



MONASH University

FIT2022
Computer systems 2

Unit guide

Semester 2, 2008

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FIT2022 Computer systems 2 - Semester 2 , 2008

Unit leader :

Lecturer(s) :

Clayton

- John Hurst

Introduction

Welcome to FIT2022 Computer Systems 2 for semester 2, 2008. This 6point unit is core to all students in the Bachelor of Computer Science and the Bachelor of Software Engineering. The unit has been designed to provide you with an understanding of computer systems and the role of the operating system in delivering computing resources to applications programs. It takes a balanced theory and practice approach to the design of the software layer between the raw hardware, and the application environment. Topics include processes, memory management, I/O device and file system design, networking and security.

Unit synopsis

Software organisation of multi-user, multi-tasking computers. The principles of operating systems are covered with reference to the underlying hardware requirements and are illustrated by case studies. Topics include operating system structure and services, multi-programming processes, CPU scheduling, memory management, device management, synchronisation, deadlocks, virtual memory and file systems.

Learning outcomes

1. to understand the fundamentals of computer systems insofar as they are necessary to support applications programming, and the role of operating systems in providing that support.
2. to understand operating systems as resource managers for CPU context switching, process scheduling and job scheduling; memory management and virtual memory systems; I/O device drivers and management; file subsystems; abstract resource allocation strategies
3. to understand asynchronous and synchronous communication mechanisms and their use in operating systems
4. to understand interprocess communication and its use in distributed computer systems
5. to appreciate the balance between theory and practice in operating system implementation
6. to develop skills in programming OS components, such as: job and process schedulers; page replacement algorithms; file management subsystems
7. to appreciate that operating system design is an exercise in resource management
8. to appreciate the applicability of OS techniques and mechanisms to the wider context of computing
9. to appreciate the contextual drivers of OS design and practice across a range of organizational contexts, both in terms of: conventions and protocols; and interoperability and portability

Workload

- 3x1-hour lectures per week
- 1x1-hour tutorial per fortnight
- 1x3-hour laboratory session per fortnight
- an additional 14 hours per fortnight of self-study and/or peer-group discussion of the topics addressed in class contact time.

Tutorials and lab sessions will alternate week by week.

Unit relationships

Prerequisites

Material covered by the following units, as noted:

FIT1008 or FIT1015

This unit covers a number of software skills that are relevant to the unit. From the background in programming that the unit provides, students will be expected in FIT2022 to quickly pick up the programming language Python, an object-oriented high-level scripting language that will allow rapid orientation to the underlying programming issues in operating systems implementation.

FIT1001

This unit (which is itself a prerequisite to FIT1008) covers some basic computer systems material. In particular, knowledge of the internal organization and operation of the basic stored-program digital computer is assumed for FIT2022.

Relationships

see under prerequisites

Continuous improvement

Monash is committed to 'Excellence in education' and strives for the highest possible quality in teaching and learning. To monitor how successful we are in providing quality teaching and learning Monash regularly seeks feedback from students, employers and staff. Two of the formal ways that you are invited to provide feedback are through Unit Evaluations and through Monquest Teaching Evaluations.

One of the key formal ways students have to provide feedback is through Unit Evaluation Surveys. It is Monash policy for every unit offered to be evaluated each year. Students are strongly encouraged to complete the surveys as they are an important avenue for students to "have their say". The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

Student Evaluations

The Faculty of IT administers the Unit Evaluation surveys online through the my.monash portal, although for some smaller classes there may be alternative evaluations conducted in class.

If you wish to view how previous students rated this unit, please go to <http://www.monash.edu.au/unit-evaluation-reports/>

Over the past few years the Faculty of Information Technology has made a number of improvements to its courses as a result of unit evaluation feedback. Some of these include systematic analysis and planning of unit improvements, and consistent assignment return guidelines.

Monquest Teaching Evaluation surveys may be used by some of your academic staff this semester. They are administered by the Centre for Higher Education Quality (CHEQ) and may be completed in class with a facilitator or on-line through the my.monash portal. The data provided to lecturers is completely anonymous. Monquest surveys provide academic staff with evidence of the effectiveness of their teaching and identify areas for improvement. Individual Monquest reports are confidential, however, you can see the summary results of Monquest evaluations for 2006 at <http://www.adm.monash.edu.au/cheq/evaluations/monquest/profiles/index.html>

Improvements to this unit

visit page

<http://www.csse.monash.edu.au/~ajh/teaching/fit2022/2008/outline/feedback-2007.xml>

to see how comments from students in 2007 have affected this year's offering.

Unit staff - contact details

Unit leader

None provided

Lecturer(s) :

Associate Professor John Hurst

Associate Professor

Phone +61 3 990 34102 +61 3 990 55192

Fax +61 3 990 55146

Additional communication information

Name: A/Prof John Hurst.

You can call me "John" or "Prof Hurst" as you like.

Location:

- Room 123 in Building 63, Clayton campus. (Mondays to Thursdays)
- Room 7.78 in Building H, Caulfield campus. (Fridays)

Phone: (03) 990 55192, 0407 569 041 (Mobile phone: urgent issues only, please)

Email: ajh@csse.monash.edu.au (preferred method of contact)

Consultation Hours:

- office hours TBA
- By appointment, see My Appointments Page:
<http://www.csse.monash.edu.au/cgi-bin/cgiwrap/ajh/ajhdiary.py>

Teaching and learning method

The lectures define the formal content of the unit, and will be used as the initial point of reference for unit knowledge outcomes. This knowledge will be built upon by the tutorials and laboratories in order to address the higher level objectives relating to skills and application.

The tutorials are designed to reinforce lecture understandings, and to prepare the student to apply these understandings towards building the skills required to complete the laboratory sessions.

The laboratories are designed to give the student hands-on development of various computer systems concepts. Each lab is offered as a partially developed set of program exercises, where demonstrations show the student what is required, and extensions to complete or extend the exercise are required to be completed by the student. This is called the lab work, and it is a required part of the assessment for the unit. Students may work together in pairs (if they wish) for this purpose.

An introduction to the topic of the lab will be provided in the tutorial in the week preceding the lab. (Students should attend all tutorials, and a roll will be kept.) Students should read through the lab sheet in the week between the tutorial and corresponding laboratory, and should prepare their lab work as required.

Students will be required to maintain an on-line journal, recording the things that they have studied in lectures, tutorials and laboratories. Of particular noteworthy record are difficulties with the material, and how these difficulties were resolved (if at all).

In addition, some examinable material is identified in the on-line **Learning Modules** page: <http://www.csse.monash.edu.au/~ajh/teaching/fit2022/2008/tandlmethods.xml> This page contains links that will refer to material NOT covered in lectures, but yet is examinable. The material will not be required for a pass in the unit, but students aiming for higher grades are expected to read and assimilate the material. Discussion on this material will be encouraged through the unit wiki page (see the Moodle resources)

A wiki page is available under Moodle. All students will be expected to contribute to this page, as a means of sharing their own learning experiences. See <http://moodle.med.monash.edu.au/mod/wiki/view.php?id=1378>

Timetable information

For information on timetabling for on-campus classes at all Australian campuses please refer to MUTTS, <http://mutts.monash.edu.au/MUTTS/>

see

<http://www.csse.monash.edu.au/~ajh/teaching/fit2022/2008/timetables/index.xml>

This timetable shows how the three teaching methods interrelate, and reinforce the learning objectives.

Tutorial allocation

On-campus students should register for tutorials/laboratories using Allocate+.

Communication, participation and feedback

Monash aims to provide a learning environment in which students receive a range of ongoing feedback throughout their studies. You will receive feedback on your work and progress in this unit. This may take the form of group feedback, individual feedback, peer feedback, self-comparison, verbal and written feedback, discussions (on line

and in class) as well as more formal feedback related to assignment marks and grades. You are encouraged to draw on a variety of feedback to enhance your learning.

It is essential that you take action immediately if you realise that you have a problem that is affecting your study. Semesters are short, so we can help you best if you let us know as soon as problems arise. Regardless of whether the problem is related directly to your progress in the unit, if it is likely to interfere with your progress you should discuss it with your lecturer or a Community Service counsellor as soon as possible.

Students are encouraged to give feedback to the lecturer through the Anonymous Feedback Page (see link in:

<http://www.csse.monash.edu.au/~ajh/teaching/fit2022/2007/index.xml>

Unit Schedule

| Week | Topic | References/Readings | Key dates |
|--------------------|---|----------------------|------------|
| 1 | Computer Systems Overview | Stallings Chap 1 | 2008/07/14 |
| 2 | Operating Systems Overview | Stallings Chap 2 | 2008/07/21 |
| 3 | Process Description and Control | Stallings Chap 3 | 2008/07/28 |
| 4 | Threads, SMP, Microkernels | Stallings Chap 4 | 2008/08/04 |
| 5 | Concurrency: Mutual Exclusion and Synchronization | Stallings Chap 5 | 2008/08/11 |
| 6 | Concurrency: Deadlock and Starvation | Stallings Chap 6 | 2008/08/18 |
| 7 | Memory Management | Stallings Chap 7 | 2008/08/25 |
| 8 | Virtual Memory | Stallings Chap 8 | 2008/09/01 |
| 9 | Uniprocessor Scheduling | Stallings Chap 9 | 2008/09/08 |
| 10 | I/O Management, Disk Scheduling | Stallings Chap 11 | 2008/09/15 |
| 11 | File Management | Stallings Chap 12 | 2008/09/22 |
| Mid semester break | | | |
| 12 | Security, Networking | Stallings Chap 14,17 | 2008/10/06 |
| 13 | revision | | 2008/10/13 |

Unit Resources

Prescribed text(s) and readings

Stallings, W, Operating Systems Internals and Design Principles, Prentice Hall, 2009, 0-13-600632-9

Recommended text(s) and readings

Silberschatz, A.; Galvin, P.B.; and Gagne, G.
Operating System Concepts
Wiley

Required software and/or hardware

Python 2.3 or later

svn clients, and an svn server accessible in the laboratories

ftp clients, and a writable FTP server accessible in the laboratories

Equipment and consumables required or provided

Students will need access to:

- a personal computer (preferably with Linux)
- the internet via dial-up connection or preferably by broadband

On-campus students may use the facilities available in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook.

Study resources

Study resources we will provide for your study are:

The Web Pages at

<http://www.csse.monash.edu.au/~ajh/teaching/fit2022/2008/index.xml>

provide access to all the supplied teaching materials. Students are also expected to purchase a copy of one of the recommended text books.

Library access

The Monash University Library site contains details about borrowing rights and catalogue searching. To learn more about the library and the various resources available, please go to <http://www.lib.monash.edu.au>. Be sure to obtain a copy of the Library Guide, and if necessary, the instructions for remote access from the library website.

Monash University Studies Online (MUSO)

All unit and lecture materials are available through MUSO (Monash University Studies Online). Blackboard is the primary application used to deliver your unit resources. Some units will be piloted in Moodle. If your unit is piloted in Moodle, you will see a link from your Blackboard unit to Moodle (<http://moodle.monash.edu.au>) and can bookmark this link to access directly. In Moodle, from the Faculty of Information Technology category, click on the link for your unit.

You can access MUSO and Blackboard via the portal: <http://my.monash.edu.au>

Click on the Study and enrolment tab, then Blackboard under the MUSO learning systems.

In order for your Blackboard unit(s) to function correctly, your computer needs to be correctly configured.

For example:

- Blackboard supported browser
- Supported Java runtime environment

For more information, please visit: <http://www.monash.edu.au/muso/support/students/downloadables-student.html>

You can contact the MUSO Support by: Phone: (+61 3) 9903 1268

For further contact information including operational hours, please visit:
<http://www.monash.edu.au/muso/support/students/contact.html>

Further information can be obtained from the MUSO support site:
<http://www.monash.edu.au/muso/support/index.html>

Assessment

Unit assessment policy

The unit is assessed with two assignments and a three hour closed book examination. To pass the unit you must:

- attempt both assignments and the examination
- achieve no less than 40% of the possible marks in the exam
- achieve no less than 50% of possible marks
- complete the laboratory hurdle (8 or more out of a possible 12 marks)

Assignment tasks

• Assignment Task

Title : Assignment 1

Description :

You are to write a Python program to display a (background) image, and at the same time interact with the user. For this, you will need to use Python threads.

The objectives of this assignment are to:

1. Build upon Python programming skills begun in Lab Session 1 (Objective 6);
2. Develop skills in concurrent programming (Objective 3); and
3. Write a program that will be a useful demonstration of your learning in this unit (Objective 8).

The exercise is designed to be both fun, and useful! - you should be able to use it as a convenient way of using your background window to run through your favourite digital photographs.

Weighting : 20% (+5 bonus marks)

Criteria for assessment :

Completion of the program, together with a reflection on the learning outcomes

Due date : 22 Aug

Remarks (optional - leave blank for none) :

requires Python programming

• Assignment Task

Title : Assignment 2

Description :

The Banker's algorithm, and Page Replacement algorithms

Weighting : 20%

Criteria for assessment :

Completion of the worked algorithm/program, together with reflections on the learning outcomes

Due date : 3 Oct

Remarks (optional - leave blank for none) :

requires Python programming

Examinations

- **Examination**

Weighting : 60%

Length : 3 hours

Type (open/closed book) : Closed book

Assignment submission

through MUSO

Assignment coversheets

not required - but students must agree to the plagiarism statements on the faculty website

University and Faculty policy on assessment

Due dates and extensions

The due dates for the submission of assignments are given in the previous section. Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are seldom regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

students must complete an assignment extension form available from the faculty website

Late assignment

Return dates

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Assessment for the unit as a whole is in accordance with the provisions of the Monash University Education Policy at <http://www.policy.monash.edu/policy-bank/academic/education/assessment/>

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later. There is an advertised return date for each assignment.

Plagiarism, cheating and collusion

Plagiarism and cheating are regarded as very serious offences. In cases where cheating has been confirmed, students have been severely penalised, from losing all marks for an assignment, to facing disciplinary action at the Faculty level. While we would wish that all our students adhere to sound ethical conduct and honesty, I will ask you to acquaint yourself with Student Rights and Responsibilities (<http://www.infotech.monash.edu.au/about/committees-groups/facboard/policies/studrights.html>) and the Faculty regulations that apply to students detected cheating as these will be applied in all detected cases.

In this University, cheating means seeking to obtain an unfair advantage in any examination or any other written or practical work to be submitted or completed by a student for assessment. It includes the use, or attempted use, of any means to gain an unfair advantage for any assessable work in the unit, where the means is contrary to the instructions for such work.

When you submit an individual assessment item, such as a program, a report, an essay, assignment or other piece of work, under your name you are understood to be stating that this is your own work. If a submission is identical with, or similar to, someone else's work, an assumption of cheating may arise. If you are planning on working with another student, it is acceptable to undertake research together, and discuss problems, but it is not acceptable to jointly develop or share solutions unless this is specified by your lecturer.

Intentionally providing students with your solutions to assignments is classified as "assisting to cheat" and students who do this may be subject to disciplinary action. You should take reasonable care that your solution is not accidentally or deliberately obtained by other students. For example, do not leave copies of your work in progress on the hard drives of shared computers, and do not show your work to other students. If you believe this may have happened, please be sure to contact your lecturer as soon as possible.

Cheating also includes taking into an examination any material contrary to the regulations, including any bilingual dictionary, whether or not with the intention of using it to obtain an advantage.

Plagiarism involves the false representation of another person's ideas, or findings, as your own by either copying material or paraphrasing without citing sources. It is both professional and ethical to reference clearly the ideas and information that you have used from another writer. If the source is not identified, then you have plagiarised work of the other author. Plagiarism is a form of dishonesty that is insulting to the reader and grossly unfair to your student colleagues.

Register of counselling about plagiarism

The university requires faculties to keep a simple and confidential register to record counselling to students about plagiarism (e.g. warnings). The register is accessible to Associate Deans Teaching (or nominees) and, where requested, students concerned have access to their own details in the register. The register is to serve as a record of counselling about the nature of plagiarism, not as a record of allegations; and no provision of appeals in relation to the register is necessary or applicable.

Non-discriminatory language

The Faculty of Information Technology is committed to the use of non-discriminatory language in all forms of communication. Discriminatory language is that which refers in abusive terms to gender, race, age, sexual orientation, citizenship or nationality, ethnic or language background, physical or mental ability, or political or religious views, or which stereotypes groups in an adverse manner. This is not meant to preclude or inhibit legitimate academic debate on any issue; however, the language used in such debate should be non-discriminatory and sensitive to these matters. It is important to avoid the use of discriminatory language in your communications and written work. The most common form of discriminatory language in academic work tends to be in the area of gender inclusiveness. You are, therefore, requested to check for this and to ensure your work and communications are non-discriminatory in all respects.

Students with disabilities

Students with disabilities that may disadvantage them in assessment should seek advice from one of the following before completing assessment tasks and examinations:

- Faculty of Information Technology Student Service staff, and / or
- your Unit Coordinator, or
- [Disabilities Liaison Unit](#)

Deferred assessment and special consideration

Deferred assessment (not to be confused with an extension for submission of an assignment) may be granted in cases of extenuating personal circumstances such as serious personal illness or bereavement. Information and forms for Special Consideration and deferred assessment applications are available at <http://www.monash.edu.au/exams/special-consideration.html>. Contact the Faculty's Student Services staff at your campus for further information and advice.