



CSCI-GA.2250-001

Operating Systems

Class Overview

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Formal Goals of This Course

- What exactly is an operating systems?
- How does the OS interact with the hardware and other software applications?
- Main concepts of an OS
- OS knowledge useful in many contexts
- Designated C/C++ programming class
 - Please learn C/C++ on your own, but I will answer any questions you have
 - Learn how to do basic debugging on linux (besides printf)
 - There are free classes online on NYU as well as on the web (see NYU Brightspace syllabus)
 - Advertised ~3 weeks ago

Informal Goals of This Course

- To learn the basics of OS and enjoy it
- To use what you have learned in *MANY* different contexts
- To be able to develop your own OS if you want to or need to
- To get more than an A
- Jump Board for many systems related works (e.g. how GPUs interact with systems)

Instructor

Who	Where
<p>Hubertus Franke</p> <ul style="list-style-type: none">• Distinguished Research Staff Member @ IBM T.J. Watson Research Center in Yorktown Heights, NY (since 1993)• Ph.D. EE Vanderbilt University 1992• Diplom/Master CS Karlsruhe Institute of Technology, Germany, 1987• Manager and Senior Manager of OS and Cloud 2001-2015• IBM Master Inventor• IBM Academy of Technology• ACM Fellow	<p>Office hours:</p> <p>Mon 6:10 – 7:00pm WWH 320 9:00 – open (after class)</p> <p><u>OR</u></p> <p>On request via Zoom (see syllabus)</p> <p><u>OR</u></p> <p>Over discord ← your quickest response</p>
General Interests	
<p>Cloud Infrastructures</p> <p>Containers, Cloud, Security</p> <p>Operating Systems:</p> <p>Linux, AIX, object-oriented OS (K42)</p> <p>Scheduling, memory management, ..</p> <p>Computer Architecture:</p> <p>Multicore processors and Systems on a Chip</p>	<p>High Performance Computing:</p> <p>MPI (Message Passing Interfaces)</p> <p>Gang Scheduling</p> <p>Software Engineering, Compilers and Robotics.</p> <p>-----</p> <p>~152 publications in these areas</p> <p>~184 patents</p>

The Textbook

Author: Andrew Tannenbaum

Title: Modern Operating Systems **4e** or 3e

Publisher: Prentice Hall

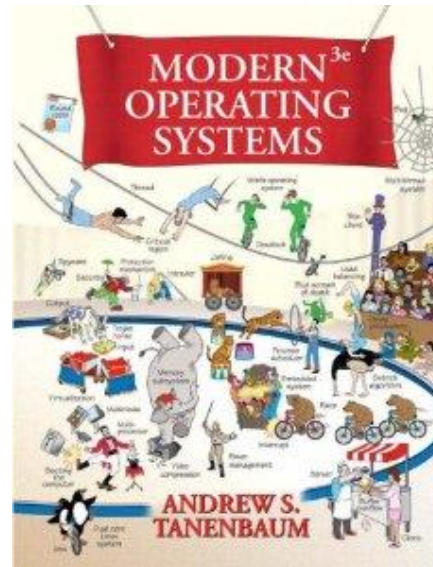
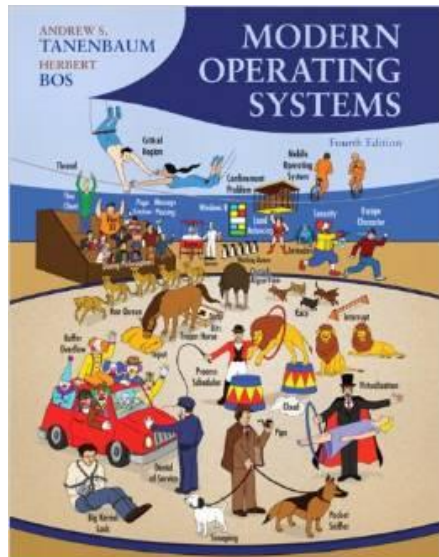
ISBN-13: 978-0133591620

ISBN-10: 013359162X

978-0-13-6006663-2

0-13-600663-9

(outdated but doable)



The Course Web Page(s)

NYU Brightspace (where we keep all resources):

- Materials (syllabus, slides and labs)
- Grades/points (including exams)
- Discussion Forum moved to Discord (see below)

<http://cs.nyu.edu/courses/fall24/CSCI-GA.2250-001/index.html>

- Not really used for material exchange, but please read

Signup for Discord: <https://discord.gg/7tXTHZ82wr>

(link might expire so sign up soon)

Communications:

- Please use discord as fastest way to get in touch with me ..
 - Designated channels for lab and general info
 - Private chat for personal stuff.
- Please use direct email (frankeh@cims.nyu.edu) for questions on your grades (after you have sync'd with your grader) or for personal matters

Graders, office hours, etc

All information will be maintained on Brightspace.

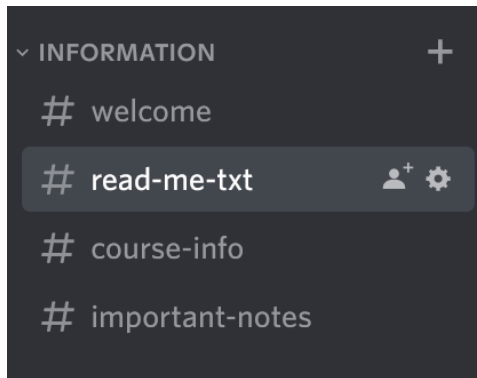
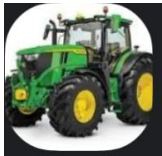
Grader designation will be maintained on Brightspace.

Grader assignments might re-adjust after the first lab assignment at which point the student population should have stabilized.

All initial disputes about points should be first directed at your assigned grader.

Interactions on Discord

Discord Menus



How to properly quote code

And code blocks with triple back tick

```
```c ← The 'c' tells discord to use syntax highlighting for C (optional)  
#include <stdio.h>
```

```
int main() {
 printf("Hello World\n");
}
...
```

```
#include <stdio.h>

int main() {
 printf("Hello World\n");
}
```

Please use proper quoting. →  
Taking a screenshot of code might be efficient for you but can be really inefficient for me.

I can not cut/paste and can only stare at some small font



# Fall 2024 Dates / Issues

- Exams are closed book and will test general understanding of OS
  - Midterm: 10/28/2024 (0:50hr) part of class
  - Final: 12/16/2024 ( 1:45hr ) 8:00-9:50pm
- I am available week-round on email ([frankeh@cims.nyu.edu](mailto:frankeh@cims.nyu.edu)) Discord (@Prof) ( discord preferred ).
- I check Discord and [frankeh@cims.nyu.edu](mailto:frankeh@cims.nyu.edu) daily several times.
- I do not check [hf44@nyu.edu](mailto:hf44@nyu.edu) frequently ( so please don't send email there )
- I ( can be | am ) available for phone/zoom calls if necessary 7 days a week (give and take based on my regular job schedule, evenings are typically the best).

# Anticipated Dates (these might change)

## September 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

## October 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

## November 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

## December 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

M=Midterm Exam ; F=Final Exam ; NC no class

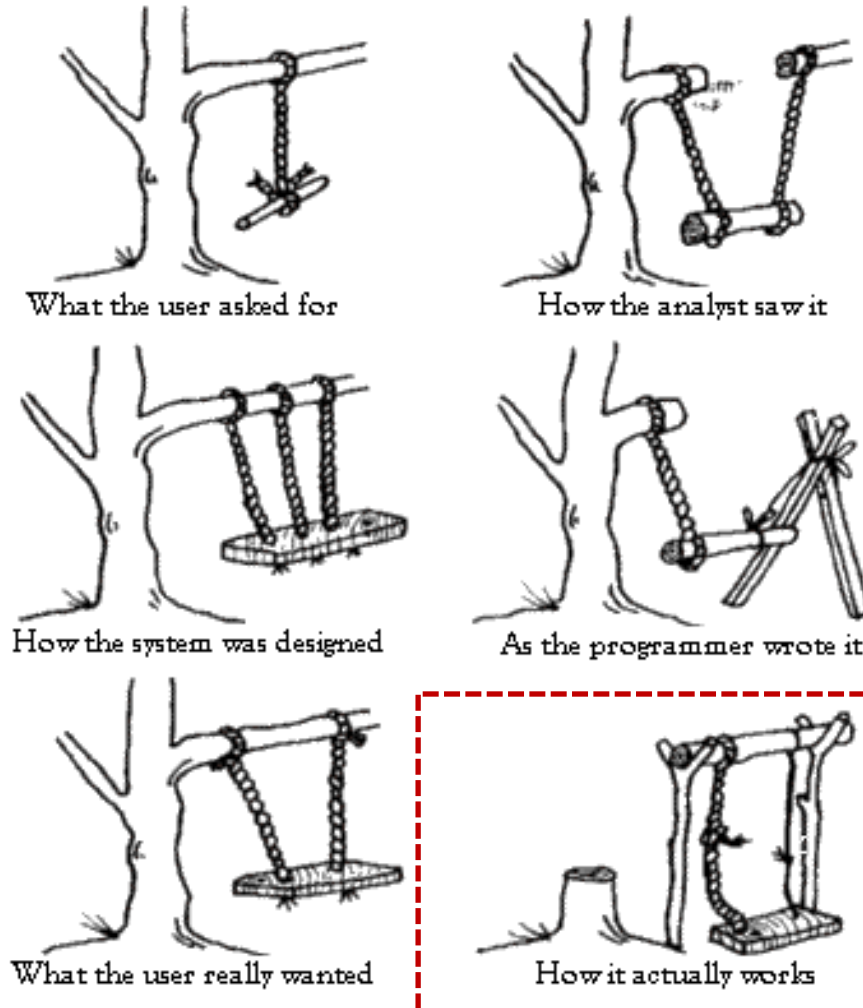
Labs: L\* release L\* due, 11:59pm EST

We follow official calendar <https://cs.nyu.edu/dynamic/calendar/graduate/>

4 Labs: L1-L3 each lab have 7 days grace period with 2pts/day deduction  
L4 has no grace period

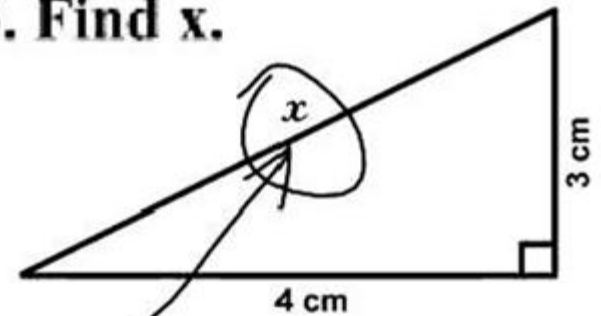
# Lab instructions

# Possible solutions



Maths question for engineers

3. Find  $x$ .

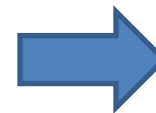


*Here it is*

What we  
grade



**Read and Understand  
the instructions, follow  
“how to approach the lab”  
(start early !!! Ask questions early)**



**Solution  
test frequently on cims**

# Submissions

- You have to submit the following:
  - **your source code** , please don't submit outputs/inputs/objectfiles etc.
  - a **makefile** that runs with "make" and "make clean"
  - Show your makefile works
    - ( make clean ; make ) > **make.log** # this creates a file of the make
  - a log file that is proof you ran it and "graded" it on CIMS ( see below )
    - ./gradeit.sh ../refout ../mylab1out # that is on screen  
203645b102d1bcb34e82de4166fc8 - /home/frankeh/1000/lnx4/0826/1027/13.2.0  
RES 17 of 20: 1 1 1 1 1 0 0 1 1 1 1 1 1 1 1 0 1 1
  - > ./gradeit.sh ../refout ../mylab1out > **lab1out.log** # this puts it into a file
  - ZIP these 4 things up and submit as a single **ZIP** file on Brightspace

# Grading

- Labs : 60%
- Midterm : 15%
- Final : 25%



- Typically, due a few weeks after assignment
- Submitted as softcopy of code
- Will be graded by 'scripts' against many test cases
- 2 points penalty per day late (7days max)  
(no more grace period beyond that)

Labs are typically due on a Tue night at 11:59pm EST

Only ONE submission is allowed.

We will start grading right after the due date.

We accept a late submissions up to 7 days late. (exception lab4 which doesn't have an extension )

There is a penalty of 2 points per day up to 7 days with a max of 14 pts.

Not handing in a lab has significant impact on your grade as it counts 0 and that is 15% which takes you down to a B. So don't consider that an option. Also delaying one lab puts you in a hole for the next lab.

Labs are roughly 500-700 lines of code each (some will repeat), so don't start the night before. Expect each lab to take 20-30+ hours straight work minimum. Start early, finish early and you will be fine. Start late and in many cases that's the beginning of the end.

Grading Table		
0.00	0.70	F
0.70	0.73	C-
0.73	0.77	C
0.77	0.80	C+
0.80	0.83	B-
0.83	0.87	B
0.87	0.90	B+
0.90	0.93	A-
0.93	1.00	A

Labs will be graded as follows:

- all based on 100 pts
  - **35 pts** for turning something in that attempts to solve the problem:  

```
main () { printf("The Prof is totally crazy!"); }
```

  
only identifies the problem but doesn't attempt solve it.
  - **5pts** for including your "makelog" "gradeit.log"
  - **60pts** (upto) for getting various inputs right, so you need to get ~50% right to get 30pts ~C or 75% to get 45pts ~B, preferred is getting 100% right to get an A
- Exams:**
- you need to get ~40% right to achieve a 70/100 for passing exam (C-)

# Integrity (1)

- Academic integrity
- <http://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/academic-integrity-for-students-at-nyu.html>
- Your labs, and exams must be your own - we have a zero tolerance policy towards integrity violation of any kind and any student who has been involved will get a **substantial deductions** in the course.
- Both the cheater and the student who aided the cheater will be held responsible for the infraction.
- Your required actions from day one:
  - **Github: please make it private !!!**
  - Protect your code on cims:  
``chmod 700 /home/nyuid/labX``      **OR**  
in your CIMS `~/.bash_profile` add `'umask 077'` as last line for default
- If somebody copies your code ... ( see above, I am not detangling that )

# Integrity (2)

- It is OK to discuss:
  - "I just implemented the queue using C++ deque, they have prio insert" → then go off and read about "C++ deque" and use them to implement in the context of the lab.
  - Read about general approaches on internet, e.g. how to correctly parse command line arguments (Slashdot etc.), how to iterate through `<deque>` etc.
- It's NOT OK:
  - Get "inspiration" from other solutions (see below)
  - Look at other solutions to the given problem from this or past semesters.
  - Search for solutions ( I am keenly aware they are available on github and we have them ).
  - Utilize other people's solutions (we have them too).
  - Commonly develop a very similar solution.
  - Usually any of the above means you "copied" the code and changed a few things here and there.

# Integrity (3)

- We use multiple code similarity checkers with several years of references and submissions primed. They are amazing at spotting: code restructuring, variable renaming, code obscuring, .. Why waste your and mine time that way ?
- I check throughout the semester even after points have been given. Graders are not involved in this process.
- Potential Impact:
  - 1 lab identified -> 0 points ->  $\frac{1}{4} * 60\% = 15 / 100$ 
    - > **1+ grade reduction + Department Notification**
    - > **mark on your academic record**
  - 2 or more labs -> another Department Notification
    - > **"?" typically not pleasant**
    - > **Class failed for sure**and you are not eligible for grader jobs from that point on at CIMS.
- No lab resubmissions or extra project to make up lost points (please don't ask)
- No point of recognizing your fault after the fact, do it during your action
- **If in doubt:** you are responsible for your action
- **If you get stuck, ask questions on discord or setup an office hour with me.**  
**The call is free, the advice might be priceless (or not)**

THINK





And now to the

Real and hopefully  
fun stuff:

Operating Systems