CS430 Exam3 Review

Chapter 12 Instruction Sets: Characteristics and Functions (Reading pp. 406-438)

- Instruction Cycle State Diagram
- Instruction Formats encoding opcode, operand, register in the instruction
- Instruction Types
    - ALU
    - Data movement
    - Control
- 0, 1, 2, 3 address machines
- Instruction Set Design
    - Operation repertoire
    - Data types
    - Instruction formats
    - Registers
    - Big-endian vs little-endian
    - Alignment
- Call/Return Instructions
    - stack pointer
    - frame pointer
    - activation record
- call versus an interrupt
- status flag
- logical vs physical addresses including PC update

Chapter 13 Instruction Sets: Addressing Modes and Formats (Reading pp. 452-461, 464-466, 477-479)

- Addressing Modes
    - Immediate
    - Direct
    - Indirect
    - Register
    - Register Indirect
    - Displacement
    - Stack
    - PC Relative

- Variable length

Chapter 14 Processor Structure and Function (Reading pp. 484-514, 518-520

- Internal structure of CPU
- User-visible registers
    - general purpose
    - data
    - address
    - condition codes
- Control and status registers
    - PC
    - IR
    - MAR
    - MBR
- Instruction cycle with interrupts
- Pipelining
    - Fetch Instruction
    - Decode Instruction
    - Calculate Operands
    - Fetch Operands
    - Execute Instruction
    - Write Operand
- Pipeline Hazards
    - Resource
    - Data
        - RAW
        - WAR
        - WAW
    - Control
- Dealing with control hazards
    - Multiple Streams
    - Prefetch branch target
    - Loop Buffer
    - Branch prediction

Chapter 15 Reduced Instruction Set Computers (Reading: pp. 532-538)

- Major architectural advances

    - Family of computers
    - cache memory
    - pipelining
    - multi-processing
- Characteristics of CISC vs RISC
- Characteristic computer changes over the years
- Influence of HLLs on computer design
- Non-pipelined MIPS
    - IF
    - ID
    - EX
    - MEM
    - WB