

CS250: Computer Architecture
Midterm Review

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Grading

- 10%: Written assignments (equally weighted, lowest score dropped)
- 33%: Labs (equally weighted, lowest score dropped)
- 16%: *Midterm Exam*
- 5%: Project 1
- 12%: Project 2
- 22%: Final Exam
- 2%: Evaluation of instructors based on in-class/lab contributions, discussions, and overall performance



Digital Hardware

- Transistors, RTL and TTL logic
 - Recognize/construct basic gates
- Gates
 - And/or/xor/not
 - Schematic representation
 - Multi-input and/or
- Flip-Flops
 - Recognize/understand feedback circuits
 - Construct simple circuits (e.g., S-R latch)

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Digital Logic

- Truth Table
 - Karnaugh Map
- Boolean Algebra
 - Basic properties
 - DeMorgan's Theorem
- Understanding Feedback / Clocked Circuits

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Data Representation

- Binary, Hex, Decimal
- Integer Representations
 - Unsigned
 - Approaches to signed
 - Implications for arithmetic
- Character Representations
 - ASCII chart might be handy
- IEEE Floating Point
 - $\langle \text{sign} \rangle \times 2^{\langle 8 \text{ bit exponent} \rangle - 127} \times 1.\langle 23\text{-bit mantissa} \rangle$
- Recognizing in Memory Dump

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Processor Organization

- Von Neumann Architecture
 - Processor/memory
 - Stored Program Computer
- CPU
 - Register / ALU / controller
 - Microcode
 - Processor modes / protection

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CPU

- ALU
 - Operations
- Registers
 - Banks, windows, special purpose
- Instruction processing
 - Fetch/Execute Cycle
 - Pipelines
- Instruction Set
 - Arithmetic, Logical, Memory, Control Flow, Floating Point, Processor Control

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Assembly Language

- Instruction format
 - [Label:]
 - Instruction
 - Operands
 - Register, Immediate, Memory
- Addressing Modes
 - Specified vs. Computed
 - Register / Register+offset
 - Direct vs. Indirect

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Assembly Language (cont.)

- Flow of control
 - Branch vs. jump
 - Conditional branches and condition codes
- Subroutines
 - Argument passing
 - Function results
 - Return address handling

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Assembly Language (cont.)

- Data
 - Data vs. code sections
 - Alignment issues
- Macros

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Memory

- Types of memory / hardware issues
 - Static vs. dynamic ram
 - Performance characteristics
- Addressing
 - Processor vs. Memory word
 - How this affects alignment
- Memory Controller
 - Banks / interleaving

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Midterm Hints

- Open Book / Open Note
 - No electronic aids
- Time will be tight
 - You won't be able to look everything up – need to know it
 - **Don't get stuck – do what you know well first!**
- If something doesn't make sense, speak up
- Read last year's midterm at the web site

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