January 13, 2023

Computer Systems
Spring 2023

1 Whats Below Programs

High level language (like C)
↓
Compiler
↓
Assembly (Machine Language)
↓
Assembler
↓
Binary Machine Language

2 What is a Computer System?

Five classical components:

1. Input
2. Output
3. Memory
4. Datapath
5. Control

Same components for all kinds of computers:
Desktops, servers,etc

PostPC era:
Tablets, smartphones, supercedes keyboard/mouse input

- Volatile Main Memory

  - Loses instruction and data when power off

- Communication
- Local area network
- Datapath
- Control
- Memory

Abstractions in Computer Systems

- Abstractions - suppress certain details to emphasize others
- instruction set architecture
  - HW/SW Interface
- application binary interface
  - Architecture + System Services (OS)

Understanding Performance

- Challenging to assess
- Need
  - Ways to measure performance
  - Metrics to evaluate performance
  - POV of comp user
    * POV of designer
    * processor performance equation

Define metrics, measurement methods, understand sources of error, and implement results

- Processor executes a stored program
- A stored program is a sequence of instructions
- Each instruction has operators and operands
- Each instruction is a binary pattern
- The binary pattern of each instruction is directly interpreted and executed by digital logic
  - Hardware, Electronics

Response time
- How *long* it takes to do a task

Throughput
- Total work done *per unit time*

How are response time and throughput affected by:
- Replacing the processor with a faster versions?
- Adding more processors?