

EEL 358: Operating Systems

Ajay Kumar

Department of Electrical Engineering

IIT Delhi



EEL 358

➤ Lecture Schedule:

- Tuesday (III 336, 10:00-10:55 Hrs)
- Wednesday (III 336, 10:00-10:55 Hrs)
- Friday (III 336, 10:00-10:55 Hrs)

➤ Course Website:

<http://web.iitd.ac.in/~ajaykr/eel358/main.htm>

- Lecture materials
- Assignments, Solutions
- Online References and Links

➤ Teaching Assistance:

- Mr. XYZ
- Email: *abc@jkl.com*

Who Am I?

- My Research Interests:
 - Computer Vision, Pattern Recognition
 - Biometrics and Vision-based Industrial Inspection
- Electrical Engineering
- Office: 202 Block II
- Email: ajaykr@ieee.org
- Office hours: by appointment via email

Course Outline

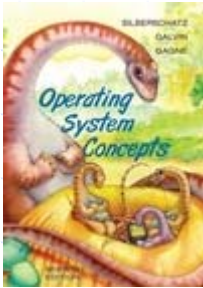
➤ Objectives

- To introduce the major concepts of operating system design;
- To study the detailed operation of various components of an operating system;
- To gain some hands-on experience on operating system concepts.

Course Outline

➤ Textbooks and References

- A. Silberschatz, P. Galvin, and G. Gagne, Operating System Concepts, 7th Edition, John Wiley & Sons, 2005.



Need 7th Edition?

- Not necessarily, but has new material that may be covered
 - Completely reorganized
 - Lectures may include readings from both 6th and 7th edition
- W. Stallings, Operating Systems, 5th Edition, Prentice Hall International Editions, 2005.

EEL 358

- A conceptual and “thinking” course
 - Not an easy course
 - Expect to work hard
- A fundamental computer science course
 - Must know if you claim to be a computer scientist
 - Must know if you want to be a good programmer and designer
 - Essential for many follow up materials

Course Contents

- Introduction
- Operating Systems Structure
- Processes & Threads
 - Process Description and Control, Threads
- Concurrency
 - Mutual Exclusion and Synchronization
 - Deadlock and Starvation
- Memory
 - Memory Management
 - Virtual Memory
- Scheduling
 - Uniprocessor Scheduling
- Input/ Output and Files
 - I/O Management and Disk Scheduling
 - File Management

Course Prerequisite

- **CSL101 or CSL102**
 - Need to know C and UNIX; but if not, assume that you can learn quickly → without any excuse
 - UNIX programming environment
 - Good programming skills
 - Translate pseudo-codes into codes
 - Speedy review in the 1st week
- **CSL201**
 - Not essential
 - Recommended to be taken concurrently
- **Basic mathematical skills**
 - Solving recursive equations, manipulation of symbols, etc.
- **Computer architecture**
 - Basic data structures, computer organization, memory access, etc.

Lecture Format

- Slides and transparencies
- Illustrative examples
 - Supplement the slides and transparencies
- Lectures
 - Come regularly
 - It is your responsibility to catch up your missed lectures with your friends
- Assignments
 - No Tutorials!
 - Important exercises to supplement the lectures
- Programming assignments
 - More rigorous problems to consolidate your knowledge

Grading Scheme (Tentative)

- 5 Programming assignments
 - 20%
 - Done and handed in individually
 - Electronic submission through CASS (Course Assignment Submission System). Details will be announced later.
- 5 Unannounced quizzes
 - 10% (2% each)
 - No make up quizzes will be given
 - Will cover material in assigned readings from *Silberschatz* and
 - Material included in the lecture, closed-note and closed-book
- Minor I and Minor II
 - 20% Each
 - Fall 2005, Dates will be announced later
- Major
 - 30%

Homework and Programming Assignments

➤ Computing Account

- Each student must have an UNIX account
- Use this account for all demo
- Maximum number of processes → 50
 - ◆ Your responsibility
 - ◆ Ensure checks in your program (use *ps -fs*)

Homework and Programming Assignments

➤ Written homework

- Due by time specified
- Contact TAs directly for re-grades
- Re-grade requests will only be entertained within 2 days after the homework are handed back
- Late policy: 20% reduction, allows only one day late.

➤ Programming assignments

- Submission using CASS: to be announced later
- Late policy : 20% reduction, allows only one day late.
- Run on PC

Minors and Major

- Individually done
- Closed-book, closed-notes
- No early or late examination
 - Unless under very unusual circumstances, with letters of proof
 - Instructor informed beforehand

Thou Shall Not Cheat

- Do not cheat
- I encourage you to discuss your assignments with your friends
 - Put everything in your own words
- But no copying
 - It is NOT a shame of not knowing how to do
 - Copying causes damage to your integrity and respect
 - Copying is stealing intellectual property
 - TAs will catch cheaters
- What if you are caught copying?
 - Both the copier and the originator get 0
 - 2nd time: Both get 0 *and* one full downgrade
 - Caught 3rd time: FAIL
 - If it is minor or major, an automatic FAIL

Email Policy

- Email is not effective to explain things. Please visit TA's offices
- Please do not expect answers right away
- Please do not send us codes for debugging
 - We would not debug codes for you

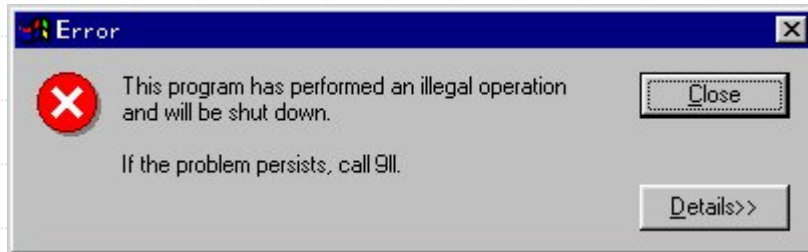
Why study OS?

May not actually write an OS, however...

- One of the largest and most complicated system
- Multifaceted areas
 - Computer architecture, data structure, algorithms, software engineering
- Understanding of OS is must to improve/change
- The techniques learned from OS can be applied to other areas
 - Resource management
 - Conflict resolution
 - Concurrency
 - Complex data structures

Motivation

Why does Windows invoke this error message frequently?

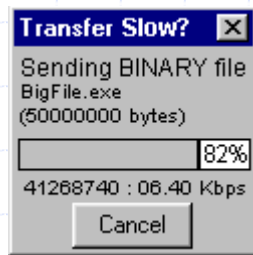


Why does the printer continue to print, even if the computer has been turned off?



Motivation

Why is the web so slow sometimes?

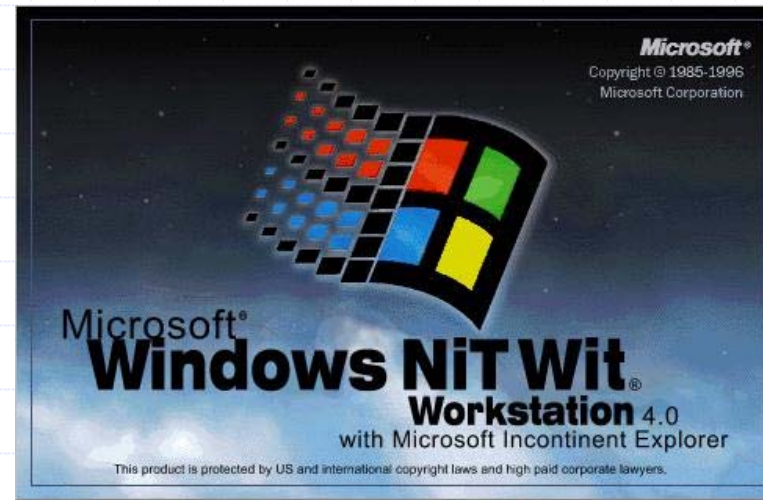


Why is the different PCs with same CPU behave differently?

Should you get Windows XP, 2000, Linux, Mac OS... ?

Motivation

Why does Microsoft has such a bad name?



Motivation

How can many users work on a single computer simultaneously?



If you study Operating Systems, you can know!