Course Description

CSE 430 studies operating system structure and services, emphasizing concurrent processes (threads, concurrency, race conditions, mutual exclusion, critical sections, synchronization, deadlocks, semaphores) and concurrent programming paradigms including OpenMP and threading libraries, the use of Intel® Parallel Studio tools on multicore machines, and the Saguaro cluster. Other topics include CPU scheduling, virtual memory management, I/O and disk scheduling, file management, and security.

Prerequisites: CSE 230 (or EEE 230), CSE 310, and programming experience in C or C++.

Required Textbook


Evaluation Procedure

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<tr>
<th>Assignment Type</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>20%</td>
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<tr>
<td>Individual Projects</td>
<td>20%</td>
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<tr>
<td>Team Project</td>
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<td>Midterm Exam</td>
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<td>Final Exam</td>
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<td><strong>Total</strong></td>
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The goal is to cover the following chapters of the textbook:

1. Computer System Overview (Review)
2. Operating System Overview (Review)
3. Process Description & Control
4. Threads
5. Concurrency: Mutual Exclusion & Synchronization
6. Concurrency: Deadlock & Starvation
7. Memory Management
8. Virtual Memory
9. Uniprocessor Scheduling
10. I/O Management & Disk Scheduling
11. File Management
12. I/O Management & Disk Scheduling
13. File Management
14. Computer Security Threats
15. Computer Security Techniques
Intel® Parallel Studio, Threading Libraries, and Saguaro

A large emphasis of this course is on the topic of concurrent processing. From the assignments and/or projects on this topic you will gain experience developing parallel C/C++ code using OpenMP assisted by the tools of Intel® Parallel Studio (including Advisor, Composer, Inspector, and Amplifier), and threading libraries such as POSIX pthreads and Intel® Thread Building Blocks (TBB). ASU’s Advanced Computing Center (A2C2) Saguaro system currently contains over 5,000 processor cores; 215 TB of high speed parallel LUSTRE scratch space; 11 TB aggregate RAM and 1.5 GB of aggregate L2 cache; double fat tree DDR InfiniBand network, and more than 40 teraFLOPS of computation power; we will use a small fraction of these resources.

The Team Project

The purpose of the team project is to study a topic close to or at the frontier of operating systems research. The result of this study is a (short) team report, and a team presentation in class on the topic. Each team member will conduct a peer assessment of the team; the presentation will be evaluated by the class and the instructor. The topics studied by the teams are considered part of the curriculum.

Suggested topic ideas include: virtualization (e.g., Xen, VMWare), operating systems for embedded devices (e.g., cell phones, sensor networks), massive storage systems (e.g., Google, Akamai), distributed systems, real-time systems, multimedia systems (e.g., for gaming), and security. Alternative topics may be proposed for approval by the instructor.

Use of myASU

Among other things, myASU is used to provide a discussion group for CSE 430. myASU is accessible from a browser at http://my.asu.edu. Use your ASUrite user-id to access the course. Use the forums of the discussion group to ask questions related to the course. The strength of a discussion group comes from everyone seeing all the questions and answers; you are expected to check it often and to participate. Note that some announcements may only be posted on myASU.

Class Policies

Assignments are due at the beginning of class on their due date. Late assignments are accepted only on a documented emergency basis. For consideration of an extension you must contact me prior to the due date. Similarly for rescheduling a midterm. The final exam date is scheduled by ASU and will not be changed.

A hard copy is required for all assignments. If you are unable to turn in a hard copy on time, you must e-mail a soft copy to the TA before the due date and time. You are still required to bring a hard copy of the submission sent by e-mail as soon as possible.

The submission requirements for each individual and team project will be provided in its description. Whenever a new grade for work is available it will be posted on myASU. If you wish to appeal the grade, you must do so in writing within one week of the grade availability. Your right to appeal is waived one week after the grade is posted. It is your responsibility to keep the graded hard-copy of your assignments, projects, and midterm exam.

ASU Code of Conduct and Academic Integrity Policy

Plagiarism or any form of cheating in assignments, projects, or exams is subject to serious academic penalty; this may range from a grade of zero for the work to failure of the course. To understand your responsibilities as a student read:

- The ASU Student Code of Conduct: http://students.asu.edu/srr/code
- The ASU Student Academic Integrity Policy: http://provost.asu.edu/academicintegrity