CS 232 Fall 2006 Final Exam

- December 14th (Thursday), 1:30pm to 4:30pm
  - *everyone* in 1320 DCL
- Conflict: December 15th (Friday), 8am to 11am
  - 1109 SC
- Practice exam: released tomorrow
- Final Exam review sessions (identical), 1214 SC
  - Tuesday, December 12, 5pm to 6pm
  - Wednesday, December 13, 5pm to 6pm
- "All day" office hours on Wednesday, December 13th
- Also 5:30pm to 8:30pm on Thursday, December 14th for Conflict final

General exam layout

- Five or six questions

- Each question will have two parts (possibly with sub-parts):
  (A) direct application of concepts
  (B) a little bit of thinking (apply ideas to new context)

- Three hours long, expect you to finish in about 1.5 to 2 hours

MIPS (Lectures 1 - 5)

- All syntax/calling conventions provided on reference sheet
- Exceptions and interrupts: concepts only (no programming)
- C to MIPS translation
  - pointers
  - calling conventions
  - stack manipulation/recursion
- How would you implement …… high-level feature in MIPS?

Performance (Lectures 6, 7, 10, 11)

- No memorization of formulas (reference sheet)

- Performance equation and its consequences
  - RISC vs. CISC
  - single cycle vs. pipelined (what controls clock cycle time?)

No register allocation or datapaths

- No direct questions pertaining to
  - Lecture 8: register allocation
  - Datapath stuff from lectures 9 – 12

Hazards (Lectures 13, 14)

- Pipeline diagrams
- Data vs. control vs. structural hazards
- Stalling, flushing, forwarding
- Prediction strategies – why is strategy A better than strategy B?
- Applied to different pipelines (not just 5-stage MIPS pipeline)
- No hazard-detection equations
- No datapath questions like: what is the state of wires when these instructions get executed

Caches (Lectures 15 - 18)

- Tag, index, block-offset, associativity
  - what they mean
  - how to compute them
  - cache size $\neq$ number of bits to implement the cache

- AMAT calculation (hierarchical system)

- Hit/miss for given addresses

Virtual Memory (Lecture 19)

- How page-tables work
  - single-level
  - multi-level
- TLB
  - why
  - interaction with page-table
- AMAT calculation
- “What-if” questions

Parallelism (Lecture 20, 23, 24)

- No SSE stuff

- Thread level parallelism
  - Amdahl's law
  - forking/joining
  - data races
  - atomic operations

- How to parallelize …
  - when can't you parallelize
  - what would cause a data race
  - how would you privatize-and-reduce a variable

I/O and ECC (Lectures 21, 22)

- I/O calculation-based questions:
  - disk access time
  - bandwidth (maximum vs. effective)
  - formulas given

- ECC:
  - codewords
  - detection vs. correction
  - Hamming distance
  - number of redundant bits (Section 11)

ICES feedback

- Please don't fill demographic item 5 (student sex)

- Please answer questions A and D overleaf!
  - I'm especially keen to get your feedback on Midterm 3

- Good luck on your finals!!