Introduction to Computer Architecture

Classes of Computers

- Personal Mobile Device (PMD - smartphones, tablet)
- Emphasis on energy efficiency and real time.
- Desktop Computing
- Emphasis on price-performance
- Servers
- Emphasis on availability, scalability, throughput
- Cluster / Warehouse Scale Computers
- User for *SaaS*, cloud
- Emphasis on availability and price-performance
- Sub-class: Supercomputers, emphasis: floating-point performance and fact internal networks
- Embedded Computers
- Emphasis: price, robustness

ISA: Industry Standard Architecture

Problem Solution Stack
Problem
Algorithm
Data structure user programs
System programs
Architecture
Microarchitecture
Circuits
Electrons

Von-Neiman Architecture

- Stored program
  - Instructions stored in a linear memory array
  - Memory is unified between instructions and data
  - The interpretation of a stored value depends on the control signal
- Sequential instruction processing

  - One instruction processed
  - Program counter identifies the current instruction
  - Program counter is advanced sequentially except for control transfer instructions

Parts of computer

CPU

Parts of CPU: - Control Unit (CU) - Arithmetic-Logic Unit (ALU) - Registers (32/64 or custom for embedded)

Memory

- System Main Memory (stores a program). Divided into cells, each cell has address.