# CS:APP Chapter 4
# Computer Architecture
# Overview

**Randal E. Bryant**

***Carnegie Mellon University***

`http://csapp.cs.cmu.edu`

# 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