

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** reply 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