CMPS 4760/6760 Final Review

- When: May 11 (Sat) 10-12 pm
- Where: ST 302
- Format: similar to midterm
- closed-book and closed-notes, you are allowed to bring a one letter page single-sided cheat sheet
- Office hours in the final week
  - May 9 (Thu) 1-2 pm
  - May 10 (Fri) 1-2 pm
Topics

- Topics before midterm:
- Group communication (15.4)
- Consensus (15.5)
- Transactions (16.1-16.2,16.4,17.3)
- Replication (18.1-18.3)
Group Communication (15.4)

- Multicast vs. Unicast
  - Programming model: open vs. closed groups, overlapping vs. non-overlapping groups, membership management (JGroups not required)

- Reliable multicast
  - Assumptions, correctness requirements
  - Reliable multicast via reliable unicast, reliable multicast over IP multicast

- Ordered multicast
  - FIFO ordering, Total ordering using a sequencer (ISIS algorithm not required), causal ordering
  - Hybrids of reliable and ordered multicast in synchronous and asynchronous systems
Consensus (15.5)

- Overview
  - definition and correctness requirements
  - consensus and byzantine generals
  - consensus and reliable totally ordered multicast

- Consensus in synchronous systems
  - Consensus under crash failures
  - Byzantine generals problem: impossibility with three processes, solution with one faulty process

- Consensus in asynchronous systems
  - Know the FLP impossibility result (proof not required)

- Paxos algorithm not required
Transactions (16.1-16.2, 16.4, 17.3)

- Transactions (16.1-16.2)
  - definition, coordinator interface, transaction life histories, ACID properties
  - lost update, inconsistent retrievals => serial equivalence
  - dirty reads, premature writes => strict execution of transactions

- Concurrency control via locking (16.4)
  - exclusive locking, read-write lock
  - two-phase locking => serial equivalence; strict two-phase locking
  - deadlocks

- Distributed transactions: two-phase commit protocol (17.3.1)
Replication (18.1-18.3)

- Why replication (18.1)
  - performance, availability, fault tolerance

- Replica management (18.2)
  - group membership management
  - totally ordered view delivery
  - view-synchronous group communication

- Fault-tolerance service (18.3)
  - passive replication vs. active replication