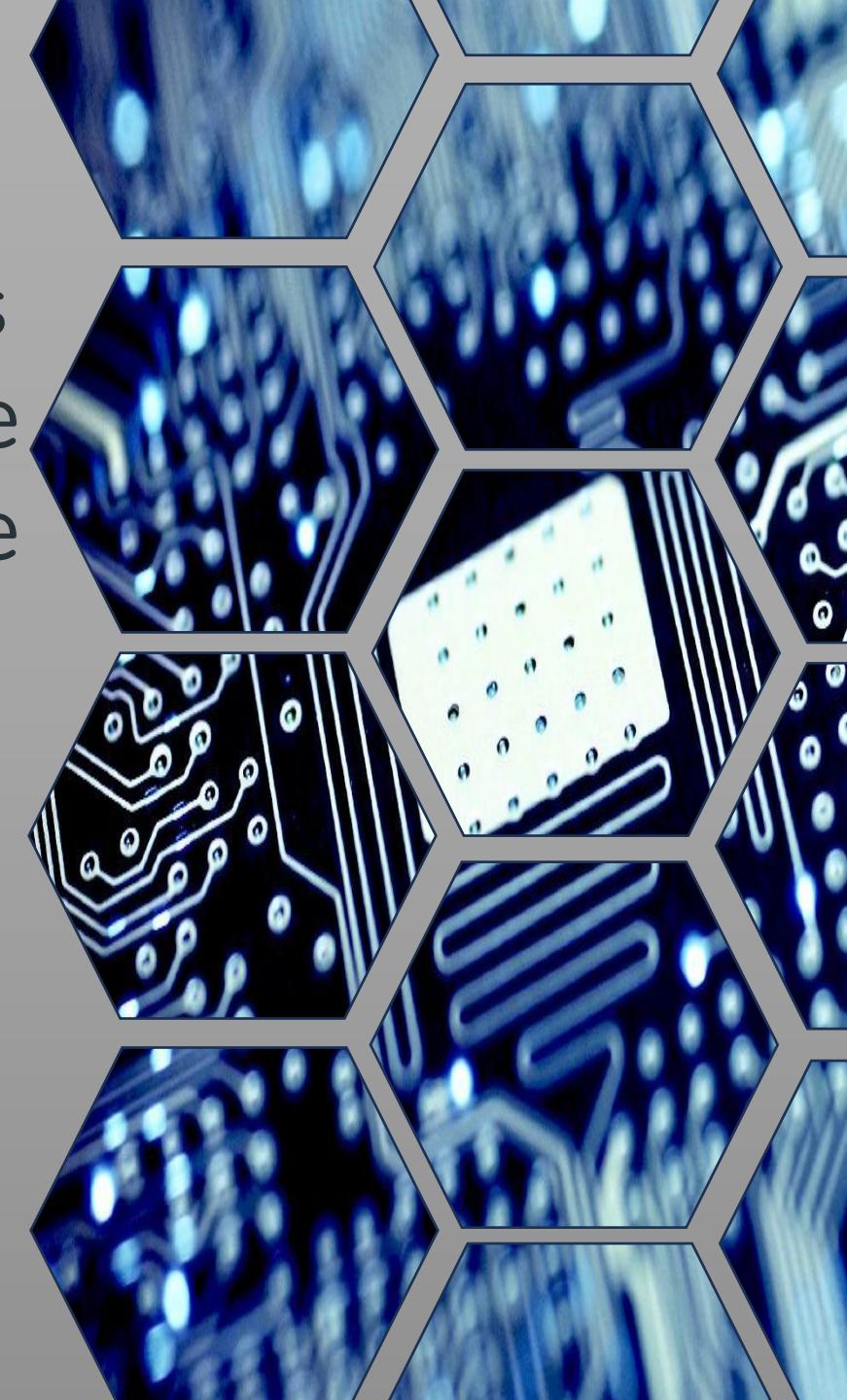


# **COMPUTER ORGANIZATION AND ARCHITECTURE**

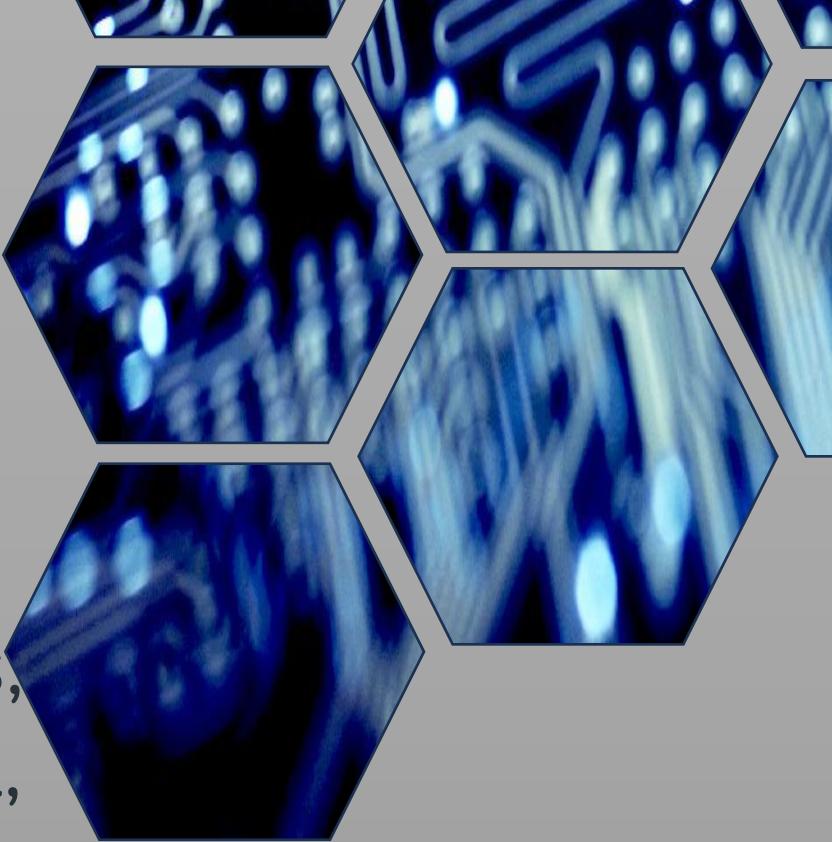
# Computer Architecture

- considered to be those attributes of a system that are visible to the user and has direct impact on the logic execution of a program.
- On the Functional behavior of computer system.
- Design Implementation of various part of a computer



# Computer Organization

- a system has a structure and it is operational units and the **interconnections between** them that achieve the architectural specifications, is the realization of the abstract model, and it deals with how to implement the system.
- Deals with the **structural relationship** and it's **Operational attributes**.



# What is Computer?

an electronic device that can process and store information.

- CPU (Central Processing Unit)
- Memory (RAM)
- Storage (Hard Drives and Solid-State Drives)
- Input/Output devices (Keyboard, Mouse, Monitor, Printer, and etc.)  
and various peripheral devices (USB drives and external HDD)

are incredibly versatile machines that have become an integral part of modern life,  
used for work  
entertainment  
education  
and many other purposes.

Language: BINARY (1's and 0's) On and off



# Binary

binary language whose vocabulary contains only two letters or states or symbols i.e. 0 and 1,

- True and False, On and Off.

```
1 as 1  
2 as 10  
3 as 11  
4 as 100  
5 as 101  
a as 01100001  
A as 01000001  
s as 01110011  
U as 01010101
```

Hello =

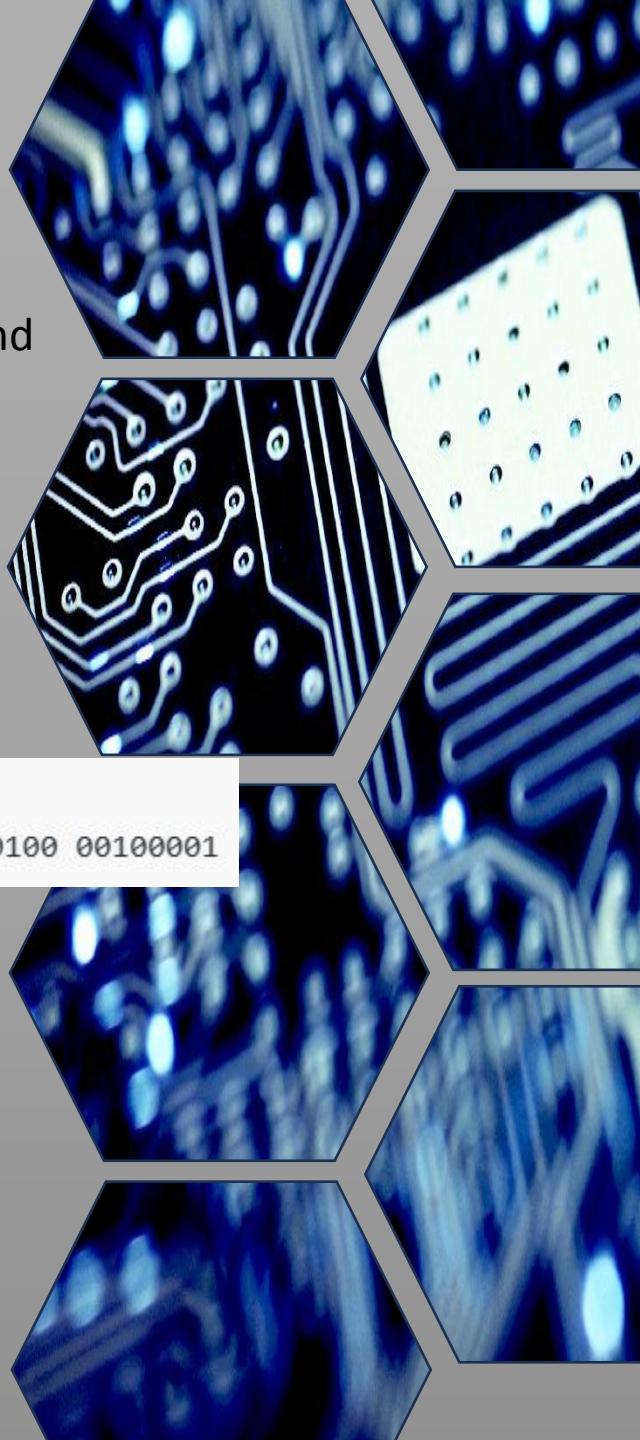
```
01001000 01100101 01101100 01101100 01101111
```

Hello World! =

```
01001000 01100101 01101100 01101100 01101111  
00100000 01010111 01101111 01110010 01101100 01100100 00100001
```

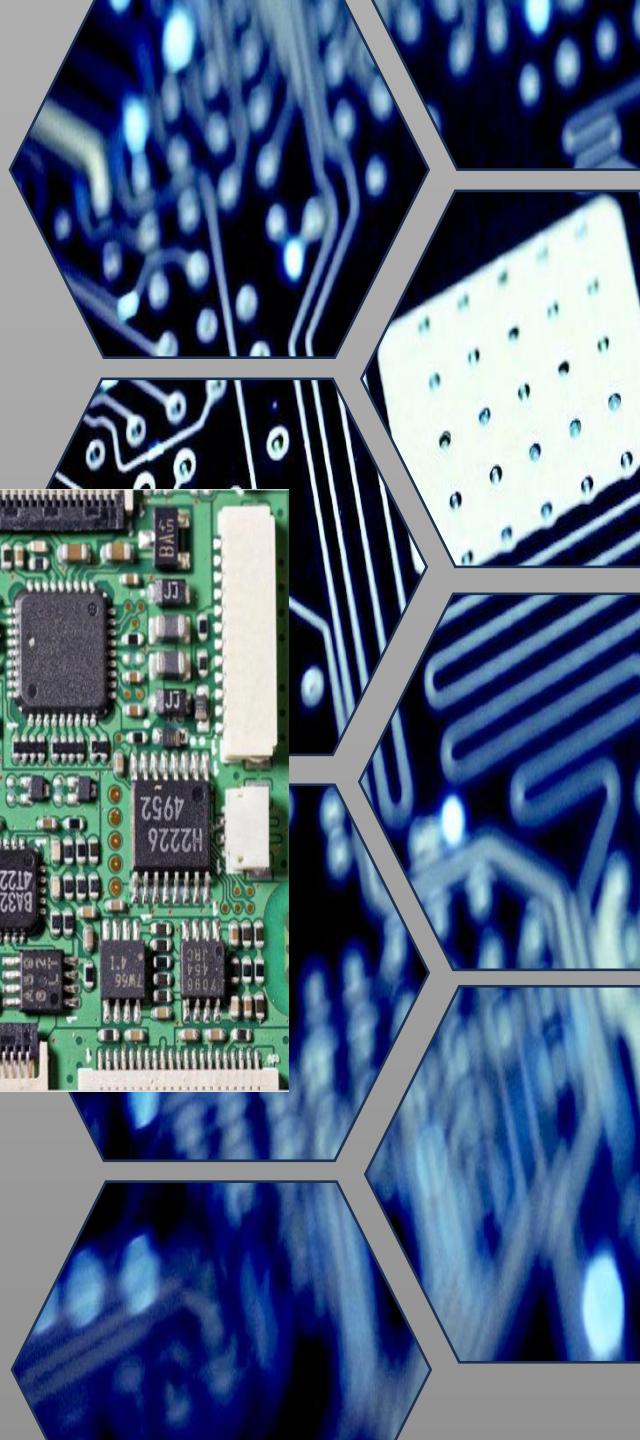
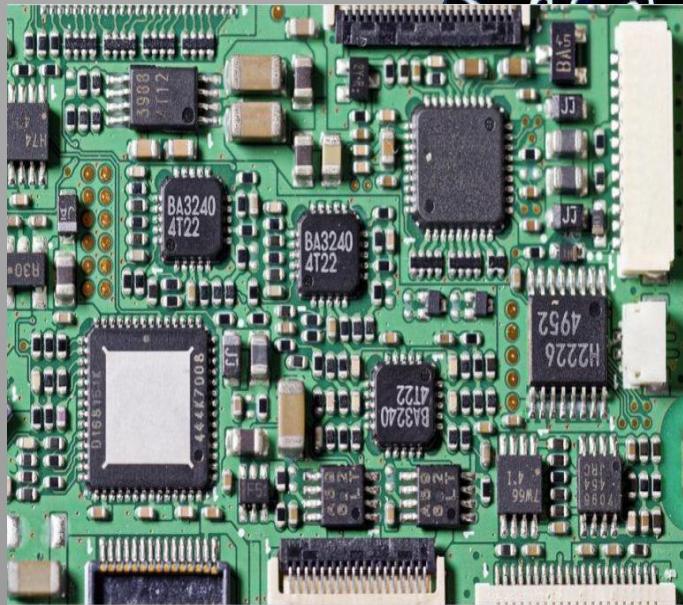
but in order to have this Binary in our computers we must have,

## Transistors

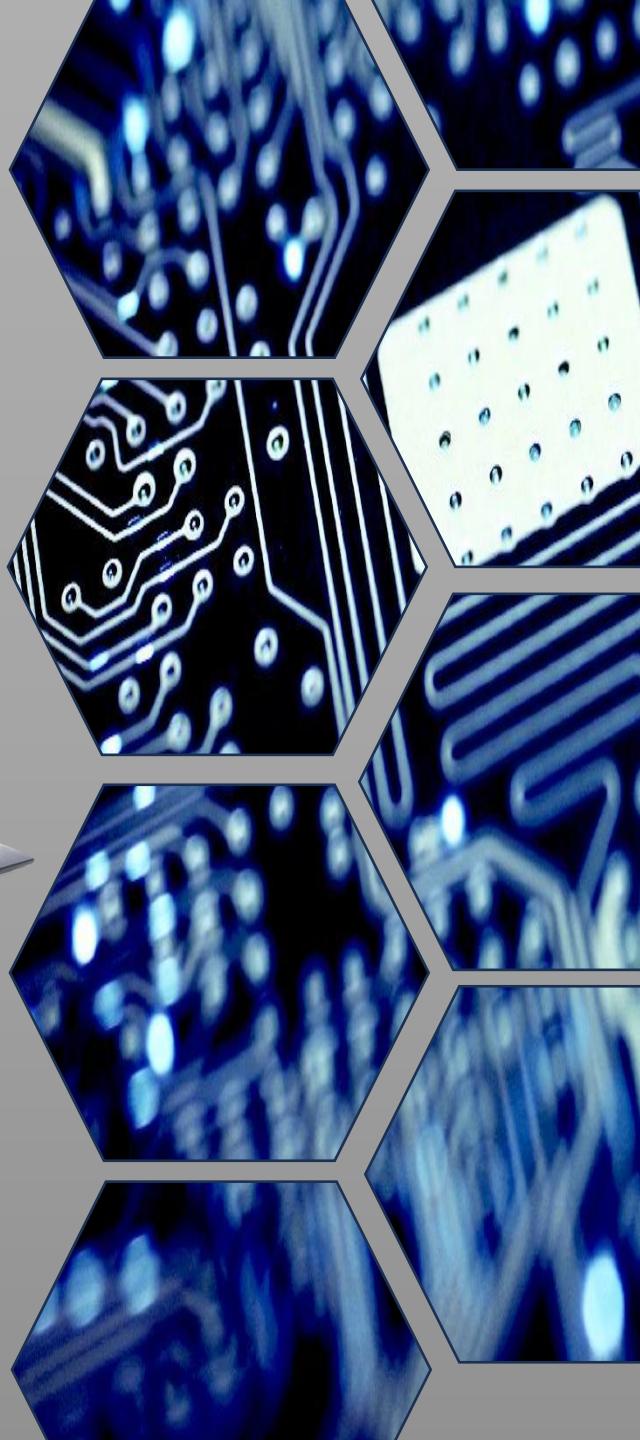


# Transistors

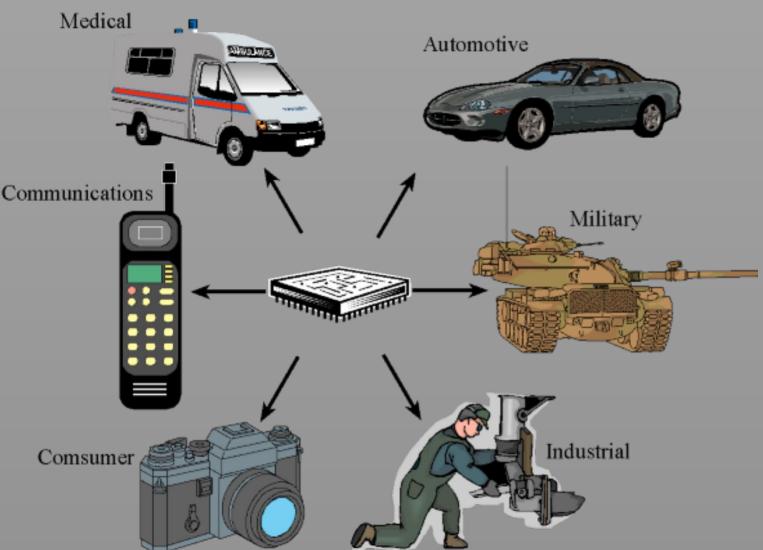
A transistor is a semiconductor device used to amplify or switch electrical signals and power. It is one of the basic building blocks of modern electronics.



# Computer



# Types of simple understanding of Computers



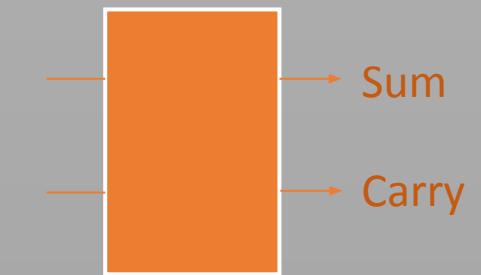
- Personal Computer
- Servers
- Mainframes
- Supercomputers
- Embedded System
- Wearables

# Features of a computer include



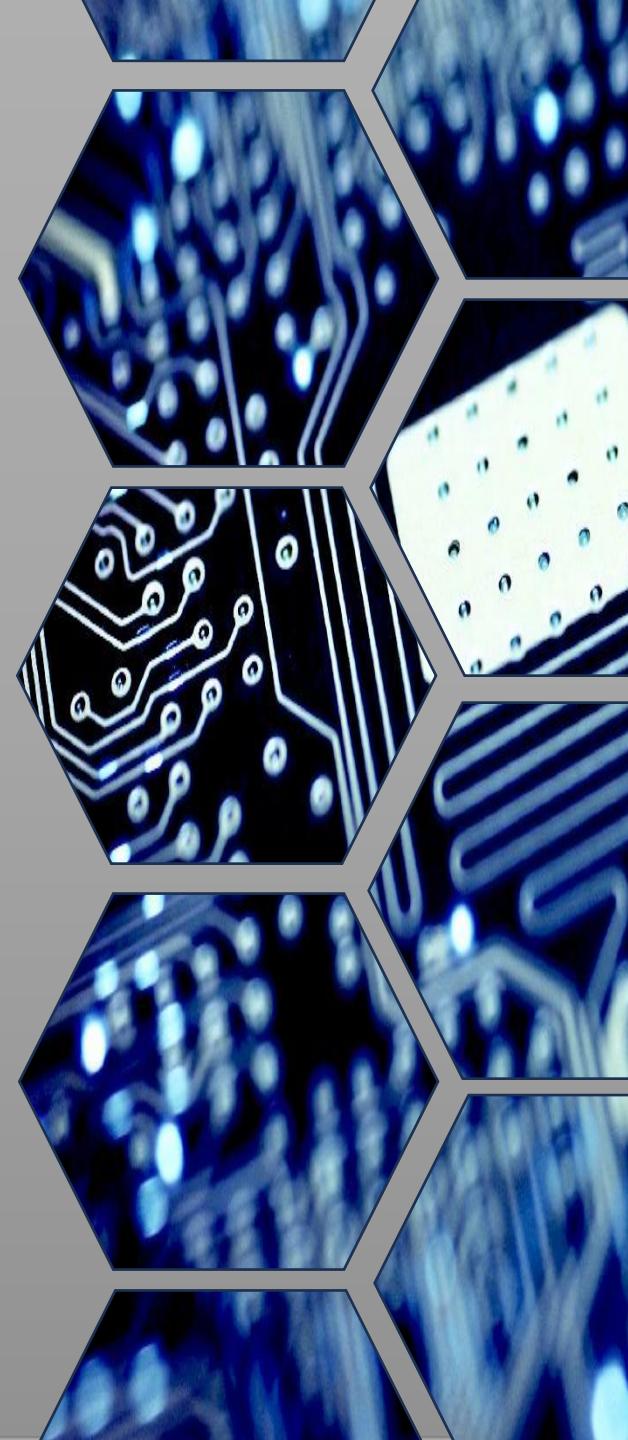
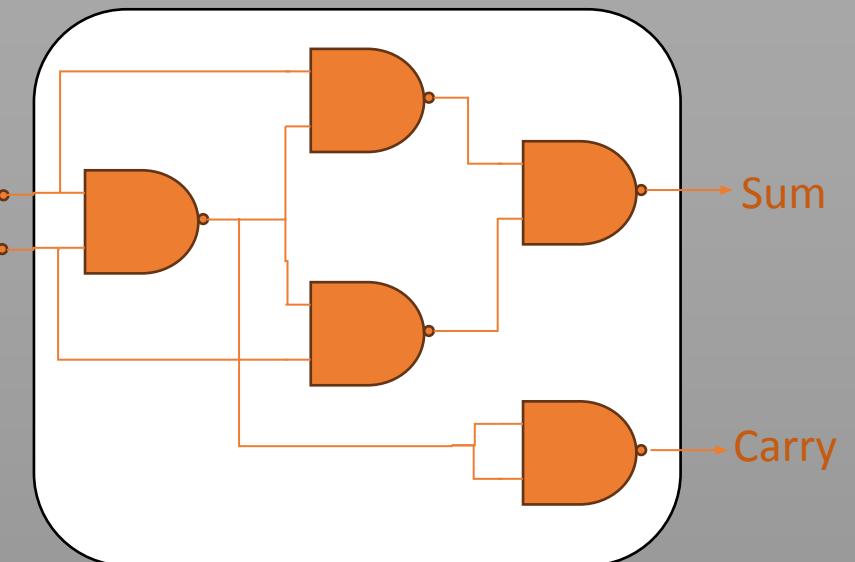
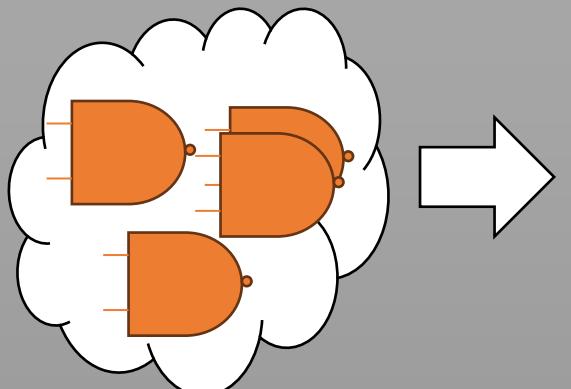
- CPU
- MEMORY
- STORAGE
- INPUT/OUTPUT DEVICES
- OPERATING SYSTEM
- NETWORKING
- GRAPHICS AND SOUND
- CONNECTIVITY

A circuit to add 2 bits (ex. Half Adder)



$$\begin{array}{r} 0 \\ +0 \\ \hline 00 \end{array} \quad \begin{array}{r} 0 \\ +1 \\ \hline 01 \end{array} \quad \begin{array}{r} 1 \\ +0 \\ \hline 01 \end{array} \quad \begin{array}{r} 1 \\ +1 \\ \hline 10 \end{array}$$

CS CS CS CS



# Computer Design

is the structure in which components relate to each other.

Issues in Computer Design:

- Assumption of infinite speed
- Assumption of infinite Memory
- Speed mismatch between memory and processor
- Handling of bugs and errors
- Multiple processors
- Multiple threads
- Shared memory
- Disk access
- Better performance
- Performance
- Power consumption
- Security
- Compatibility
- User experience
- Reliability

The designer deals with a particular level of system at a time and there are different types of issues at different levels.



L6

L7

TRI

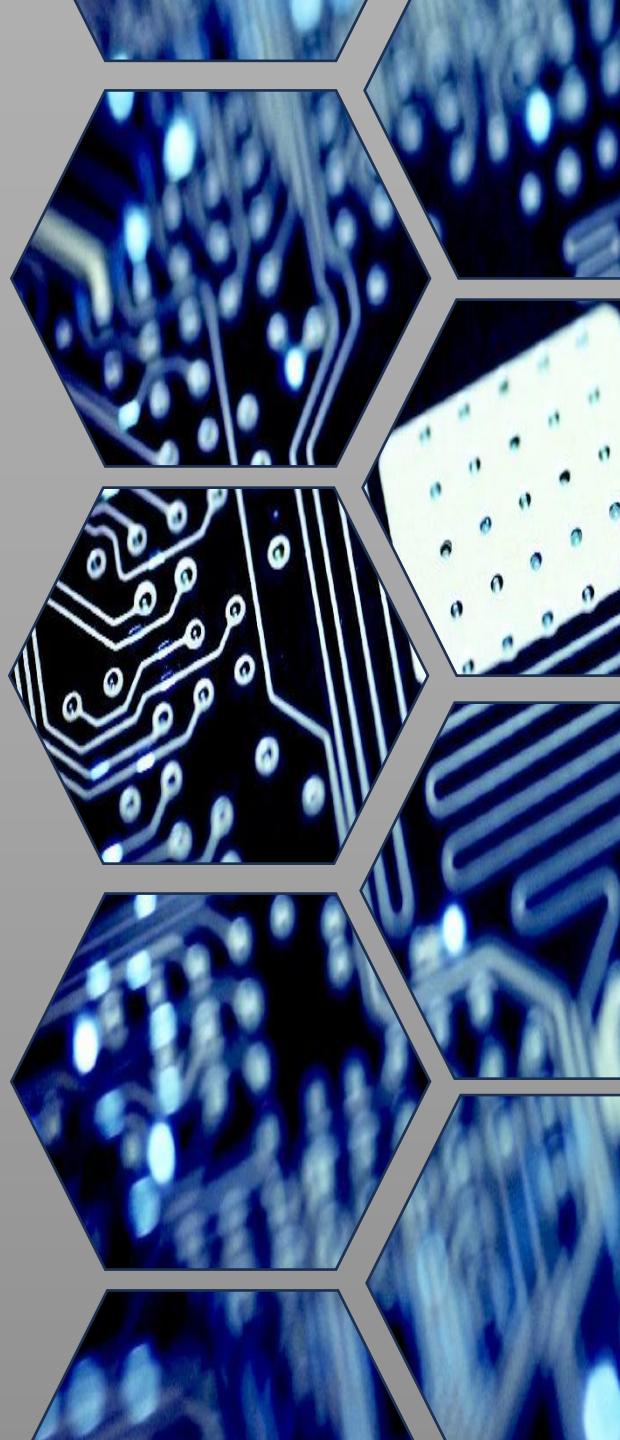
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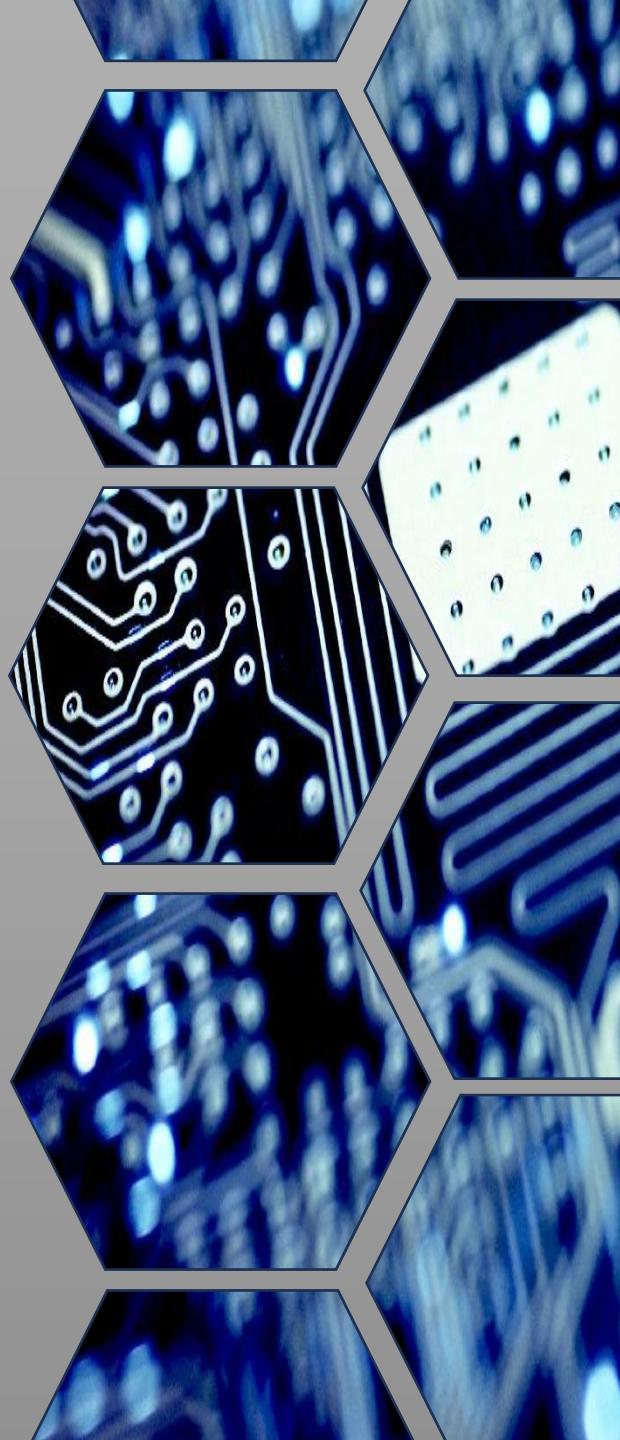
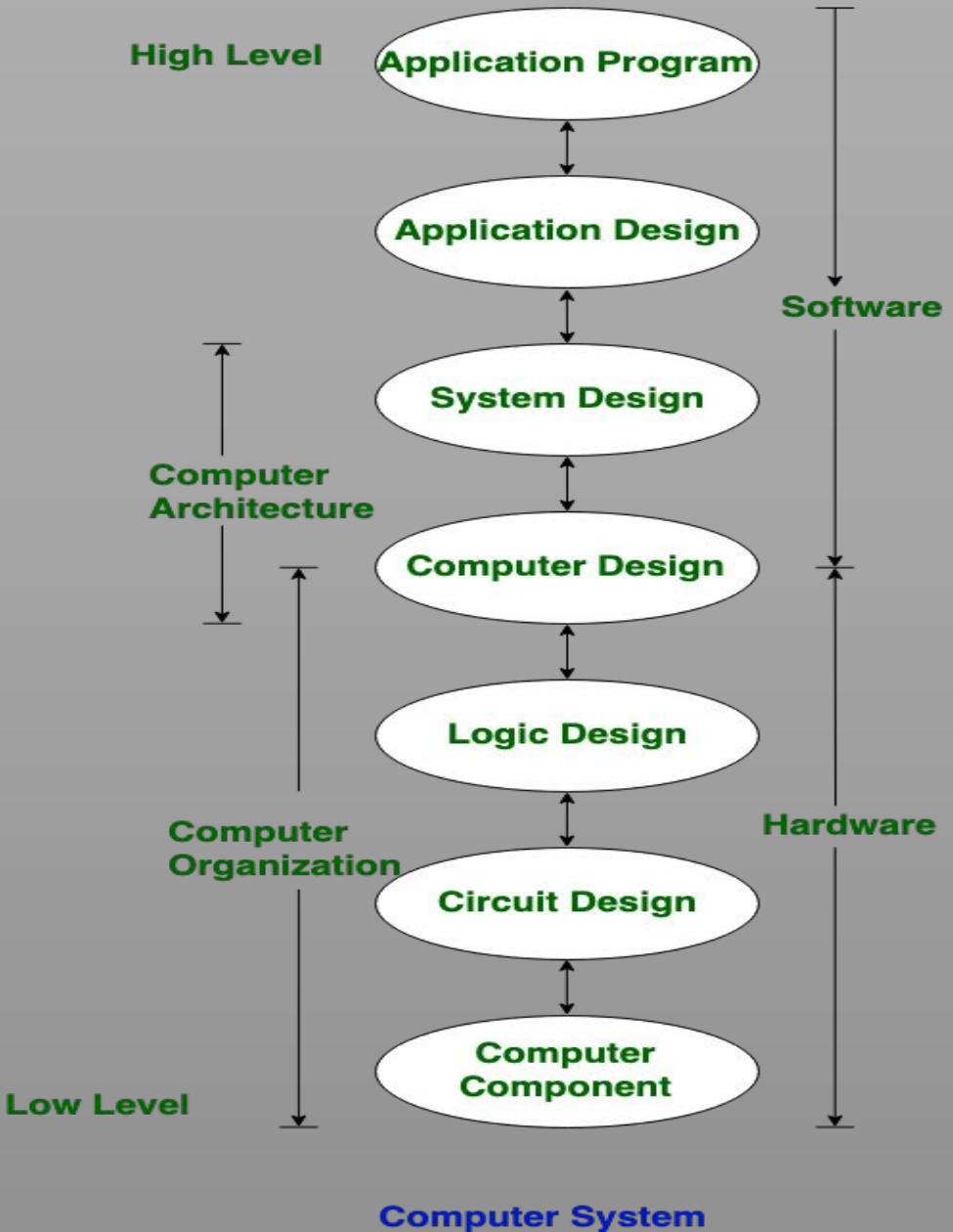
# Computer Architecture & Computer Organization

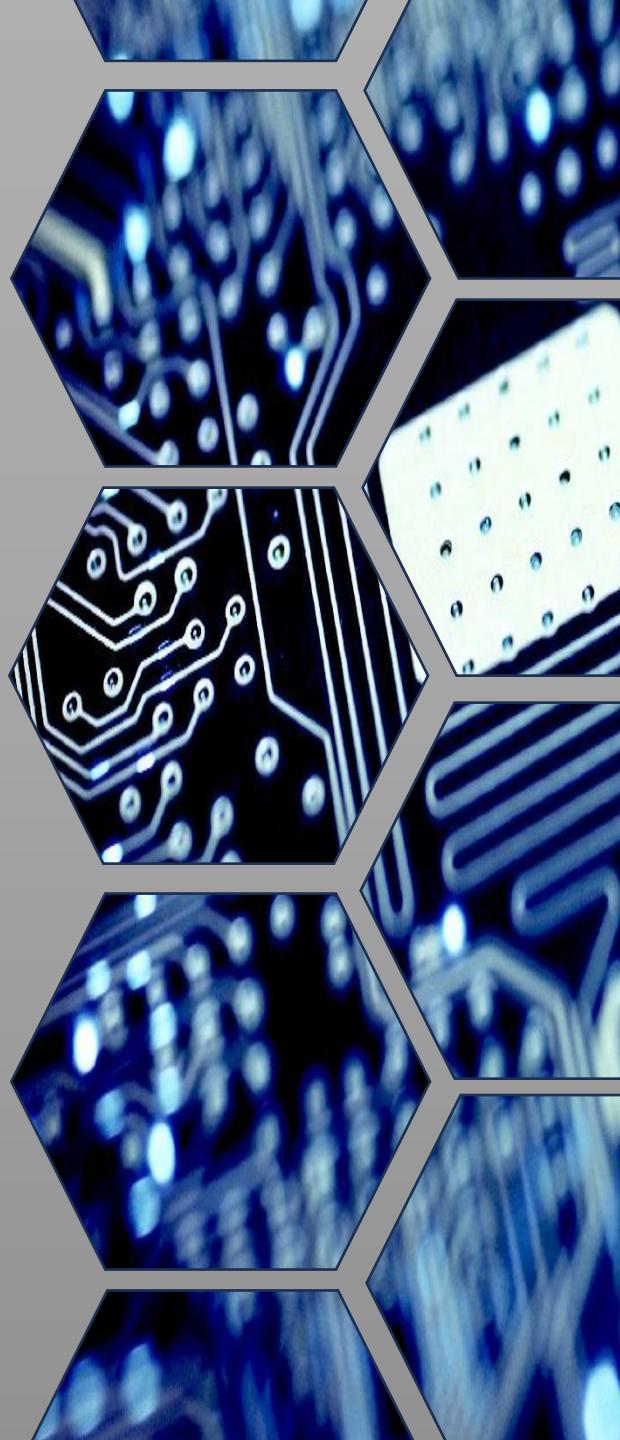
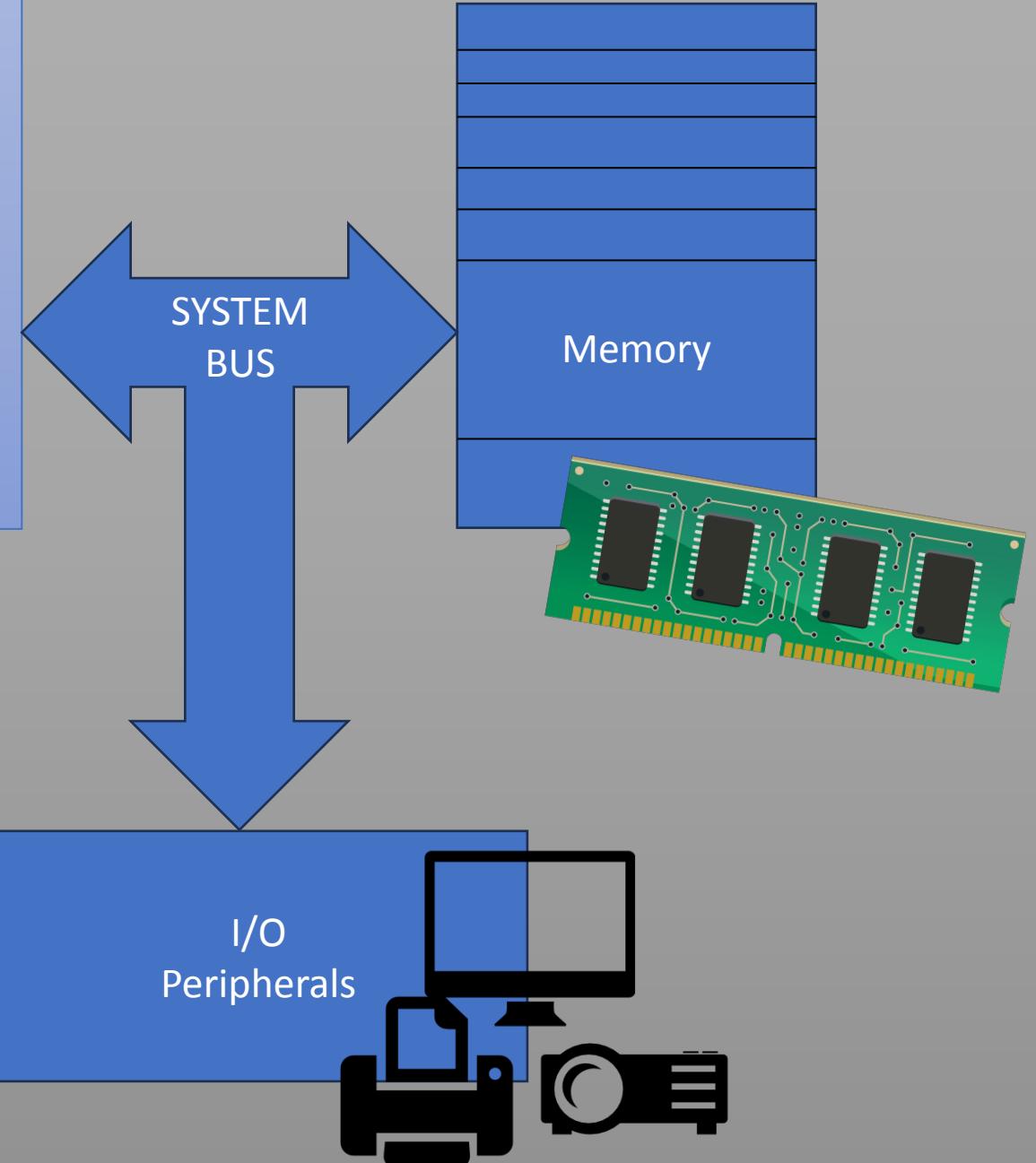
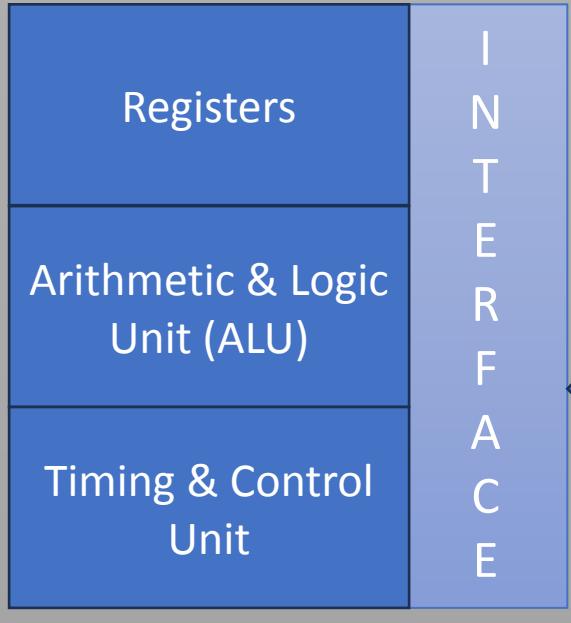
computer architecture is focused on the design of the internal workings of a computer system, while computer organization is focused on the implementation of that design.

Computer architecture is concerned with the high-level design decisions, while computer organization deals with the low-level implementation details.



# Computer Architecture VS. Computer Organization

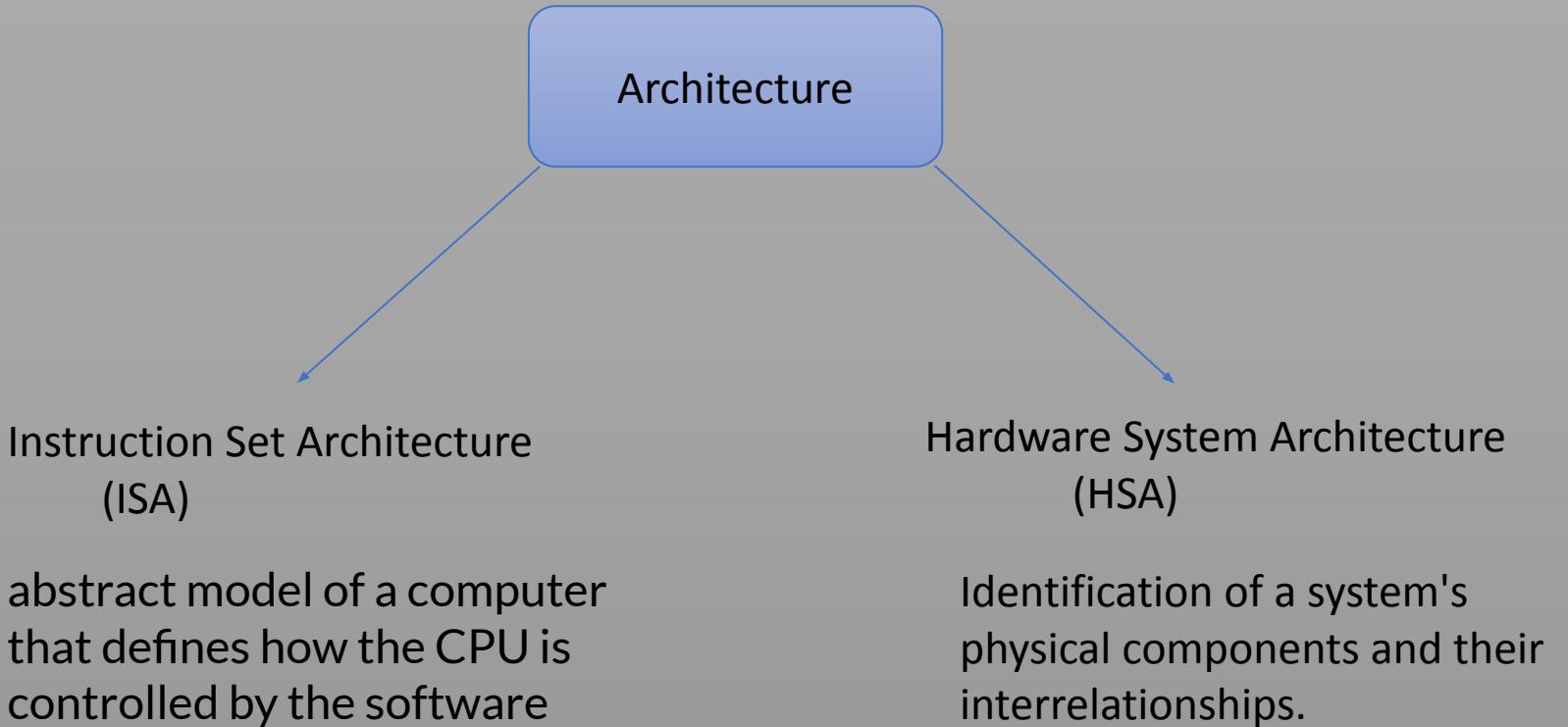






# Computer Architecture

Designing of computers, including their instruction sets, hardware components and system organization



## Instruction Set Architecture:

LDI 02H  
ADI 03H  
STA X

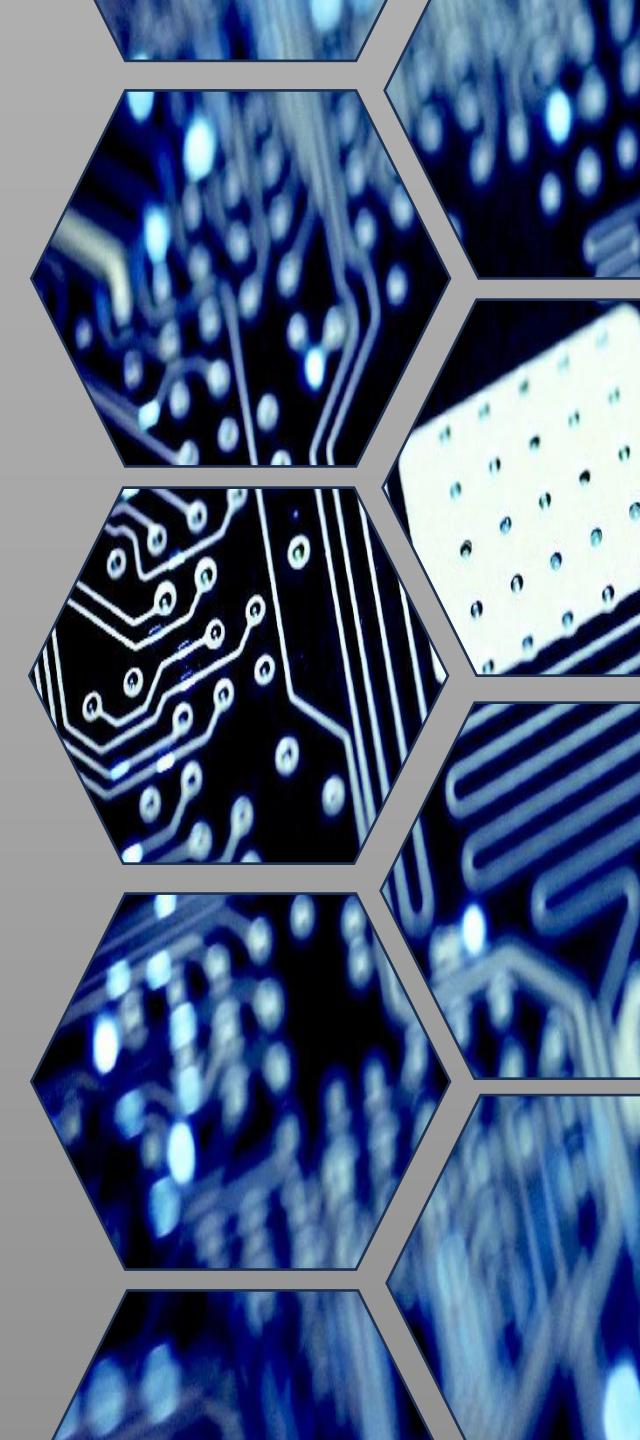
MOV R1, 02H  
MOV R2, 03H  
ADD R1, R2  
STORE X, R1

$$X = 4 + 6$$

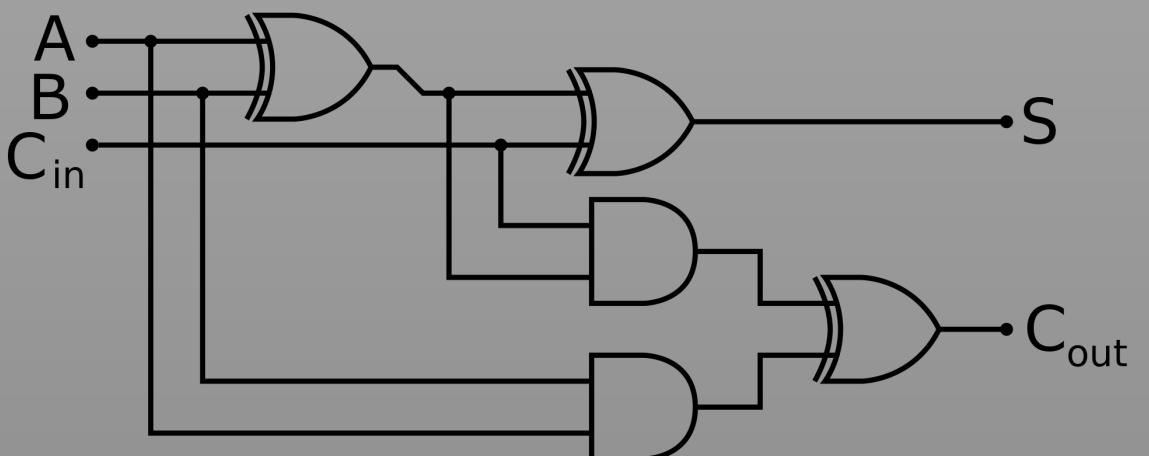
PUSH 02H  
PUSH 03H  
ADD  
POP X

MOV R1, 02H  
MOV R2, 03H  
SUB R1, R2  
STORE X, R1

MOV R1, 02H  
MOV R2, 03H  
MUL R1, R2  
STORE X, R1



## Hardware System Architecture:





Half adder is used  
in ALU (Arithmetic  
Logic Unit) of  
computer  
processors to add  
binary bits

