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Winter 2007

CEG 820-01: Computer Architecture II

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CEG 820 Computer Architecture II

Winter Quarter, 2007

Description : Continuation of CEG720 with more details on multiprocessor systems, parallel processing, and performance analysis.

Prerequisite : CEG720 or an equivalent course.

Instructor : Dr. Soon M. Chung
soon.chung@wright.edu
403 Russ Engineering Center, 775-5119

Class : M. W. 4:10-5:25 p.m. at 171 Math & Micro. Biology

Office hour : M. W. 2:30-3:30 p.m. at 403 Russ Center
or by appointment.

* use e-mail for short questions.

Text Book : K. Hwang, *Advanced Computer Architecture: Parallelism, Scalability, and Programmability* (McGraw-Hill, 1993), and technical papers.

Topics : Vectorization and vector processing methods

SIMD processing algorithms

Multiprocessor architecture and interconnects (Sec 7.1)

Multicache coherence algorithms (Sec 7.2)

Message-passing architecture and routing mechanism (Sec 7.3, 7.4)

Systolic array

Reconfigurable processor array

Conditions of parallelism (Sec 2.1)

Performance metrics (Sec 3.1.3)

Data flow computers (Sec 9.5)

Parallel language constructs (Sec 10.2)

Program partitioning and multiprocessor scheduling (Sec 2.2)

Grading : A:[85,100], B:[75,85), C:[65,75), D:[55,65), F:[0,55)

Midterm 25% (Feb. 12, Open book, note, and handouts)

Final 40% (Mar. 16, 5:45-7:45 p.m., Open book, note, and handouts)

Project 35%

{ originality 10%

organization of the report 5%

class presentation 10%

discussion 10% }

CEG 820 Project

- Choose a topic, and do either A or B.
- A. Design, implementation, and/or performance analysis (deterministic modeling, analytical modeling, or simulation).
- B. Technical paper review. (B is an incomplete form of A, and will get 70% of the score at maximum).

- Submit a description of your topic and a list of reference papers. (due 2/14)
- Present in the class and submit the report (report due 3/16)
- Size of the report is between 20 and 30 double-spaced pages.

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
- Cluster and GRID computing
- RAID (Redundant Array of Inexpensive Disks)
- Network switches
- Multimedia Systems
- 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