Fundamentals of Computer Systems
Review for the Final

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Fall 2011
The Final

3 hours
8–10 problems
Closed book
Simple calculators are OK, but unnecessary
One double-sided 8.5 × 11″ sheet of your own notes
Anything discussed in class after the midterm is fair game
Much like homework assignments
Problems will range from easy to difficult; do the easy ones first.
Historical developments & trivia will not be on the test.
MIPS Architecture/Assembly programming
  ▶ Computational, Load/Store, & Control-flow Instrs.
  ▶ Instruction Encoding
  ▶ Pseudoinstructions
  ▶ Higher-level constructs; subroutines and recursion

MIPS Microarchitecture/Datapaths
  ▶ Single-Cycle
    ▶ The datapath for lw, sw, R-type, and branch
    ▶ The controller: instruction decoding
    ▶ Processor Performance
  ▶ Multi-cycle
    ▶ Constructing the datapath
    ▶ The FSM controller
    ▶ Performance Analysis
  ▶ Pipelined
    ▶ Basic pipelined datapath and control
    ▶ Hazards: forwarding, stalling, and flushing
    ▶ Performance Analysis
The Memory Hierarchy: Caches

- Memory hierarchy to make it fast & cheap
- Temporal and Spatial Locality
- Memory performance; hit rate
- Direct-mapped caches
- $n$-way set associative caches
- Fully associative caches