Spring 2009

CEG 720-01: Computer Architecture I

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Catalog Data: Review of sequential computer architecture and study of parallel computers. Topics include memory hierarchy, reduced instruction set computer, pipeline processing, multiprocessing, various parallel computers, interconnection networks, and fault-tolerant computing.

Prerequisite: CEG633, or CEG520 and CEG611
Prerequisite Topics: Process management, CPU scheduling, Memory management, Cache management, Disk management. If not familiar with these topics, take CEG433/633 (Operating Systems) first.

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

Class: Tu. Th. 4:10-5:25 pm at 154 Russ Center
Office hour: Tu. Th. 2:30-3:30 pm at 403 Russ, or by appointment.
*use e-mail for short questions.

References:

Topics: Overview of computer architecture and parallel processing
Processors and Memory Hierarchy
Bus, Cache, and Shared Memory
Interconnection Networks
Pipeline and Superscalar Techniques
Multivector and SIMD Computers
Multiprocessors and Multicomputers

Grading: A:[85,100], B:[75,85), C:[65,75), D:[55,65), F:[0,55)
Midterm 30% (5/7, Th.)
Final 40% (6/9, Tu., 5:45-7:45 pm)
Paper-review project 30% {papers referenced 7%, report organization 6%, written presentation 8%, discussion 9%}
CEG 720 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 5/12)
4. Present in the class (?), and submit the report and the papers you studied. (due 6/9)
5. Size of the report is between 25 and 35 double-spaced pages.
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 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
Briefly answer the following questions.

1. What is the definition of a process?

2. List a couple of CPU scheduling algorithms and explain how they work.

3. Explain the paging memory management scheme and the role of a page table.

4. Explain a couple of cache block replacement algorithms.