Midterm Review

CS 475: Concurrent & Distributed Systems (Fall 2021)

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Midterm

- Thursday, Oct 7th, 9:00 – 10:15am
  - 75 minutes
  - Open-book, open-notes (you may use class notes, papers, and lab materials; you may read them on your laptop, **but you are not allowed to use any network**)

- Covering topics from lec-1 to lec-9-2
  - Go-specific questions
  - High-level design questions

Concurrency in Go

- Labs that were completed
  - Possible race condition bugs in Go
  - Go channels
  - Go mutex locks

MapReduce

- Why MapReduce
  - Google workload characteristics
- How MapReduce works
  - Paper
- How data flows within a MapReduce job
  - Use of local file system and use of GFS (Fig. 3 sort app)
- Fault tolerance in MapReduce
  - Backup tasks; task idempotence

Time & Clocks

- Cristian's algorithm
- Logical Clock algorithm
  - Guarantees if a → b, then C(a) < C(b)
  - How to guarantee a total order of events
- Vector Clock algorithm
  - If V(a) < V(b), then a → b
  - If V(a) $\not<$ V(b) and V(b) $\not<$ V(a), then a || b
  - Can be used to infer when an event b was aware of / influenced by a

Raft

- Raft material: Slides #1-24; paper: Section 1-5
- Safety and liveness requirements
  - Election
  - Normal operations
  - Leader changes
- Rules of selecting the best leader
- Rules of safe commitment
- Log consistency