ECG702 Interconnection Networks for Parallel Processing
Fall 2011

Class meets: TTh 4:00-5:15pm at SEB 1240

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Course Website: http://www.ee.unlv.edu/~meiyang/ecg702/ecg702.htm

Course Description
This course covers topics in interconnection network architecture and design, including network topology, routing strategies, flow control methods, deadlock and deadlock avoidance, congestion control, and network performance analysis. We will also examine applications of networks to parallel computer interconnect, main-memory interconnect in multiprocessors, and switching fabric in Internet routers. 3 credit hours.

Reference Books

Supplementary Materials
Class handouts & notes

Topics
Introduction
Introduction to interconnection networks, network design considerations, and classification of interconnection networks.

Topology & Related Algorithms
Direct networks: linear arrays, meshes, trees, hypercubic networks,
Indirect networks: Crossbar, multistage interconnection networks
(Omega network, Banyan and Banyan-Like, Batcher sorter, Clos and Benes network),
Hybrid networks

Switching Techniques
Basic concepts, basic switching techniques, virtual channels, hybrid switching techniques, optimizing switching techniques, comparison of switching techniques

Routing Algorithms
Taxonomy of routing algorithms, deterministic routing algorithms, partially adaptive algorithms, fully adaptive algorithms, maximally adaptive routing algorithms, nonminimal routing algorithms, routing in MINs, routing in switch-based networks with irregular topologies, resource allocation policies
Deadlocks, Livelocks, and Starvation

Theory of deadlock avoidance, alternative approaches, deadlock avoidance in switch-based networks, deadlock recovery, livelock avoidance

Network Performance Analysis *

Performance metrics, workload models, comparison of switching techniques, comparison of routing algorithms, effect of network size, impact of design parameters, impact on router delays on performance

Evaluation
1. There will be one midterm exam.
2. There will be around 6 home assignments. In general, homework will be due two weeks from the date it is assigned, returned in two weeks from the due date. Late assignments will not be accepted. Staple your paper sheets together. Loose papers will not be accepted.
3. There will be one term project. Project may be individual or group-based. Each group needs to turn in the project proposal by the 8th week, turn in the progress report in the 12th week, and turn in the final report and present in the final week. The final report should include an abstract, introduction, body, conclusion, and a list of reference. For each group, you need specify the tasks performed by each member. All members in one group will obtain the same grade for the project.
4. Distribution of final grade:
   - Midterm exam 30% (75 points)
   - Term project 30% (75 points)
   - Presentation 10% (25 points)
   - Homework 24% (60 points)
   - Class attendance 6% (15 points)

Grades may be determined according to this scale:
- A >= 220
- B >= 180
- C >= 150

Attendance Policy
Attendance is required. You are responsible for all class work missed, regardless of the reason for the absence(s). And make sure you turn in the exam papers on time. It is your responsibility to check the course website for all activities going on with this course.

Academic Dishonesty
Academic dishonesty includes, but is not limited to, activities such as cheating and plagiarism. Any work turned in for individual credit must be entirely the work of the student submitting the work. You may share ideas but submitting identical assignments (for example) will be considered cheating. For assignments, access to notes, the course textbooks, books and other publications is allowed. All work that is not your own, MUST be properly cited. This includes any material found on the Internet. Any person caught cheating will be given an ‘F’ grade for the course and reported to appropriate university officials.

ADA statement
If you have a documented disability that may require assistance, you will need to contact the Disability Resource Center (DRC) for coordination in your academic accommodations. The DRC is located in the Reynolds Student Service Complex in room 137. Call at 895-0866 or TDD 895-0652, visit the DRC website at: http://www.unlv.edu/studentlife/disability/.