1. Introduction to Computer Architecture

Chapter 1. Introduction

- Reading: pp. 7-14

Why Study Computer Architecture

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What Do You Know?

Computer Architecture

- computer architecture – "refers to those attributes of a system visible to a programmer..."[STAL96].
- Examples include:
  1. the instruction set
  2. the number of bits in a floating point number
  3. memory addressing modes

Computer Organization

- computer organization – "refers to the operational units and their interconnections that realize the architectural specifications "[STAL96].
- Examples include:
  1. CPU control signals
  2. address and data buses
  3. memory organization

Architecture vs Organization

- Identify each of the following issues as architectural or organizational
  1. Onboard video with shared memory versus a separate memory card with 1GB of memory
  2. A 32-bit data bus versus a 64-bit data bus
  3. The implementation of a multiply instruction in a separate multiply unit versus using repeated addition using an add unit
- How does cost come into play for each of the listed issues?

Top-down Computer System

- We describe the computer system from the top down
- Each level is concerned with
  1. structure – how components are interrelated
  2. function – the operation of each individual component

Functional View of the Computer

- Fundamentally, a computer must be able to
  1. Process data
  2. Store data
  3. Move data
  4. Control operations 1. to 3.

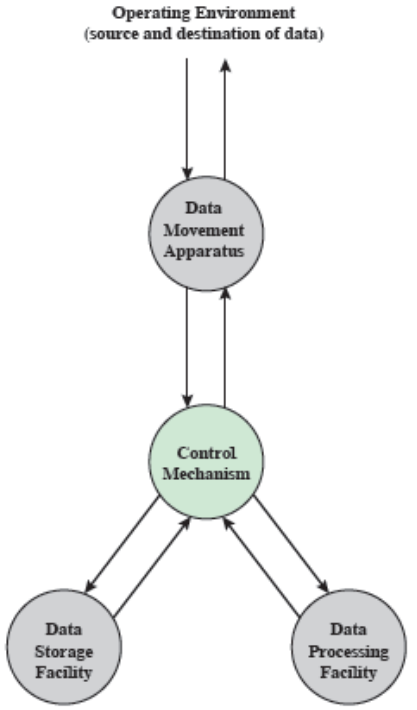

Figure 1.1 A Functional View of the Computer

Structural View of the Computer

- At its highest level, we know a computer system is structurally as follows:
  1. Central Processing Unit (CPU) – controls the computer's operation and often referred to as the processor
  2. Memory – used for storing data
  3. I/O – used to move data to/from the computer and its external environment
  4. System Interconnection - allows communication between CPU, memory, and I/O

Structural View of the Computer

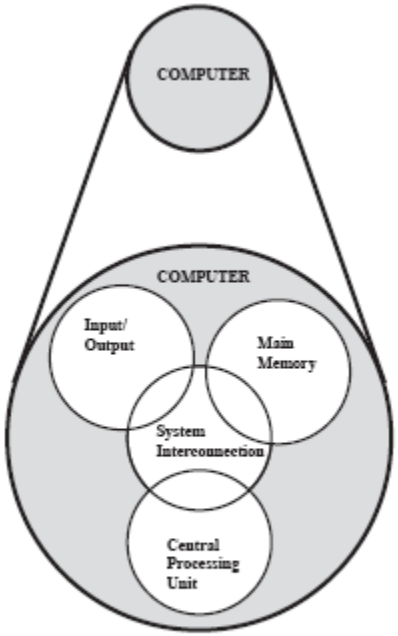

Figure 1.4 The Computer: Top-Level Structure

Refining the Structural View of the CPU

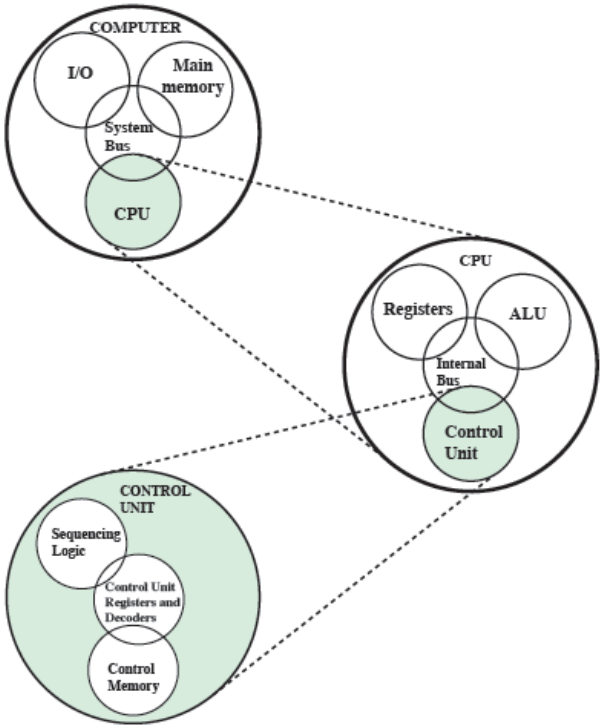

Figure 1.4 A Top-Down View of a Computer

Readings

- See Moodle for readings
- You must answer the questions by midnight on Tuesday, February 2nd.