CS:APP Chapter 4
Computer Architecture
Overview

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Course Outline

Background
- Instruction sets
- Logic design

Sequential Implementation
- A simple, but not very fast processor design

Pipelining
- Get more things running simultaneously

Pipelined Implementation
- Make it work

Advanced Topics
- Performance analysis
- High performance processor design
Coverage

Our Approach

- Work through designs for particular instruction set
  - Y86---a simplified version of the Intel IA32 (a.k.a. x86).
  - If you know one, you more-or-less know them all

- Work at “microarchitectural” level
  - Assemble basic hardware blocks into overall processor structure
    » Memories, functional units, etc.
  - Surround by control logic to make sure each instruction flows through properly

- Use simple hardware description language to describe control logic
  - Can extend and modify
  - Test via simulation
  - Route to design using Verilog Hardware Description Language
    » See Web aside ARCH:VLOG
Schedule

Week #1
- Instruction set architecture
- Logic design

Assignment: Write & test assembly code programs

Week #2
- Sequential implementation
- Pipelining and initial pipelined implementation

Assignment: Add new instructions to sequential implementation

Week #3
- Making the pipeline work
- Modern processor design

Assignment: Optimize program+pipeline for maximum performance