CS250 Midterm 1 Review

Theo Park

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1 Why Computer Architecture

1.1 Definitions

- *Computer* is a machine that can be programmed to **carry out computation automatically**
- *Architecture* is a **conceiving, planning, and designing structures**
  - CA has purpose only when given SW
- *Software* is a **description of a computation** expressed in a programming language, any data, and documentation
  - Purpose 1: Definining an DS & A
  - Purpose 2: Executing
- *Interpreter* **executes software**
  - Directly executes instructions expressed in a PL

  - **Does NOT rely on "Turtles all the way down"** (interpreter for interpreter for interpreter...) approach

- *Compiling* is the process of **traslating** programs written in one **HLL** (High-level language) into a **LLL** that **has a machine interpreter**

1.2 C Compiling Process

```
source_code -> preprocessor -> preprocessed source code -> compiler -> assembly code ->
```

1.3 Mechanical Computers

- Antikythera Mechanism (200B.C): Count Olumpics days
- Charles Babbage (1849)

1.3.1 Disadvantages

- Parts are small, require individual assembly
- Part shape and size determine computational function
- Parts cause waer and accuracy degrades over time
- Algorithm are slow

1.4 Vacuum Tube Computers

- Colossus

1.4.1 Disadvantages

- About the same volume as mechanical computer
- Uses a lot of electrical energy
- Vacuum tubes burn out

1.5 Transistor

- First one built at AT&T Bell Labs
- Used to use germanium crystal, now use silicon
- Futures are graphene or single layer of carbon

1.6 Two Architectures

1.6.1 Harvard Architecture

Separate memories for instructions and data

1.6.2 Von Neumann Architecture

Single memory for instruction and data

2 Representation