COSC 462

Final Exam Review

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Overview

- Date and time decided by the department
  - December 7 @ 8am-10am, Min Kao 524
- Final exam is cumulative
  - 40% of the grade
  - Look at review for Exam 1
- General guidelines
  - Show your work
  - No calculators
    - Leave hard numbers/fractions plugged in but don't calculate
    - Estimate the answer if needed for another calculation
      - 1/3 ~ 0.3
      - 1/7 ~ 0.14
- Questions to expect
  - Small programming assignments
  - Multiple choice
  - Some questions will be optional (Answer Q1 or Q2 but not both)

OpenMP

- Parallel regions

  - How to open, close, what happens inside?

- Parallel loops

  - What are restrictions on C/C++ syntax for loops?
  - Runtime schedule

- Reductions

- Pragmas for concurrency

  - Exclusion, locking, limiting thread access

- Runtime and environment

- Tasking syntax and semantics

OpenSHMEM

- PGAS concepts
- RDMA
- Basic put/get
  - Memory consistency and synchronization issues
  - Fences
- Barriers, broadcast, reductions
- Remote atomics
- Locks

CUDA

- GPU hardware basics
  - From CUDA and OpenACC lectures
- Kernel programming
  - GPU-side syntax
    - Attributes, builtin variables
  - Host side invocation
  - Memory management
  - Host synchronization
- Thread organization
  - Grids
  - Blocks
  - Warps
  - Threads

MPI+CUDA

- What can be omitted in GPU-aware MPI?
- Programming simple MPI+CUDA examples
- How to tell if in a code snippet MPI handles GPU reads/writes

Advanced MPI

- **Non-blocking communication**
  - Eager vs Rendezvous
  - Pipelining
  - Communication progress inside MPI library
- **Topologies**
- **MPI Collectives**
  - Basic
  - Neighborhood
  - Non-blocking

MPI One-Sided

- Memory windows
- Memory consistency
  - Synchronization
  - Fences
- Remote operations

OpenACC

- Not included in the final exam

Good Luck!