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

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