



# CS 220 Computer Architecture

## HW 01 - Introduction

Fall 2023

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS

### PART 1: READING AND PRACTICE ASSIGNMENT

1. Read Chapter 01 - Basic Concepts and Computer Evolution
2. Solve Chapter 01 Problems and submit it to **Chapter 01 Problems** under Assignments on Canvas.

### PART 2: QUESTIONS

Please provide your answer in [BLUE color](#)

1. What, in general terms, is the distinction between computer organization and computer architecture? Provide example(s) for each.

	Description	Example
computer architecture	Computer architecture is the way a computer should do in order to work.	A CPU interacts with RAM which interacts with the I/O stream to transfer data.
computer organization	The Computer Organization explains how a computer works.	The computer takes in a number, adds 3, then prints it out

2. Compare and contrast computer structure and computer function.

computer structure	<p>Same: Structure includes all the parts in computer function, like how the CU and other parts work together to make the CPU</p> <p>Different: the way components are interrelated, like how</p>
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	they transmit data
computer function	Same: Function includes all the parts in computer structure, like the CPU itself Different: the way that each individual computer part functions, like how it is built

3. List and briefly define the four main functions of a computer.

Function	Description
Data Processing	Operations done by the computer to transfer or change data.
Data Storage	Short and long term data functions needed for active operations and storage respectively.
Data Movement	The ability to transfer data from one place to another using either input-output or
Control	The unit which orchestrates how the computer functions

4. List and briefly define the four main structural components of a **Computer**.

Component	Description
Central Processing Unit	Controls the operations of the computer like a human brain. It tells the computer what to do to complete a task.
Main Memory	Stores data that is currently in use
Input/Output Stream	Takes in data to move it to the CPU, then receives the modified data to print it out
System Interconnection	The nervous system of the computer, connecting all functions together by allowing the parts to communicate.

5. List and briefly define the four main structural components of a **Processor (CPU)**.

Component	Description
Control Unit	Circuitry in the computer that directs operations
Arithmetic Logic Unit	Performs the computers data processing function
Registers	Provides internal storage for the CPU while it completes tasks
CPU interconnection	Provides communication between the CPU parts and outside the CPU parts

6. Explain Moore's law and its consequences.

Moore's law is the idea that the number of transistors in an integrated circuit (IC) doubles about every 18 months, which is now closer to 2-3 years. Moore's law allowed computer parts to shrink down to the size of rooms to the size of a fingernail. The transistors have shrunk to nanometers when they used to be centimeters many decades ago. It allowed computers to move from science departments and universities to the home, then even on the go. Moore's law may be coming to an end as we reach the possible smallest a transistor can theoretically be, but Moore's law has undoubtedly changed our lives by making our computers mobile. Not to mention making them more affordable for people.

7. Compare and contrast the three different programs that we discussed in class.

Machine Language - also known as low level language, it is the language that computers understand. All coding languages need to be converted into machine language because it operates in 1's and 0's. Computer parts like the CPU are made up of transistors that switch between 'on' and 'off' to do tasks. It is also the fastest language to process.

Assembly Language - also known as middle level language, it acts as a middle ground between machine and high level language. There are basic functions like 'add' and 'sub' that help people understand what is going on in the computer without converting bytes. The

downside is that the language is extremely simple compared to high level languages in terms of managing data and is slower than Machine language. Not to mention that it is machine dependent because of hardware.

High level language - The most commonly used language in computing today, this is because it is the simplest language to understand as it uses many human words to do complex tasks. High level languages allow for a larger use of a computer's capabilities, this is needed for more complex tasks that the computer must do. It is the easiest program to also modify and read. The downside of this language is that it is the slowest of all the languages, and it must be translated into a lower level language when being compiled.