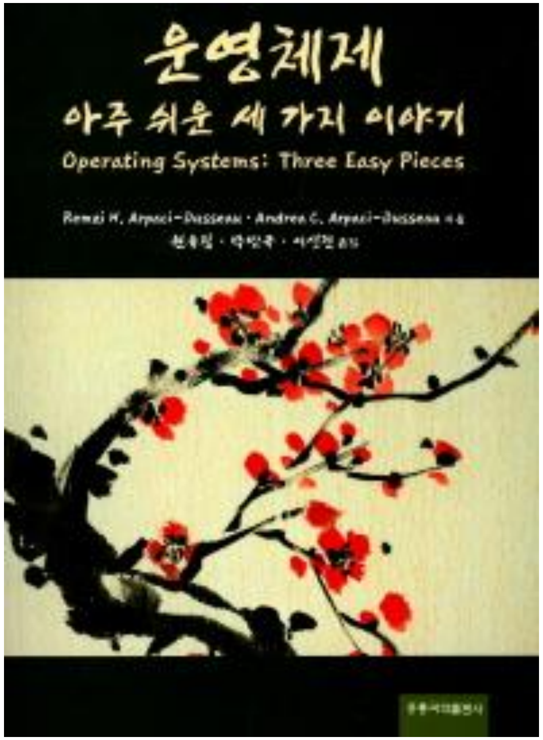
Textbook

- Operating Systems: Three Easy Pieces
  - Remzi Arpaci-Dusseau and Andrea Arpaci-Dusseau
  - CreateSpace Independent Publishing Platform
  - 2018
  - WebSite
    - https://pages.cs.wisc.edu/~remzi/OSTEP/


Operating Systems
Three Easy Pieces
Remzi H. Arpaci-Dusseau
Andrea C. Arpaci-Dusseau

Textbook (Korean)

- 운영체제 아주 쉬운 세 가지 이야기
  - 원유집 외 옮김
  - 홍릉과학출판사
  - 2017
  - WebSite
  - https://github.com/remzi-arpacidusseau/ostep-translations/tree/master/korean



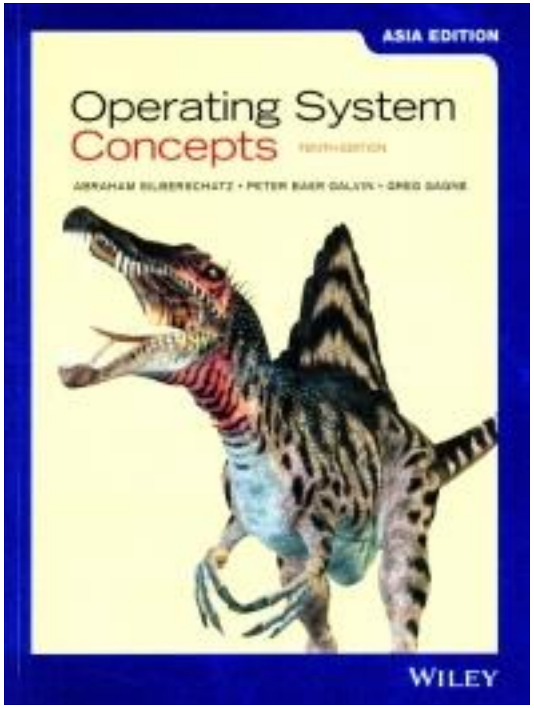
운영체제

아주 쉬운 세 가지 이야기

Operating Systems: Three Easy Pieces

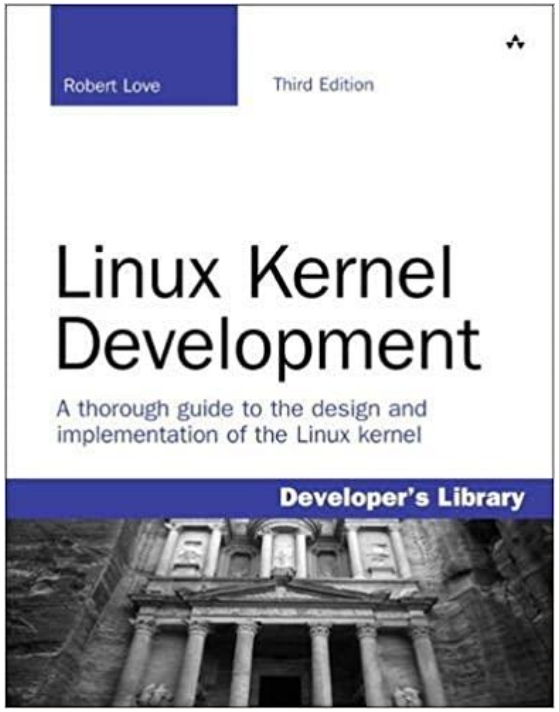
Reference 1

- Operating System Concepts
  - Abraham Silberschatz, Greg Gagne, and Peter B. Galvin
  - 10th edition
  - Wiley
  - 2018


ASIA EDITION
Operating System Concepts
ABRAHAM SILBERSCHATZ • PETER BAER GALVIN • GREG GAGNE
WILEY

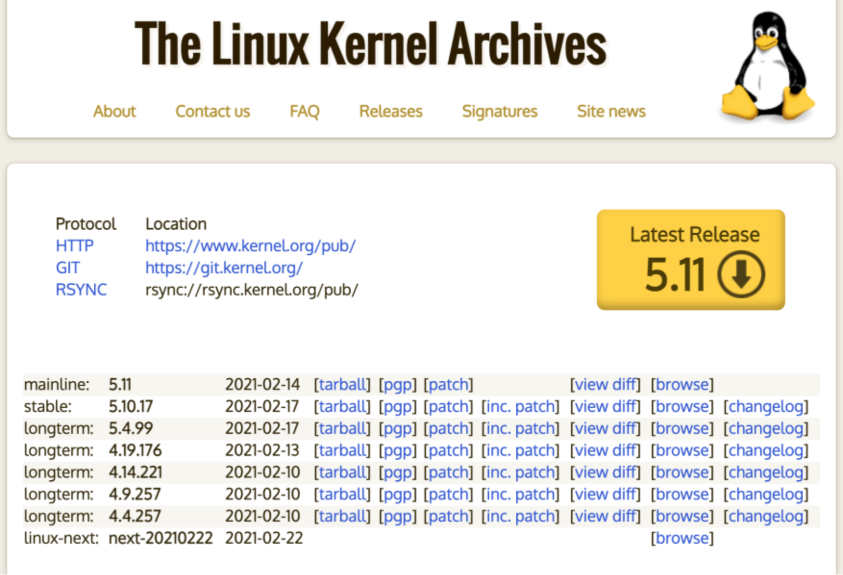
Reference 2

- Linux Kernel Development,
  - Robert Love
  - 3rd Edition
  - Addison-Wesley Professional
  - 2010


Robert Love
Third Edition
Linux Kernel Development
A thorough guide to the design and implementation of the Linux kernel
Developer's Library

Reference 3

- Website
  - [The Linux Kernel Archives]
  - [Linux Cross Rereference]



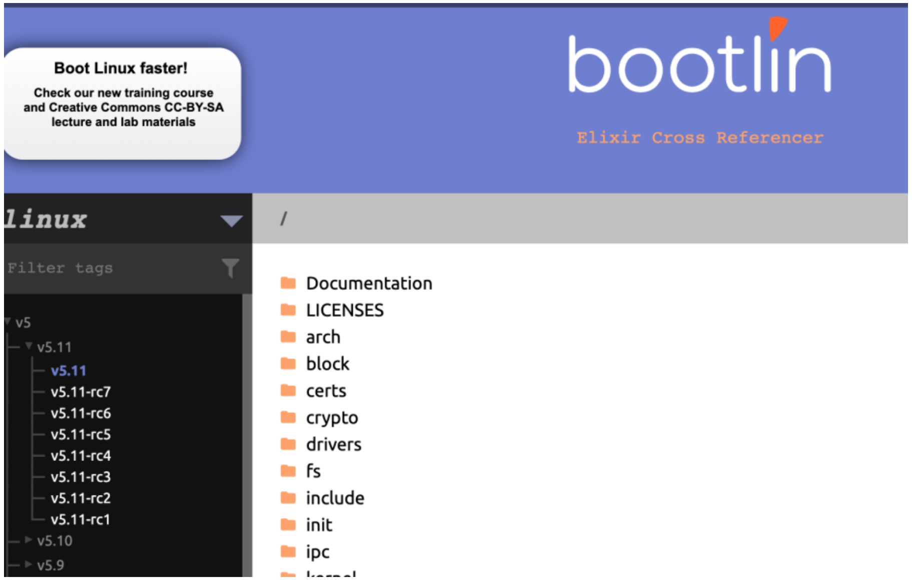
The Linux Kernel Archives

About Contact us FAQ Releases Signatures Site news

Protocol	Location
HTTP	https://www.kernel.org/pub/
GIT	https://git.kernel.org/
RSYNC	rsync://rsync.kernel.org/pub/

Latest Release
5.11

mainline:	5.11	2021-02-14	[tarball]	[pgp]	[patch]		[view diff]	[browse]	
stable:	5.10.17	2021-02-17	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]	[browse]	[changelog]
longterm:	5.4.99	2021-02-17	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]	[browse]	[changelog]
longterm:	4.19.176	2021-02-13	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]	[browse]	[changelog]
longterm:	4.14.221	2021-02-10	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]	[browse]	[changelog]
longterm:	4.9.257	2021-02-10	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]	[browse]	[changelog]
longterm:	4.4.257	2021-02-10	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]	[browse]	[changelog]
linux-next:	next-20210222	2021-02-22						[browse]	



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Elixir Cross Referencer

linux

Filter tags

- v5
  - v5.11
    - v5.11
    - v5.11-rc7
    - v5.11-rc6
    - v5.11-rc5
    - v5.11-rc4
    - v5.11-rc3
    - v5.11-rc2
    - v5.11-rc1
  - v5.10
  - v5.9

/

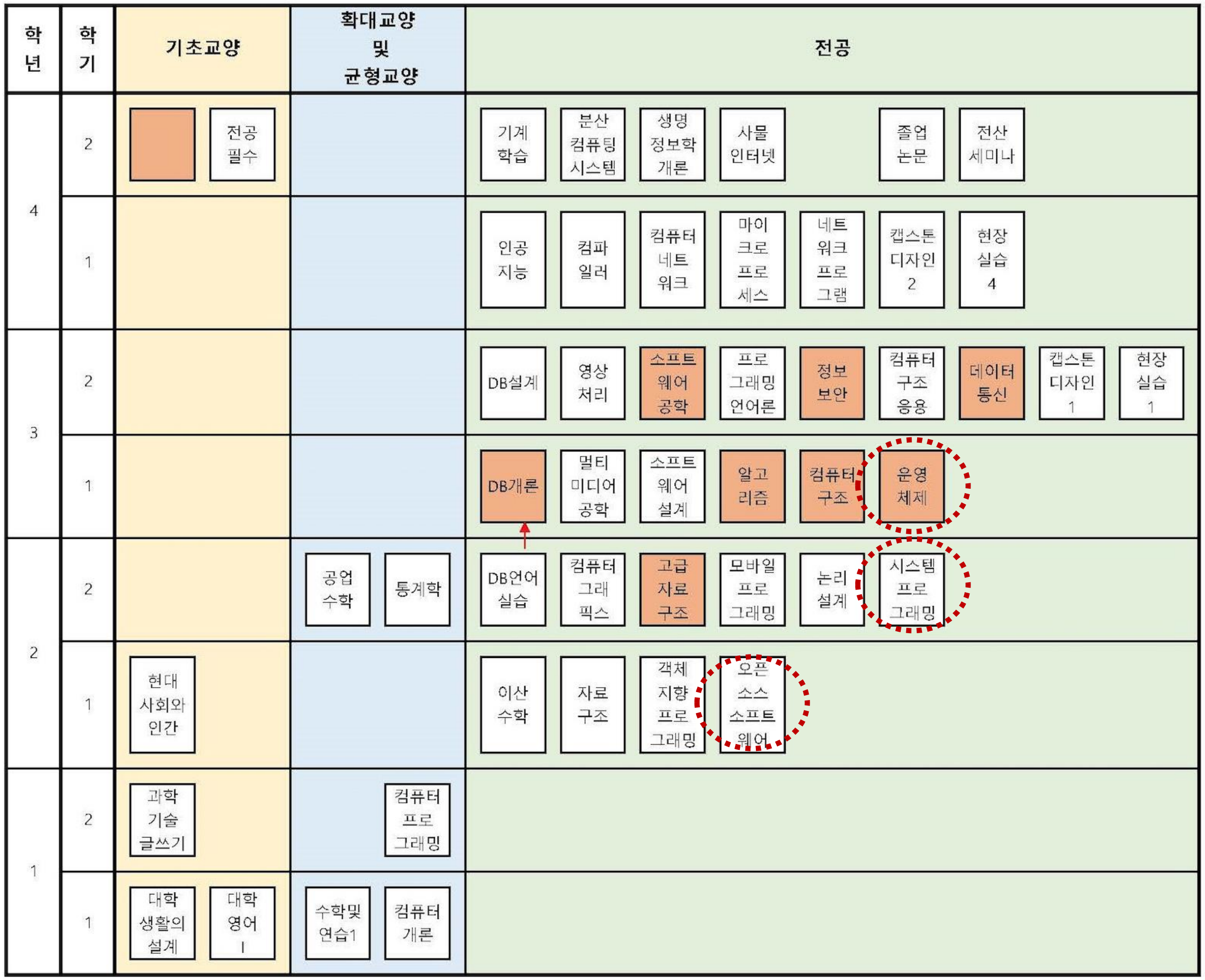
- Documentation
- LICENSES
- arch
- block
- certs
- crypto
- drivers
- fs
- include
- init
- ipc

Prerequisites

- CDA0156: Open Source Software
- CDA0006: System Programming

- You should be fluent in C programming!

Where are we?



학년	학기	기초교양	확대교양 및 균형교양	전공
4	2	🟧 전공 필수		기계 학습 분산 컴퓨팅 시스템 생명 정보학 개론 사물 인터넷 졸업 논문 전산 세미나
	1			인공 지능 컴파 일러 컴퓨터 네트 워크 마이 크로 프로 세스 네트 워크 프로 그램 캡스톤 디자인 2 현장 실습 4
3	2			DB설계 영상 처리 🟧 소프트 웨어 공학 프로 그래밍 언어론 🟧 정보 보안 컴퓨터 구조 응용 🟧 데이터 통신 캡스톤 디자인 1 현장 실습 1
	1			🟧 DB개론 멀티 미디어 공학 소프트 웨어 설계 🟧 알고 리즘 🟧 컴퓨터 구조 🟧 운영 체제
2	2		공업 수학 통계학	DB언어 실습 컴퓨터 그래 픽스 🟧 고급 자료 구조 모바일 프로 그래밍 논리 설계 시스템 프로 그래밍
	1	현대 사회와 인간		이산 수학 자료 구조 객체 지향 프로 그래밍 오픈 소스 소프트 웨어
1	2	과학 기술 글쓰기	컴퓨터 프로 그래밍	
	1	대학 생활의 설계 대학 영어 I	수학및 연습1 컴퓨터 개론	

Grading Policy

- Class attendance 10%
  - Must - otherwise you will get ‘F’ grade
    - Attend 12 weeks and more

  - May
    - From an absent, it will be reflected on your grade (-2 point per absent)
    - Attending after lecture will be counted by late (-0.5 point per late)
      - ~ 15 minutes before
      - 2 lates = 1 absence

Grading Policy

- Projects / Quizzes: 40%
  - You will get '0' score for each project
    - Not run
    - No submission
    - More than 80% similarity
  - You will get '0' score for each quiz that is performed without prior notice
    - No submission

Grading Policy

- Mid exam 25%
  - You will get ‘0’ score for the exam if you would not submit
- Final exam 25%
  - You will get ‘0’ score for the exam if you would not submit

- If you get less than 60, you will fail this course.
  - There is no exception

- Grading policy is subject to change.

Lecture notes & Projects

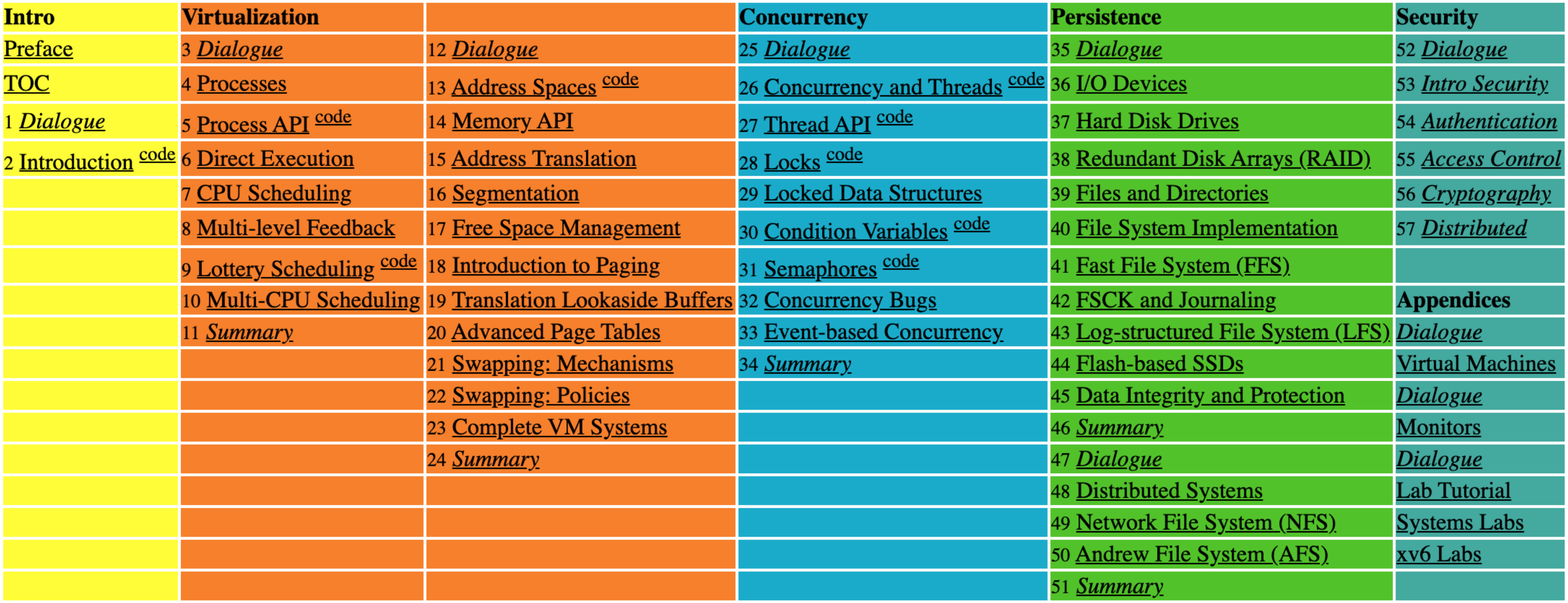
- Lecture notes will be uploaded at LMS
  - Some of slides for this lecture are based on materials provided by the textbook publisher
  - They will be made in Korean

- Projects (xv6)
  - A teaching OS developed by MIT
    - Port of the Sixth Edition Unix (v6) in ANSI C
    - Runs on multi-core x86 systems
  - We are preparing 4 ~ 5 projects
  - These will be individual projects

Today's Talk

- Briefly describing how to study operating systems

Topics



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*	

Shedule

Week	Topics
Week 1	Introduction to Operating Systems
Week 2	Process
Week 3	Scheduling & Multiprocessor Scheduling
Week 4	Memory & Address Translation
Week 5	Paging
Week 6	TLB
Week 7	Swapping & Concurrency
Week 8	Midterm
Week 9	Locks
Week 10	Condition Variables & Semaphores
Week 11	I/O Devices
Week 12	File System
Week 13	Locality & Crash Consistency
Week 14	Log-structured Filesystems & Flash-based SSD
Week 15	Final Exam

Q&A