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CEG 720-01: Computer Architecture I

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CEG 720 Computer Architecture I

Fall Quarter, 2009

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 : M. W. 6:05-7:20 pm at 157 Rike Hall

Office hour : M. W. 2:30-3:30 pm at 403 Russ, or by appointment.
*use e-mail for short questions.

References :

- J. L. Hennessy and D. A. Patterson, Computer Architecture, 4th edition, Morgan Kaufmann, 2007.
- K. Hwang, Advanced Computer Architecture: Parallelism, Scalability, and Programmability, McGraw-Hill, 1993.
- A. Silberschatz, P. Galvin, and G. Gagne, Operating System Concepts.

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% (10/19, M.)

Final 40% (11/18, W., 8:00-10:00 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 10/26)
4. Present in the class (?), and submit the report and the papers you studied. (due 11/18)
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

CEG 720 Computer Architecture I

Prerequisite Test

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.