INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

CSN-101 (Introduction to Computer Science and Engineering)

Lecture 3: Computer Hardware Components and Their Working

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Piazza Class Room: https://piazza.com/iitr.ac.in/fall2019/csn101

[Access Code: csn101@2019]

Moodle Submission Site: https://moodle.iitr.ac.in/course/view.php?id=45

[Enrollment Key: csn101@2019]

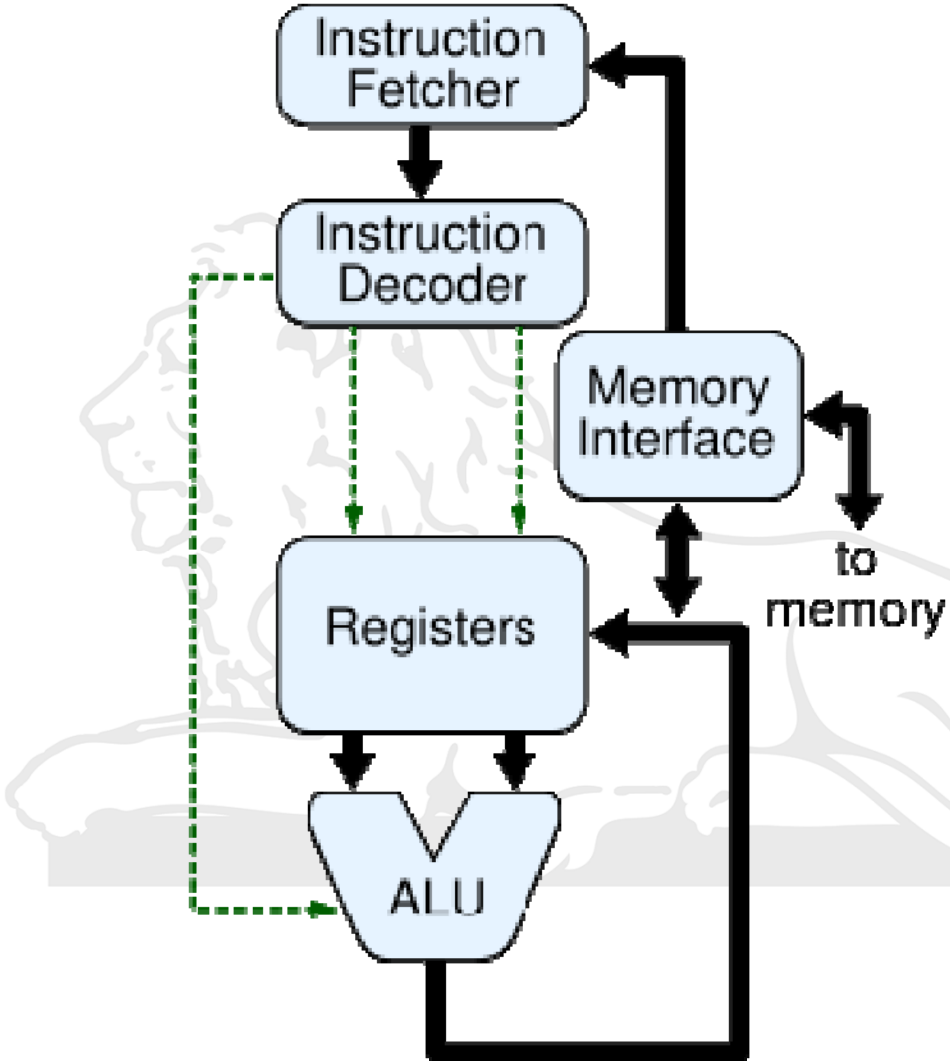
Plan for Lecture Classes in CSN-101 (Autumn, 2019-2020)

Week	Lecture 1 (Monday 4-5 PM)	Lecture 2 (Friday 5-6 PM)
1	Evolution of Computer Hardware and Moore's Law, Software and Hardware in a Computer	Computer Structure and Components, Operating Systems
2	Computer Hardware: Block Diagrams, List of Components	Computer Hardware: List of Components, Working Principles in Brief, Organization of a Computer System
3	Linux OS	Linux OS
4	Writing Pseudo-codes for Algorithms to Solve Computational Problems	Writing Pseudo-codes for Algorithms to Solve Computational Problems
5	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms
6	C Programming	C Programming
7	Number Systems: Binary, Octal, Hexadecimal, Conversions among them	Number Systems: Binary, Octal, Hexadecimal, Conversions among them
8	Number Systems: Negative number representation, Fractional (Real) number representation	Boolean Logic: Boolean Logic Basics, De Morgan's Theorem, Logic Gates: AND, OR, NOT, NOR, NAND, XOR, XNOR, Truth-tables
9	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput
10	Different layers of networking, Network components, Type of networks	Network topologies, MAC, IP Addresses, DNS, URL
11	Different fields of CSE: Computer Architecture and Chip Design	Different fields of CSE: Data Structures, Algorithms and Programming Languages
12	Different fields of CSE: Database management	Different fields of CSE: Operating systems and System softwares
13	Different fields of CSE: Computer Networking, HPCs, Web technologies	Different Applications of CSE: Image Processing, CV, ML, DL
14	Different Applications of CSE: Data mining, Computaional Geometry, Cryptography, Information Security	Different Applications of CSE: Cyber-physical systems and IoTs

CPU:

- **CPU – Central Processing Unit (Microprocessor) consists of three parts:**
  - **Control Unit**
    - **Execute programs/instructions: the machine language**
    - **Move data from one memory location to another**
    - **Communicate between other parts of a PC**
  - **Arithmetic Logic Unit**
    - **Arithmetic operations: add, subtract, multiply, divide**
    - **Logic operations: AND, OR, XOR**
    - **Floating point operations: real number manipulation**
  - **Registers**
- **CPU speed is influenced by several factors:**
  - **Clock speed:** Megahertz, Gigahertz
  - **Word size :** 32-bit or 64-bit word sizes
  - **Cache: Level 1, Level 2 caches**
  - **Instruction set size**
- **Single Core/Multi Core**

Processor Architecture:



And some board work…

- To discuss basic components inside the processor
- How a high-level language program is executed by a processor
- Role of a Compiler, Machine language
- Memory – Main Memory and Cache Memory (multi-level)
- Positional number system – decimal, binary
- Processor Architecture - Instruction set

Reference Book:

- M. Morris Mano, “Computer System Architecture”, Pearson India, 3rd Edition, 2008.

Continued to Next Class…