Unit Outline: KXC254 Operating Systems

March - July 2007
Hangzhou, China

Prerequisites
KXC151

Corequisites
None

Unit Weight
12.5% of one academic year

Unit Coordinator
Sung Gun (Sunny) Hwang

Lecturing Staff
Mr. Sung Gun (Sunny) Hwang
Ms Guo, Yong yan
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Scheduled Teaching Sessions
Lectures: 3 hr/wk
Tutorials: 1 hr/wk (from week 2)

Unit Website
The unit website is accessed from http://www.utas.edu.au/coursesonline/. You will need to use your University of Tasmania email pop account username and password to log on to the WebCT system. Once authenticated by the system your personalised MyWebCT area will be displayed. It contains links to the websites that you have permission to access - including the website for this unit. This unit is Web Supplemented. This means that the use of the Web is optional for this unit. The unit website contains unit information and resources. If you are not able to access the unit website, please contact the technical staff at ZUT.

University Website
Information and Resources for 'Current Students' are available on the university website at: http://www.utas.edu.au/students/

Provider
School of Computing - Faculty of Science, Engineering, and Technology.

OVERVIEW

Introduction
In this unit the approach is based on theoretical issues and practical work. Lectures will review computer architecture, with an emphasis on new technologies and trends, cover the concepts of processes, mutual exclusion and deadlock, and discuss general algorithms for scheduling, memory management and I/O processing. Upon completion of this unit the student should be able to demonstrate a practical understanding of operating system architecture, and the functions of operating system components, explain the relationships between the operating system modules, and design and implement some operating system functions in commonly used operating systems environments. Students should be able to understand how popular operating systems such as Windows and Unix were built.

Learning Outcomes
On successful completion of this unit, you will be able to:

1. Articulate the basic principles and management of modern operating systems
2. Use a multiuser operating system to implement a broad range of system level tasks
3. Beware of security implications of multiuser, networked operating systems
4. Understand and analyse types and implications of new developments in operating systems

Unit Content
Operating Systems:

- Need for an operating system
- Components of an operating system
- How do the components work

UNIX:
- Unix file system
- Unix shells and shell programming
- Protection and Security:
- File protection and access rights

Processes:
- What is a process?
- Process state
- Threads
- Interrupt handling, CPU context switching
## CPU Scheduling, Interprocess Communication and Synchronization:
- CPU scheduling algorithms
- Producer/consumer implementation
- Critical sections
- Mutual exclusion and synchronization
- Solutions: strict alternation, Peterson's solution
- Deadlock

## Memory Management:
- Swapping
- Virtual Memory
- Paging, segmentation
- Page replacement algorithms

## File System:
- Basics
- RAID
- Secondary storage management, disk head scheduling
- File system design
- File system performance, caching, free space management
- Distributed file systems

## Input/Output:
- Device types
- Device interface

## Protection and Security:
- Good passwords, bad passwords, password vulnerability
- Threats

For more information see the section titled 'Content' on the unit website.

### Generic Skills

The university has defined a set of generic graduate attributes expected in its graduates. Your course is designed to enable you to develop generic skills that are valued in, and expected of, graduates. These are skills that you will need to develop over time. Hence you are encouraged to look for opportunities, as you study each unit, to reflect on and improve these skills.

### LEARNING AND TEACHING

#### Approach to Learning

You are expected to spend about 130 hrs studying in this unit - this includes attendance at scheduled teaching sessions. (For a 13 week semester this is, on average, 10 hr/wk.) This is the amount of study time that the 'typical' student will need to reach the level of competence and understanding required to fulfil the unit objectives.

You are expected to:
- attend all scheduled lectures and tutorials, unless otherwise notified by the unit coordinator
- prepare for, and actively participate in lectures and tutorials
- complete the assigned learning tasks
- review what has been learnt
- complete assessment items and submit them on time
- access and be familiar with the information and resources available on the unit website
- seek help from teaching staff if you have any questions or difficulties in studying this unit

You are encouraged to read the university's Code of Conduct for Teaching and Learning. Part A describes the 'Responsibility of the University to Students' and part B describes the 'Responsibilities of Students to the University'. [http://www.utas.edu.au/tl/policies/codes.html](http://www.utas.edu.au/tl/policies/codes.html)

### Schedule

See the 'Schedule' section on the unit website.

### Teaching Staff

#### Unit Coordinator:

Sung Gun (Sunny) Hwang  
E-Mail: hwangs@utas.edu.au

#### Lecturing Staff

Mr. Sung Gun (Sunny) Hwang  
Ms Guo, Yong yan  
gyy@zjut.edu.cn

### School Help Desk

Contact technical staff at ZUT for information about accessing and using the Computer labs.
University Services and Support

The University has staff available to assist you, such as the:

- Learning Development Advisor
- Student Counselor
- Careers Advisor
- Disability Officer

For more information and contact details see the Services and Support section on the University 'Current Students' web page. [http://www.utas.edu.au/students/](http://www.utas.edu.au/students/)

Resources

Unit Website

The unit website contains unit information and resources.

Prescribed Text

Students are advised to have good access to the following books (but not necessarily a personal copy):


The following text is for tutorials and weeks 2-4 lectures:


Readings

Extra readings:


Software

The software that you will need to access the unit website and to study this unit, including general purpose software such as word processors, is provided on the computers in the computing labs. If you intend to use software on other computers please check that the versions are compatible.

ASSESSMENT

<table>
<thead>
<tr>
<th>Assessment Items</th>
<th>Item 1</th>
<th>Title: Assignment 1</th>
<th>Type: In-Semester - individual assignment</th>
<th>Weighting: 10%</th>
<th>Due: 3pm, 23 April (Monday Week 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Item 2</td>
<td>Title: Assignment 2</td>
<td>Type: In-Semester - individual assignment</td>
<td>Weighting: 15%</td>
<td>Due: 3pm, 6 June (Wednesday Week 14)</td>
</tr>
<tr>
<td></td>
<td>Item 3</td>
<td>Title: Practical exercises in tutorials</td>
<td>Type: In-Semester - learning tasks</td>
<td>Weighting: 5%</td>
<td>Due: At the end of each tutorial session</td>
</tr>
<tr>
<td></td>
<td>Item 4</td>
<td>Title: 3 hr Examination</td>
<td>Type: Formal Examination</td>
<td>Weighting: 70%</td>
<td>Due: University Examination Period</td>
</tr>
</tbody>
</table>

Unix shell programming.

Understanding of Window XP and Unix internals

(This is to make sure that students attend the tutorials and do the exercises)
Due:
University Examination Period

Closed book examination.

See the 'Assessment' section in unit website for more detailed information about assessment items.

In-Semester Assessment

Unless specifically stated in the specification of the assessment item provided on the unit website, it is required that:

- work submitted by a student is the work of that student alone OR
- where the assessment item is to be completed by a group of students, the work submitted by the group of students is the work of that group of students alone.

Assignment submissions will not be considered for assessment unless they are 100% compatible with the School environment.

Plagiarism

Plagiarism is a form of cheating. It is taking and using someone else's thoughts, writings or inventions and representing them as your own, for example:

- using an author’s words without putting them in quotation marks and citing the source;
- using an author’s ideas without proper acknowledgment and citation; or
- copying another student’s work.

If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at [http://www.utas.edu.au/tl/supporting/academicintegrity/index.html](http://www.utas.edu.au/tl/supporting/academicintegrity/index.html).

The intentional copying of someone else’s work as one’s own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University. Details of penalties that can be imposed are available in the Ordinance of Student Discipline – Part 3 Academic Misconduct, see [http://www.utas.edu.au/policy/subject.html#students](http://www.utas.edu.au/policy/subject.html#students).

The University reserves the right to submit assignments to plagiarism detection software, and might then retain a copy of the assignment on its database for the purpose of future plagiarism checking.

Referencing

The university document on plagiarism contains information about referencing the work or ideas of others. (See [http://www.utas.edu.au/plagiarism/](http://www.utas.edu.au/plagiarism/).) The preferred text referencing systems for the School is the Harvard system (also referred to as the author-date system).

Submissions

The details of the submission method (paper, electronic or other) for each assignment will be supplied in a separate assignment specification sheet. All in-semester assignment submissions (including electronic submissions) are to include an Assignment Cover Sheet which includes a statement confirming that the submission is your own work. If this undertaking is not signed, the assignment will not be marked. The Assignment Cover Sheet is available on the School's web site [http://www.comp.utas.edu.au/app/studyresources.jsp](http://www.comp.utas.edu.au/app/studyresources.jsp).

Extensions

Assessment items will not be accepted after the due date except under the conditions stated in the school policy on late assessment. [http://www.comp.utas.edu.au/app/late_assess.jsp](http://www.comp.utas.edu.au/app/late_assess.jsp)

Formal Examination

The formal examination will be held at ZUT, Hangzhou, and is conducted by the University Registrar.

Final Grade

Overall assessment will be based on the student's performance throughout the semester as well as in a formal examination. In order to achieve a pass (or better) result, a student must obtain:

1. at least 45% of the total mark for in-semester assessment items
2. at least 45% of the mark for the formal examination
3. at least 50% of the overall mark

In order to comply with the benchmarks set by the Faculty of Science, Engineering & Technology for distribution of grades in units, both the in-semester and examination marks that students obtain may be adjusted either upwards or downwards. See [http://fcms.its.utas.edu.au/scieng/scieng/policies.asp](http://fcms.its.utas.edu.au/scieng/scieng/policies.asp) for details of the Faculty Assessment Guidelines.

Passing grades will be awarded based on the AVCC guidelines:
- PP at least 50% of the overall mark but less than 60%
- CR at least 60% of the overall mark but less than 70%
- DN at least 70% of the overall mark but less than 80%
- HD at least 80% of the overall mark

The maximum mark awarded to a student who fails the unit will be 44.

For more information, including other grades such as Supplementary and Terminating grades, see the School of Computing's guidelines for assessment - available at: