Welcome to OS @ UNSW

COMP3231/9201/3891/9283

(Extended) Operating Systems

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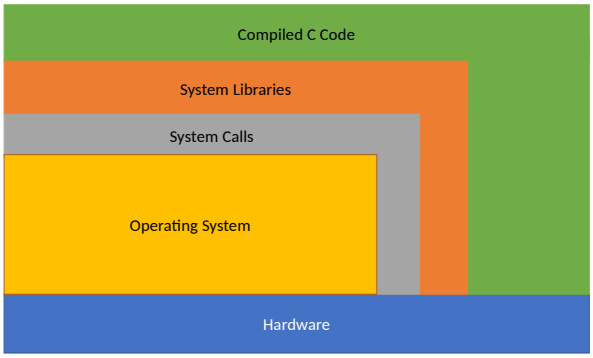
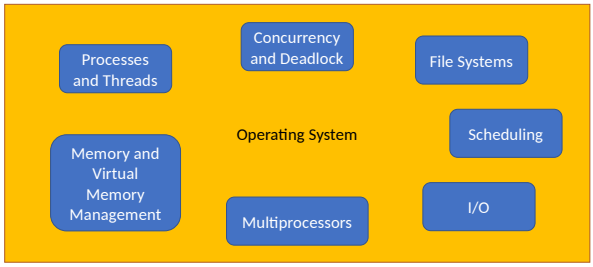
System Software Structure

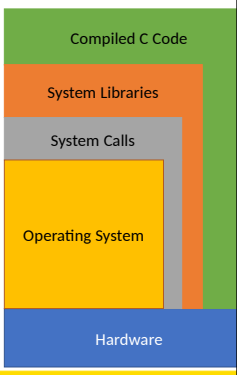


Major OS Topics



Why Learn Operating Systems?

- Understand the whole software stack
- Develop OS code
- Develop code in a challenging environment
  - Concurrency issues
  - Security issues
- Application performance
  - Understand operating system behaviour and how best to interface with it.
  - Diagnose system performance issues.



Overview of Course

Lectures

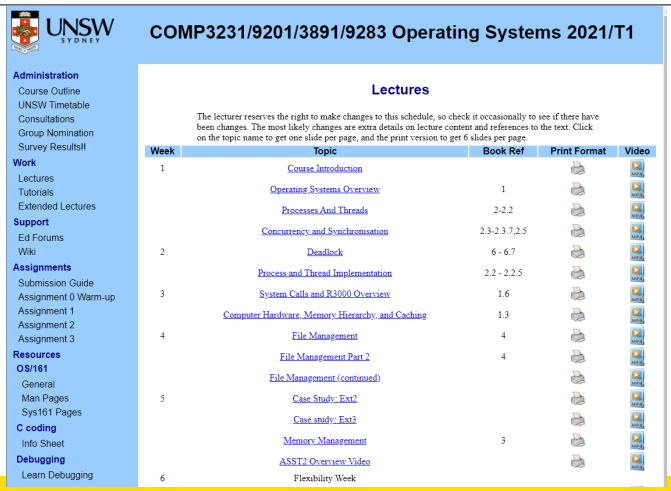
- Introduce OS theory and case studies

Tutorials

- Re-enforce theory
- Provide guidance on the assignments

Assignments

- Opportunity to write real OS code
  - OS/161 is a simplified UNIX-clone intended for teaching
- Consist of the following
  - Warm-up exercise
  - Simple system calls and debugging
  - I/O system calls and file system
  - Memory management



UNSW SYDNEY

COMP3231/9201/3891/9283 Operating Systems 2021/T1

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Learn Debugging

Lectures

The lecturer reserves the right to make changes to this schedule, so check it occasionally to see if there have been changes. The most likely changes are extra details on lecture content and references to the text. Click on the topic name to get one slide per page, and the print version to get 6 slides per page.

Week	Topic	Book Ref	Print Format	Video
1	Course Introduction			
	Operating Systems Overview	1		
	Processes And Threads	2-2.2		
	Concurrency and Synchronisation	2.3-2.3.7,2.5		
2	Deadlock	6 - 6.7		
	Process and Thread Implementation	2.2 - 2.2.5		
3	System Calls and R3000 Overview	1.6		
	Computer Hardware, Memory Hierarchy, and Caching	1.3		
4	File Management	4		
	File Management Part 2	4		
	File Management (continued)			
5	Case Study: Ext2			
	Case study: Ext3			
	Memory Management	3		
	ASST2 Overview Video			
6	Flexibility Week			

Assumed Knowledge

- Computing Theory and Background
  - Basic computer architecture
    - CPUs, memory, buses, registers, machine instructions, interrupts/exceptions.
  - Common CS algorithms and data structures
    - Links lists, arrays, hashing, trees, sorting, searching…
  - Ability to read assembly language
  - Exposure to programming using low-level systems calls (e.g. reading and writing files)
- Practical computing background
  - Capable UNIX command line users
  - Familiar with the git revision control system
  - Competent C programmers
    - Understand pointers, pointer arithmetic, function pointers, memory allocation (malloc())
    - The dominant language for OS (and embedded systems) implementation.
  - Comfortable navigating around a large-ish existing code base.
  - Able to debug an implementation.

Lectures

- Common for all courses (3231/3891/9201/9283)
- 2 * 2 hrs each week
- The lecture slides will be available on the course web site
  - http://www.cse.unsw.edu.au/~cs3231
    - Available prior to lectures.
    - The version actually shown in lectures might be slightly edited.
- Lectures will be face-to-face and recorded
  - Recording made via Echo360.
  - Recording will be available afterwards as per usual.
  - We will experiment with live-streaming in the early lectures.
    - Join links will be posted on the forum.

Extended OS Comp3891/9283

- Additional lecture
  - Starts in week 1
- A combination of:
  - Examination of topics in more depth
  - Looking at research in areas (past/present)
  - OS/161 internals in more depth
- Separate Assessment
  - 80%-ish of final exam common with base course
  - 20%-ish targeted to extended students
  - Assignment rules are slightly different
- Assumes the tutorials are not challenging enough
  - Effectively replaces the tutorial with extra interactive lecture.

Tutorials

- Start in week 2
- All tutorials are face to face
- Attendance is strongly recommended
  - But it is not marked.
- Tutorial questions cover a broad range of examples
  - Answers available online the week after.
  - There are intentionally more questions than can be covered
  - Review the questions beforehand

Assignments

- Assignments form a substantial component of your assessment.
- They are challenging!!!!
  - Because operating systems are challenging
- We will be using OS/161.
  - It is an education-focused operating system.
  - It was originally developed by the Systems Group At Harvard.
  - It contains roughly 20,000 lines of code and comments.
    - Comments are part of the documentation.

Assignments

- Don't underestimate the time needed to do the assignments.
  - 80% is understanding
  - 20% programming
- OS developing is a challenging environment.
- Avoid
  - 1% understanding
  - 9% programming
  - 90% debugging
- If you start a couple days before they are due, you will be late.

Assignments

Assignment	Due
ASST1	Week 4
ASST2	Week 7
ASST3	Week 10

- Warmup exercise
  - Done individually
  - Not marked
  - Get started now!
- ASST1 done individually
- ASST2 and ASST3 can optionally be done in pairs
  - Info on how to pair up will be available soon
- Additionally, advanced versions of assignments 1, 2 & 3
  - Some bonus marks are available, but do these for the challenge, not the marks
  - Extended OS students are required to complete some advanced components
  - Attempting the advanced component is not a valid excuse for failure to complete the normal component of the assignment

Group Work Policy

- Groups of two
- Group members do not have to be in the same tutorial
- Group members are expected to contribute equally to each assignment.
  - No "I'll do the 2nd if you do the 3rd assignment"
  - We will accept statements of unequal contributions and may adjust the m of the lessor contributor down.
- Submissions are required to have significant contributions attributable to individual group members.
  - E.g. verifiable using the git revision control system

AI Use in Assignments

You are not permitted to use AI to generate or adjust any part of yo submitted assignment.

- Code
- Documentation

Be warned! AI generated text tends to get flagged by our plagiarism detection systems.

- This is one reason why it is forbidden

Exams

- No mid-session exam or quizzes.
- The final exam is 2 hours, open book, done at CSE.
  - The exam will be invigilated.
  - This is expected to use Inspera platform, more info at the end of term
- Supplementary exams are available according to UNSW & school policy.
  - Not available as a second chance.
  - Medical or other special consideration only

Assessment

Assessment Item	Assessment Weight
ASST1	10%
ASST2	20%
ASST3	20%
Final Exam	50%

- Additionally, a hurdle (minimum mark) of 40% is required in final exam to pass.

Support

- Forum
  - Where announcements are posted!!
  - CSE is using Discourse as a forum this term
  - Best place for Q/A about assignments and course
    - Ask questions there for the benefit of everybody
    - Share your knowledge for the benefit of your peers
  - Join the forum, it's needed to follow the course.
- Help Sessions
  - One-on-one help with assignments and course
  - Available in week 4 and weeks 7-10, more info will appear on course website
  - Seek help early to avoid missing out.
- Remaining admin queries can go to cs3231@cse.unsw.edu.au

Forums

Search first!	You are probably not the first to experience the problem, so see if the question is answered before asking again.
Add to an existing post if directly related	If you are experiencing a variant of the same issue, add to an existing post.
Start a new post for a separate issue	Try to have an accurate title Try to avoid add-on conversations to a big topic drifting onto new topics. It makes the new parts hard to find.
Avoid bitmaps (screenshots)	Bitmaps are not searchable so you limit the chances of fellow students finding your post, and indirectly make us less enthusiastic about p detailed answer to your non-searchable post.
Provide some context	Cut-n-paste the error if appropriate, and include the preceding output to provide a chance for others to understand what is going on. Me OS/machine/environment your using if it's not clear from the cut-n-paste.
Mark questions resolved if they are!	Don't leave follow-ups unresolved if you have fixed your issue.
Leave questions unresolved if they are!	We filter using 'unresolved' to find outstanding issues, we might not find them unless they are marked unresolved.
You're very welcome to post if you know the answer to an issue.	The course staff do not have a monopoly on answers, nor do we monitor the forum 24hrs a day. A quick answer can make somebody's da avoid wasting it). A responsive forum can be an awesome resource for the entire course.

What next?

https://wiki.cse.unsw.edu.au/cs3231cgi/Checklist

Startup Checklist

- Watch the online intro lecture.
  - Ask any remaining questions you have on the forum
- Join the forum, link is on the menu of the class website
- Review the warmup assignment
- Choose where you plan to do your assignment work (desktop, laptop, vlab, and at CSE).
  - You can work in multiple places. It's usually easiest to start with vlab or at CSE until y familiar with the environment.
  - Make sure the toolchain works on where you plan to work (see Setup Overview)
- Set up git (see Setup Overview)
- Choose an editor capable of code browsing (see Setup Overview).
- Complete the warmup assignment

What next?

- See you on Monday!
- Questions?
  - Post questions on the forum.
  - We will try to answer them in the first lecture.
- We will attempt to live-stream the first lecture.
  - Details will be posted on the forum on Monday.