Fall 2012

CEG 7350-01: Computer Architecture

Soon M. Chung
Wright State University - Main Campus, soon.chung@wright.edu

Follow this and additional works at: https://corescholar.libraries.wright.edu/cecs_syllabi

Part of the Computer Engineering Commons, and the Computer Sciences Commons

Repository Citation
https://corescholar.libraries.wright.edu/cecs_syllabi/868

This Syllabus is brought to you for free and open access by the College of Engineering & Computer Science at CORE Scholar. It has been accepted for inclusion in Computer Science & Engineering Syllabi by an authorized administrator of CORE Scholar. For more information, please contact corescholar@www.libraries.wright.edu, library-corescholar@wright.edu.
Description: Review of sequential computer architecture and study of parallel computers. Topics include memory hierarchy, reduced instruction set computer, pipeline processing, multiprocessing, various parallel computers, and interconnection networks.

Prerequisite: CEG 6350 Operating Systems Internals and Design, or equivalent
Prerequisite Topics: Process management, CPU scheduling, and Memory management.

Instructor: Dr. Soon M. Chung, 403 Russ Engineering Center (937-775-5119)
soon.chung@wright.edu, http://www.cs.wright.edu/~schung

Class: M. W. 6:10-7:30 pm at 155 Russ Center.

Office hour: M. W. 4:45-5:45 pm at 403 Russ, or by appointment.
*use e-mail for short questions.

Text Book:

References:

Topics: Review of OS Concepts
- Overview of Computer architecture and Parallel Processing
- Processors
- Memory Hierarchy Design
- Main Memory Management
- Memory Interleaving and Access
- Cache Memory Management and Multicache Coherence
- Interconnection Systems
- Redundant Array of Inexpensive Disks (RAID)
- Message-passing Architecture and Routing Mechanism
- Realtime Systems
- Fundamentals of Quantitative Design and Analysis
- Instruction Level Parallelism and Its Exploitation
- Data Level Parallelism in Different Architectures

Grading: A:[85,100], B:[75,85), C:[65,75), D:[55,65), F:[0,55)
- Midterm 30% (10/17, W.), Project 30%, Final 40% (12/12, W., 5:45-7:45 pm)
- Project is paper-review or design/implementation. Select one by 10/17.
- The final report is due on the last class, 12/12.
  (1) Paper-review project {papers reviewed 7%, technical quality 8%, presentation 6%, discussion 9%}
  (2) Design/implementation project 30% {originality 7%, technical quality 8%, presentation 6%, discussion 9%}
CEG 7350 Paper-Review Project

1. Choose a topic and select at least 5 relevant technical papers. High-quality journal papers are preferred.
2. Summarize and compare the papers, and then add your own discussion.
3. Submit the working title and the list of candidate papers. (due 10/17)
4. Present in the class, and submit the report and the papers you studied. (due 12/12)
5. Size of the report is around 30 pages in double-space.
6. This project can be done as an individual project or a team (of two) project.

Possible Topics

• Multiprocessor cache management
• Multicore processors
• SIMD, MIMD machines
• Fault tolerant computing
• Parallel algorithms
• Performance evaluation of parallel computers
• Interconnection networks
• Cluster computing
• GRID and Cloud computing
• RISC/CISC processors
• Reconfigurable array of processors
• Optical computing
• Application specific architectures
• Realtime computer systems
• Artificial neural network
• Other relevant topics

Reference Sources

- IEEE Transactions on Computer
- Computer (IEEE Computer Magazine)
- Communications of ACM
- IEEE Tutorials, such as Tutorial on computer architecture, on supercomputing, etc.
- Proceedings of Int'l Conf. on Parallel Processing
- Proceedings of Int'l Symposium on Computer Architecture: available in the volumes of Computer Architecture News
- Journal of Parallel and Distributed Computing
- ACM Transactions on Computer Systems
- IEEE Transactions on Parallel and Distributed Systems
- ACM Computing Surveys
- ACM/Springer Multimedia Systems
- IEEE Multimedia
- ACM Transactions on Modeling and Simulation
- IEEE Transactions on Knowledge and Data Engineering
- IEEE Transactions on VLSI
- IEEE Transactions on Neural Networks
- IEEE Micro
- Journal of Supercomputing
and others
CEG 7350 Design/Implementation Project

1. Do either (A) or (B):
   (A) Design, implementation, and/or performance analysis (i.e., deterministic modeling, analytical modeling, or simulation) of a computer system component.
   (B) Design a parallel algorithm or implement an existing parallel algorithm using MPI (Message Passing Interface) or Java RMI.

2. Submit a description of your topic and a list of reference documents (if any). (due 10/17)
3. Present in the class and submit the report (report due: 12/12)
4. Size of the report is between around 20 pages in double-space.
5. This project can be done as an individual project or a team (of two) project.

Possible Topics

- Memory/cache management in multiprocessor system.
- MIMD machines
- Fault tolerant computing
- Parallel algorithms for numeric or nonnumeric computation.
- Performance evaluation of parallel computers
- Interconnection networks
- Dataflow machines
- Systolic array
- Optical computing
- Application-specific architectures, such as database machines,
  Image processing machine, etc.
- Artificial neural networks
- RAID (Redundant Array of Inexpensive Disks)
- Multicore Processors
- Multimedia Systems
- Cluster computing
- Grid computing
- Other relevant topics

Reference Sources

- IEEE Trans. on Computer
- Computer (IEEE Computer Magazine)
- Communications of ACM
- IEEE Tutorials, such as Tutorial on computer architecture, on supercomputing, etc.
- Proc. of Int’l Conf. on Parallel Processing
- Proc. of Int’l Symposium on Computer Architecture: available in the volumes of Computer Architecture News
- Journal of Parallel and Distributed Computing
- ACM Trans. on Computer Systems
- IEEE Trans. on Parallel and Distributed Systems
- ACM Computing Surveys
- IEEE Trans. on Knowledge and Data Engineering
- IEEE Trans. on Neural Networks
- IEEE Micro
- ACM/Springer Multimedia Systems
- IEEE Multimedia
  and Others