Semester 2 2016

COMPSCI 340 & SOFTENG 370 Operating Systems

Introduction

An operating system is the software which makes a raw computer more or less usable by people. To most people who use computers, the operating system is indistinguishable from the hardware; they never experience the machine by itself. It is the operating system's job to communicate with the people who use it, to look after their files, to do sensible things when they do silly things, and generally to look after all the jobs that must be done but which are too complicated (at the moment) to be built into the hardware.

This course tries to look at general principles of operating systems, but we do look at some low level details as well. You are expected to be a competent programmer in a language such as Java or C++. Some assignments this year will use Python.

Contents of the course

- Introduction to operating systems
- Operating system history
- Virtual machines
- Processes, threads and process states
- Real-time processes
- The problems of concurrency and some of the solutions
- Communicating processes
- Deadlock
- Devices
- Memory management
- Virtual memory
- File systems
- Networked operating systems
- Distributed operating systems
- Protection and Security

Assessment

Type	% of final mark
Exam	70
Test: Tuesday 23rd August, 9am - 10am	10
Three assignments	20 (in total)
Monday 15th August	7
Friday 23rd September	7
Friday 14th October	6

The Operating Systems course is classed as a practical course. This means you have to pass both the practical component - the assignments, and the theory component - the test and exam, as well as getting an overall pass, to pass the paper.

The pass mark for the practical component is 25%. This means if for some reason you cannot do an assignment you should still be able to gain the practical pass. Of course if you have a practical mark of only 25% then you have to get more in the theory component in order to pass. You also miss out on any learning benefit you would have had from doing all of the assignments. The test and final exam always have significant questions taken from the work done in the assignments.

The pass mark for the theory component and the overall pass marks are approximately 50%.

Either Canvas or the Assignment Drop Box system will be used for the submission of assignments. This will be detailed in the assignment specifications.

Lectures

Lectures are held at the following times and places (as of the time this document was prepared):

Tuesday	9am	201N-346 (HSB)
Thursday	10am	301-G050 (Chem)
Friday	11am	301-G050 (Chem)

Occasionally throughout the semester the Friday lecture time may be used as a tutorial time.

A list of the lecture topics is appended at the end of this document.

Tutorial

There is a tutorial on Wednesdays at 10am in 201N-346 (HSB). The first tutorial is in the **second week of semester**, Wednesday the 27th of July.

Online presence

All lecture notes, assignment handouts, other documents, and lecture recordings for both COMPSCI 340 and SOFTENG 370 will be available on Canvas.

Your coursework grades for the assignments and the test will also be on Canvas.

What to do about missed lectures

If you miss a lecture, you should catch up as soon as possible by reading the relevant lecture notes, viewing the recorded lecture on Canvas and reading the sections of the textbook specified in the lecture.

Handling illness or absence

- If you must leave for family emergencies etc., PLEASE talk to the lecturer, or somehow get a message to the department. Very few problems are so urgent that we cannot be told quite quickly.
- For problems affecting assignments or tests, see the lecturer, as soon as reasonably possible.
- Always sit the test and examination if at all possible.
- For illness during exams (or other problems that affect exam performance) students MUST contact the Examinations Office within ONE WEEK of the last affected examination, to apply for an aegrotat pass (for illness) or compassionate pass (other problems).
  THE ONE WEEK LIMIT IS STRICTLY ENFORCED.

Refer to the "Exams affected by personal circumstances (aegrotat and compassionate consideration)" section of the University website for further information. https://www.auckland.ac.nz/en/for/current-students/cs-academic-information/cs-examination-information/cs-aegrotat-and-compassionate-consideration.html.

Exam

Please read the examinations handbook when you receive it and double-check (triple-check?) the examination timetable. Almost every year some students turn up at the wrong time for exams.

Policy on Cheating and Plagiarism

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting his or her learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the world-wide web. A student's assessed work may be reviewed against electronic source material using computerised detection mechanisms. Upon reasonable request, students may be required to provide an electronic version of their work for computerised review.

Please refer to the University Information on Academic integrity:

https://www.auckland.ac.nz/en/about/learning-and-teaching/policies-guidelines-and-procedures/academic-integrity-info-for-students.html

Textbook

The textbook is *Operating System Concepts* by Silberschatz, Galvin and Gagne, *9th Edition*. Published by John Wiley & Sons, Inc. 2013

This textbook is available either in hard copy from the University Book Store or in electronic form from http://au.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002013.html. The electronic form may require the installation of a special application.

People

Lecturer

Dr Robert Sheehan
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ph. ext. 88814
Rm 303.488
Office hours: Tuesday 9am, Thursday 11am, Friday 10am

Tutor

TBA

How to Seek Assistance

Utilise the class Piazza page, accessible through Canvas. Contact the tutor or lecturer either during their office hours or by email. There are many other resources available within the University, e.g. the Student Learning Centre, the library, and DELNA (to identify where you may need help with your academic English).

Preliminary lecture schedule

Lecture 1 - Introduction to the course - OS structure
Lecture 2 - History of OSs - up to batch systems
Lecture 3 - History of OSs - time-sharing systems, PCs, the Web and smaller OSs
Lecture 4 - C programming and Operating Systems
Lecture 5 - Virtualization, Processes and threads - implementation
Lecture 6 - PCBs, Process states, Process creation
Lecture 7 - Running, waiting and stopping
Lecture 8 - Scheduling
Lecture 9 - Real-time scheduling
Lecture 10 - The problem of concurrency - locks and semaphores
Lecture 11 - Readers/writers, monitors
Lecture 12 - Dining Philosophers, Equivalence of concurrency constructs
Lecture 13 - IPC, Distributed concurrency control
Lecture 14 - Deadlock
Lecture 15 - File Systems
Lecture 16 - Representing files on disk
Lecture 17 - File allocation techniques
Lecture 18 - Versioning File Systems
Lecture 19 - Distributed File Systems
Lecture 20 - NFS & AFS
Lecture 21 - Distributed services.
Lecture 22 - Memory management, Pages, Segments
Lecture 23 - Virtual memory, page faults
Lecture 24 - Page allocation algorithms
Lecture 25 - Protection and the access matrix
Lecture 26 - Capabilities and Access Control Lists
Lecture 27 - Cryptography and Authentication, Kerberos
Lecture 28 - Intro to mobile security
Lecture 29 - Device drivers
Lecture 30 - Linux modules and general device services
Lecture 31 - Disks as special devices, disk scheduling