

Lecture - 1

ppts: 01

What is Computer Architecture?

Computer architecture is a group of rules, orders, and processes that describe

the functionality and performance of computer systems. Basically, it deals

with the operational behaviour of computer systems.

What is Computer Organisation?

Computer Organisation is also known as Microarchitecture. It provides deep

knowledge of functionality, structuring, internal working, and implementation of a computer system. The role of computer organisation

comes after Computer architecture.

DIFFERENCE

Difference between Computer Architecture and Computer Organisation

S. No.	Computer Architecture	Computer Organisation
1.	They explain <i>what</i> a computer does.	They explain <i>how</i> a computer actually does it.
2.	They majorly focus on the functional behaviour of computer systems.	They majorly focus on the structural relationship and deep knowledge of the internal working of a system.
3.	Computer architectures deal with high-level design matters.	They deal with low-level design matters.
4.	It comes before computer organisation.	It comes after the architecture part.
5.	It covers logical functions, such as registers, data types, instruction sets, and addressing modes.	It covers physical units like peripherals, circuit designs, and adders.

PTR:

All Intel x86 family share the same basic architecture

- The IBM System/370 family share the same basic architecture

Structure and Function

- Structure is the way in which components relate to each other
- Function is the operation of individual components as part of the structure

- All computer functions are:

- o Data processing: Computer must be able to process data which may take a wide variety of forms and the range of processing.
- o Data storage: Computer stores data either temporarily or permanently.
- o Data movement: Computer must be able to move data between itself and the outside world.
- o Control: There must be a control of the above three functions.

Four main structural components:

- o Central processing unit (CPU)
- o Main memory
- o I / O
- o System interconnections

- CPU structural components:

- o Control unit
- o Arithmetic and logic unit (ALU)
- o Registers
- o CPU interconnections

Digital System

A Digital system is an interconnection of digital modules and it is a system that manipulates discrete elements of information that is represented internally in the binary form.

Now a day's digital systems are used in wide variety of industrial and consumer products such as automated industrial machinery, pocket calculators, microprocessors, digital computers, digital watches, TV games and signal processing and so on.

Characteristics of Digital systems

- Discrete elements are nothing but the digits such as 10 decimal digits or 26 letters of alphabets and so on.
- Digital systems use physical quantities called signals to represent discrete elements.
- In digital systems, the signals have two discrete values and are therefore said to be binary.
- A signal in digital system represents one binary digit called a bit. The bit has a value either 0 or 1.

Analog systems vs Digital systems

Analog system process information that varies continuously i.e. they process time varying signals that can take on any values across a continuous range of voltage, current or any physical parameter.

Digital systems use digital circuits that can process digital signals which can take either 0 or 1 for binary system.

Advantages of Digital System over Analog

1. Ease of programmability

The digital systems can be used for different applications by simply changing the program without additional changes in hardware.

3.High speed

Digital processing of data ensures high speed of operation which is possible due to advances in Digital Signal Processing.

4. High Reliability

Digital systems are highly reliable one of the reasons for that is use of error correction codes.

5. Design is easy

The design of digital systems which require use of Boolean algebra and other digital techniques is easier compared to analog designing.

6. Result can be reproduced easily

Since the output of digital systems unlike analog systems is independent of temperature, noise, humidity and other characteristics of components the reproducibility of results is higher in digital systems than in analog systems.

Disadvantages of Digital Systems

Use more energy than analog circuits to accomplish the same tasks, thus producing more heat as well.

Digital circuits are often fragile, in that if a single piece of digital data is lost or misinterpreted the meaning of large blocks of related data can completely change.

Conversions

- i) Binary to octal number conversion
- ii) Binary to hexa decimal number conversion

The binary number: 001 010 011 000 100 101 110 111
 └─┘ └─┘ └─┘ └─┘ └─┘ └─┘ └─┘ └─┘
The octal number: 1 2 3 0 4 5 6 7

The binary number: 0001 0010 0100 1000 1001 1010 1101 1111
 └─┘ └─┘ └─┘ └─┘ └─┘ └─┘ └─┘ └─┘
The hexadecimal number: 1 2 5 8 9 A D F

Digital Logic gates

Know the basics.....

PTR: NAND AND NOR are universal gates

XOR AND XNOR are additional gates

XOR : for different--> 1

XNOR: for same ---> 1

