Welcome to OS @ UNSW

COMP3231/9201/3891/9283
(Extended) Operating Systems
Dr. Kevin Elphinstone

System Software Structure

Hardware
Compiled C Code
System Libraries
System Calls
Operating System

Major OS Topics
- Processes and Threads
- Memory and Virtual Memory Management
- Concurrent and Threaded
- File Systems
- Scheduling
- LRU
- Multiprocessors
- Operating System

Why Learn Operating Systems?
- Understand the whole software stack
- Develop OS code
- Develop concurrent code
- Application performance
  - Understand operating system behaviour and how best to interface with it.
  - Diagnose system performance issues.
- Application performance
- Understans operating system
  - Performance issues.

Overview of Course

Lectures:
- Introduce OS theory and case studies
- Review OS concepts
- Provide guidance on the assignments

Tutorials:
- Re-enforce theory
- Provide guidance on the assignments

Assignments:
- Opportunity to write real OS code
- OS/161 is a simplified OS designed for teaching
- Consist of the following
  - Warm-up exercises
  - Concurrency and synchronisation
  - OS Structure: evolving systems calls and file systems
  - Memory management
Assumed Knowledge

• Computing Theory and Background
  • Basic computer architecture
  • C/CH, memory, buses, registers, machine instructions, interrupts/exceptions.
  • Common CS algorithms and data structures
  • Lists, trees, heap, graph, 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 user
  • Familiar with the git version control system
  • Competent C programmers
  • Understood 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 website.
    - http://www.cse.unsw.edu.au/~cs3231
    - Available prior to lectures, when possible.
    - Slide numbers for note-taking, when not.
  • Lectures will be face-to-face and recorded.
  • Uses Echo360.
  • Recording will be available afterwards as per usual.

Extended OS Comp3891/9283

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
  • A separate assessment
  • 80%-ish of final exam common with base course
  • 20%-ish targeted to extended students
  • Assumes the tutorials are not challenging enough
  • Effectively replaces the tutorial with extra interactive lecture.

Tutorials

• Start in week 2
  • A mix of online and f2f.
  • Depends on tutorial you enrolled in.
  • Attendance is strongly recommended.
  • But not marked.
  • Tutorial questions cover a broad range of examples.
  • Answers available online the week after.
  • Use the tutorial to focus where needed.
  • There is 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,
    • an educational operating system
    • developed by the Systems Group At Harvard.
  • With local changes.
  • 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
- Avoid
  - 1% understanding
  - 9% programming
  - 90% debugging
- If you start a couple days before they are due, you will be late.

Assignments

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Date</th>
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<tbody>
<tr>
<td>ASST1</td>
<td>Week 6</td>
</tr>
<tr>
<td>ASST2</td>
<td>Week 7</td>
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<tr>
<td>ASST3</td>
<td>Week 10</td>
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Warmup exercise
- Done individually
- Available NOW!!!
- ASST1 and ASST3 can optionally be done in pairs
- Info on how to pair up available soon
- Additionally, advanced versions of the assignment 1 & 3
- Available bonus marks are small compared to amount of effort required.
- Student should do it for the challenge, not the marks.
- 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 assignments will be marked as a group
  - Including ‘groups’ of one.
- Group members are expected to contribute equally to each assignment.
  - No “I’ll do the 2nd if you do the 3rd assignment”
  - We accept statements of unequal contributions and do adjust marks of the lesser contributor down.
- Submissions are required to have significant contributions attributable to individual group members.
  - E.g. verifiable using the git revision control system

Exams

- There is NO mid-session
- The final exam is 2 hours, open book, online
  - A Moodle quiz to be precise
- Supplementary exam are available according to UNSW & school policy, not as a second chance.
  - Medical or other special consideration only

Assessment

<table>
<thead>
<tr>
<th>Assessment Item</th>
<th>Assessment Weight</th>
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<tbody>
<tr>
<td>ASST1</td>
<td>20%</td>
</tr>
<tr>
<td>ASST2</td>
<td>20%</td>
</tr>
<tr>
<td>ASST3</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
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- Additionally, a hurdle (minimum mark) of 40% is required in final exam to pass.

Support

- Ed Forum
  - Where announcements are posted!!!
  - Forum for Q/A about assignments and course
  - Ask questions there for the benefit of everybody
  - Share your knowledge for the benefit of your peers
  - You need to join to follow the course.
- Help Sessions
  - One-on-one help with assignments and course
  - Available every day, see course web site for timetable
  - Seek help early to avoid missing out.
- Admin and Personal queries can be directed to the class account
  c3231@cse.unsw.edu.au
  - Don’t email me directly
Ed Forums

You are probably not the first to experience the problem, so see if the question is answered before asking again.

Search first!

If you are experiencing a variant of the same issue, add to an existing post.

Add to an existing post if directly related

Try to have an accurate title

Avoid adding an unrelated question to a hot topic because you just happen to have the same problem. It makes it hard to find the answer.

Start a new post for a separate issue

Bitmaps are not searchable so you limit the chances of fellow students finding your post, and indirectly make us less enthusiastic about providing elaborate answers to your non-searchable post.

Avoid bitmaps (screenshots)

Cut-n-paste the error if appropriate, and include the preceding output to provide a chance for others to understand what is going on. Mention the OS/machine/environment your using if it's not clear from the cut-n-paste.

Provide some context

Don't leave follow-ups unresolved if you have fixed your issue.

Mark questions resolved if they are!

I filter using 'unresolved' to find outstanding issues, I won't find them unless they are marked unresolved.

The course staff don't have a monopoly on answers, so do not bother the course staff today. In most cases, you can solve your own problem. If you cannot solve the issue, the course staff can help you.

What next?

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

Startup Checklist

- What's the source info header
- Add any additional keywords you have on the Ed Forums
- Post Ed Forums, click to "New"
- Choose the right forum for the issue
- Write a clear and concise description of the problem (with important info like the following)
  - You can work on multiple projects. If a wrongly named file exists within one of the CSIE and your instructor with
  - Include any other notes that you feel important to share
  - Share the link to the topic where you plan to complete your Stage 2 quiz
  - Complete the prework

- Setup all python staging directories
- Complete any other tasks for this stage
- Complete all prework