

Department of Electrical and Computer Engineering

EEL 6758 - ENGINEERING DESIGN OF MICROPROCESSOR BASED OPERATING SYSTEMS

Spring, 2010

Instructor : Dr. Gang Quan
Class Time : Tuesday, Thursday: 2:00 p.m. – 3:15 p.m.
Classroom : EC 2834
Office Hours : Tuesday, Thursday: 3:30 p.m. - 5:00 p.m. or by appointment
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Course Description:

This course studies operating system design issues for microprocessor-based embedded systems, rather than that for the general computing systems such as desktops, laptops, or workstations. Such systems have been pervasive, ranging from communications, transportations, medical instruments, to home electronics. A common characteristic of these systems is that these systems are tightly resource constrained and usually have stringent timing and other design constraints (such as power). Using an operating system will benefit the development and maintenance for most of these systems, except for the most trivial ones.

This course introduces the basic principles and techniques in operating system design, with an emphasis on employing scheduling techniques to address the real time, power, thermal, as well as other quality of service issues. The course content consists of two sections: the lecture section and the seminar section. In the first section, the instructor will introduce the fundamentals about real-time systems using the form of the lecture. An exam will be arranged to test the students' understanding of these basic concepts and techniques. During the second part of the semester, students in a group of two or three each will choose or be assigned a related research topic. Each group will study one or two research papers in depth or conduct a survey on a specific topic, and make a presentation in class. There is one semester-long topic research project assignment for a group of two to three students. Each group will introduce the problem, present the research ideas, and discuss their project outcomes in class. Finally, each group will also submit a formal project report, in the IEEE proceeding format.

Topics Covered:

1. Operating system and its role in processor-based design (review)
2. Major components in operating system (review)
3. Single processor scheduling: rate monotonic scheduling, earliest deadline first
4. Single processor scheduling with resource sharing
5. Other single processor scheduling techniques
6. Multiple processor scheduling and design optimization
7. Power-aware real-time scheduling
8. Thermal aware real-time scheduling

Gradings:

Exam (take home two-three days): 25%

Topics research (2 ~ 3 students per group): 25%

1. One page written proposal submitted in time and approved by the instructor (5%)
2. Prepare slides and do a 25 - 30 minutes presentation in class (10%)
3. Three-page introduction and summary (10%).

Projects (2~3 students): 40%

1. One page written proposal submitted in time and approved by the instructor (5%)
2. Research efforts, ideas, and results (15%)
3. A 25-30 minutes oral presentation in class (10%)
4. Formal project report (10%).

Attendance: 10%

Prerequisites: EEE 4746

Textbook:

The lectures will be substantially based on technical papers from literature most of which can be found from on-line databases such IEEE eXplore and ACM digital library (accessible on-line in FIU campus). It is your responsibility to print and read related papers. Lecture material will also be drawn from various books and other resources, some of them are listed as follows. There is no particular need to buy these books.

- ***Operating System Concepts*** (8th edition) by Silberschatz, Galvin, and Gagne, John Wiley & Sons, 2009.
- ***Real-Time Systems***, J.W.S Liu, Prentice Hall, 2000

Policies:

- Discussion and studying together in groups is encouraged. For individual work submitted, it is expected that each student will submit their own ***original*** work. Any evidence of duplication, cheating or plagiarism will result at least a failing grade for the course.
"Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook."
- You are required to attend the class in time. Absences are excused for medical reasons and extenuating circumstances only with proper documentation. Conflicts with work and situations regarding personal decisions are ***NOT*** acceptable excused absences. Unexcused absences will result in the loss of points from your final grade.