

Course web page:
<http://ugweb.cs.ualberta.ca/~c379/W08/index.shtml>

CMPUT 379 Operating System Concepts, Winter 2008 Course Syllabus

Date and Time: MWF at 9:00-9:50am

Location: CSC B 10

Number of credits: 3

Instructor:

Ioanis Nikolaidis <yannis@cs.ualberta.ca> Office: ATH 3-22, Phone: 492-5757, Office Hours: MW 2pm-3pm or e-mail for appointment

Note:

to arrange meetings outside the two hours indicated, I prefer that you contact me by e-mail to set up a meeting time which is mutually convenient. This allows me also to group meetings in consecutive time slots. By default, I assume a 15 minute slot. If you anticipate that a 15 minute meeting is not enough, then please let me know in advance.

Teaching Assistants:

Joel Jackson <joelj@cs.ualberta.ca>, Adam Jocksch <ajocksch@cs.ualberta.ca>, Chen Liu <cliu2@cs.ualberta.ca>, Yufeng Shen <yufeng1@cs.ualberta.ca>, Min Yang <myang2@cs.ualberta.ca>

Note: Lab attendance is *not*

mandatory. Labs are the place to meet and consult the TAs about assignments. TAs are not obliged to have additional office hours beyond the hours that they provide assistance during the labs. Also, on occasion, TAs present valuable information of tutorial value during the lab sessions. Such presentations are announced in advance (this is one good reason to check your e-mail, the course newsgroup, and the course web pages on a daily basis).

Lab schedule:

The day for the beginning of labs will be announced during the first week of classes. The lab schedule information (as well as which TA is assigned to which lab session) is available from the course web pages. On the course web pages you can also find which TA(s) are assigned to mark each assignment.

Newsgroup: ualberta.courses.cmput.379

Note:

Use the usual posting etiquette for newsgroups, but also pay particular attention to (a) not giving away answers that compromise the assignments (e.g., supplying source files etc.) and (b) not expecting to use the newsgroup as a means to get a quick solution to a technical problem you are facing (as it usually happens a few hours before an assignment deadline). We will do our best to answer questions posted in the newsgroup within a working day, and sometimes we will answer very quickly, but this is not a guarantee that the newsgroup will provide you the solutions you need in real-time. During weekends, we reserve the right to rest (including not responding to the newsgroup postings) and you should try to rest as well!

Overview

The course provides an overview of the organization of operating systems for general-purpose computers. Students will be exposed to several new aspects of programming including: process scheduling, process synchronization, multi-process computation, deadlock avoidance, file system organization, and security. The concepts taught will be illustrated with examples taken from a variety of operating systems, but mostly from UNIX. The concepts covered are (quoting from the calendar description):

Definition of a process; process states and state transitions; process control block; operations on processes; interrupt processing; parallel processing; resource allocation; shared and unshared allocation; critical sections; semaphores; deadlock; deadlock prevention, avoidance, detection, and recovery; memory management; memory allocation schemes; virtual memory; paging and segmentation; page replacement strategies; working sets; demand paging; job and

processor scheduling; scheduling levels, objectives, and criteria; various scheduling algorithms; multi-processor considerations; file system functions; file organization; tree structured file systems; space allocation; file catalogs; file access control mechanisms; operating systems security.

Objectives

First, you will be able to understand the terminology surrounding and describing operating systems. Second, you will become familiar with the kinds of abstractions provided by general purpose operating systems that facilitate the development of user applications. Third, you will become familiar with the usual (internal) policies and mechanisms implemented by operating systems (in the "kernel") and how they impact system performance. Alongside, you will develop an appreciation of what aspects of computer & CPU architecture facilitate certain facets of operating system implementation. Fourth, you will have a working knowledge of systems-level programming using the abstractions provided under the UNIX environment. Finally, you will gain some elementary understanding of how special-purpose operating systems differ from general purpose operating systems in terms of design and capabilities.

Pre-requisites

CMPUT 204 provides the background on the design and analysis of essential mechanisms for sorting, queueing, searching, etc., including their efficiency in terms of computation and storage. CMPUT 229 provides the background on the architecture and operation of modern computers, including mechanisms for I/O access and control, as well as requisite knowledge of assembly language. Prior knowledge of C programming under Unix (equivalent to the content of CMPUT 201) is essential to completing the assignments.

Course Topics

- Introduction and Overview (about 3 hours)
- Processes (about 2 hours)
- Synchronization (about 4 hours)
- Inter-Process Communication (about 4 hours)
- Scheduling (about 2 hours)
- Deadlocks (about 3 hours)
- Memory Management (about 6 hours)
- Virtual Memory (about 3 hours)
- Secondary Storage Issues (about 3 hours)
- Device Management (about 2 hours)
- Security or Case studies or Real-time Systems (about 3 hours)

(not strictly in the listed order)

Course Work and Evaluation

Course Work	Date	Weight
Assignment 1	January 31st	12%
Assignment 2	March 6th	15%
Assignment 3	April 3rd	15%
Midterm Exam	February 27th	18%
Final Exam	April 21st (9am)	40%
Deferred Exam	April 28th (1pm)	(40%)

Please double check the Final Examination date and time by consulting the *Official Fall 2007 / Winter 2008 Exam Planner* (<http://www.registrar.ualberta.ca/ro.cfm?id=360>). In case of disagreement between the contents of this syllabus and the official exam planner, the official exam planner will be the authoritative source.

All assignments are to be submitted no later than **6:59pm** on the due date. Late submissions are **not** accepted.

Grading System

The course is marked according to the grade distribution of 3rd year undergraduate courses. I try to interpret "61.6 *University of Alberta Marking and Grading Guidelines*" as faithfully as the situation allows. Occasionally, adjustments (to the benefit of the students) are made when it is evident that a course component (e.g. a midterm) was "harder" than expected. No absolute totals are required for passing the course. However, experience shows that the class average (if 100% is perfect score) tends to be close to the mid-60% and the failing grade is close to the 30%. Both types of components, i.e., assignments and exams, matter. The somewhat larger contribution of the exam scores suggests a somewhat more prominent role of the exams in the total mark. The key to success in this course is the proper organization of your time. It never, repeat: NEVER, works to wait with an assignment until a few days before the deadline.

Deferred Exams

The deferred examination date is April 28th, 2008 at 1pm. You can take the deferred final exam *only if* the Faculty grants you an excused absence from the final examination.

Re-evaluation

Any questions or concerns about marks on a particular assignment or exam must be brought to my attention within 10 days of the day you are notified about your mark for the assignment/exam. After 10 days, I will not consider remarking or re-evaluating the work. Note that what counts as notification is either an e-mail message to your CCID account, OR a newsgroup announcement instructing you on how to access your mark or marking sheet. Make sure you check daily your CCID e-mail account *and* the course newsgroup.

Important:

If you have a question or concern about marks on a particular assignment, your first point of contact is the TA (or TAs) that marked the assignment in question. Since the question/concern must be brought to the instructor's attention within 10 days of the day you are notified about your mark for the assignment/exam, the best way to initiate the process of possible assignment re-evaluation is (within the 10 day period) to send the TA an e-mail and to cc- to the instructor. This approach lets the instructor know that you are actively pursuing a re-evaluation and that you are in discussions with the TA. If after contacting the TA, you still think the assignment should be re-considered, then you should contact the instructor directly

Course Materials

Required textbook: A. Silberschatz, P.B. Galvin & G. Gagne, **Operating System Concepts**, 7th Edition, John Wiley & Sons, Inc. 2004. (ISBN ISBN0-471-69466-5).

Highly recommended: W. R. Stevens & S. A. Rago, **Advanced Programming in the UNIX Environment**, 2nd Edition, Addison-Wesley Professional Computing Series. 2005. (ISBN 0-201-43307-9).

Presentation materials: P. Gburzynski, **CMPUT 379: Operating Systems Concepts**, Fall 2007. (Available in the resources section of the course web page.)

Additional materials to assist you in your study are made available throughout the term in the **Resources** section of the course web pages. Consult also the course schedule page for a weekly updated summary of what was covered in class (and an idea of what is planned next).

Policies

Course Outlines

Policy about course outlines can be found in Section 23.4(2) of the University Calendar.

Academic Integrity

The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour which could potentially result in suspicions of cheating,

plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University. (GFC 29 SEP 2003).

Collaboration

All course work should be individually completed. This includes any programs and/or documentation. Please exercise judgment when posting to the newsgroup to not disclose many implementation details that would allow your implementation to be easily replicated by others. If you need to use a non-trivial piece of source code that is available through the web, found in a textbook, or available in any other way, you need to first get the permission of the instructor in order to use it. Even when permission is given by the instructor, the use of source code from external sources (web, textbooks, etc.) should be cited the same way you would cite published works.

Note:

In the event of suspicion of collaboration, plagiarism, and cheating in general, the instructor and the TAs reserve the right to use automated means (e.g. software tools) that provide information about the extent to which two or more student submissions are similar.

Excused Absences

Assignments:

You can request the late submission of an assignment due to incapacitating illness, severe domestic affliction or other compelling reason, provided supporting documentation (e.g., a doctor's note) is provided within 48 hours of the assignment deadline (or later if warranted by the nature of the incapacitating event). In the case of a doctor's note, you must have been seen by the doctor on the date that the assignment was due. Requests may be denied by the instructor. If the request is accepted, then submission of the assignment up to 48 hours past the assignment's deadline will be accepted (without any penalty). If the nature of the incapacitating event is such that it is impossible to submit the assignment within 48 hours of its original deadline, then, if the request is accepted, the missed assignment's mark will be set to the average of the remaining two assignments. No more than one late assignment submission is granted per student over the entire term, regardless of excuse.

Midterm:

You can request consideration for excused absence from the midterm due to incapacitating illness, severe domestic affliction or other compelling reason, provided supporting documentation is provided within 48 hours of the scheduled midterm. In the case of the midterm, supporting documentation for illness must be in the form of a completed U. of Alberta Medical Statement Form (and you have to be seen by the doctor on the day of the midterm), or other appropriate documentation (consistent with Calendar section 23.4[3]). Requests may be denied by the instructor. If the request is accepted, then the weight of the midterm is added to the weight of the final exam (i.e., the final exam weight becomes 58%). Deferred midterms are *not* given.

Final: If you cannot take the final examination, the instructor has *no control* over the process of deferral. In this case, the student must formally apply for a deferred examination to the student's Faculty office within 48 hours. If the Faculty decides to grant you a deferred examination, it will inform the instructor. The date and time of the examination is as listed in the "Course Work and Evaluation Section" above.

Additional Policies

Except for the policies listed here, be certain that you are also aware of the Departmental Policies (e.g. as they pertain to Conditions of Use of facilities) as well as of the University Policies (e.g., Electronic Communication Policy, Code of Student Behaviour, Student Appeals, etc.)