



MICROPROCESSORS

8086 features

OBJECTIVE

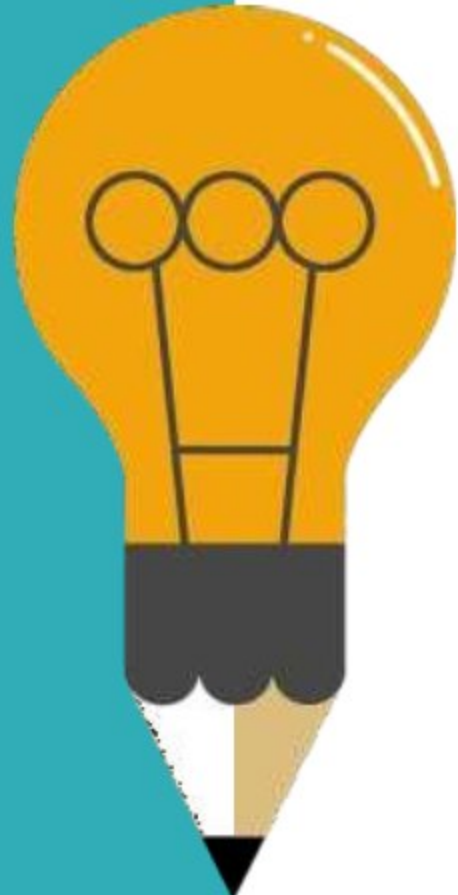


Understand the basic concepts of a microprocessor.



Understand the Intel 8085 CPU Architecture.





01

**ORGANIZATION OF A MICROPROCESSOR
BASED SYSTEM**

02

HOW DOES A MICROPROCESSOR WORK

03

FEATURES OF 8086 MICROPROCESSOR

04

ARCHITECTURE OF 8086 MICROPROCESSOR

Organization of a microprocessor based system

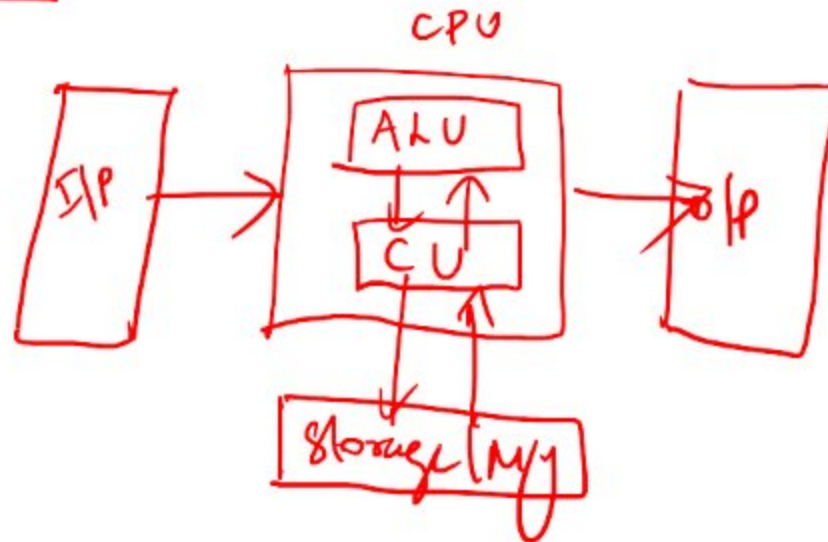
→ MP → programmable integrated device → { computation
decision making capabilities

microcomputer ↓

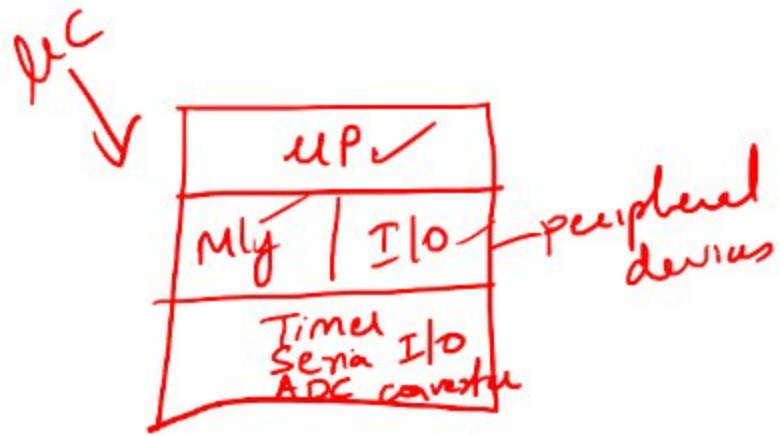
↓
similar to CPU of
a computer

Microcomputer

MP
MC



MP → CPU

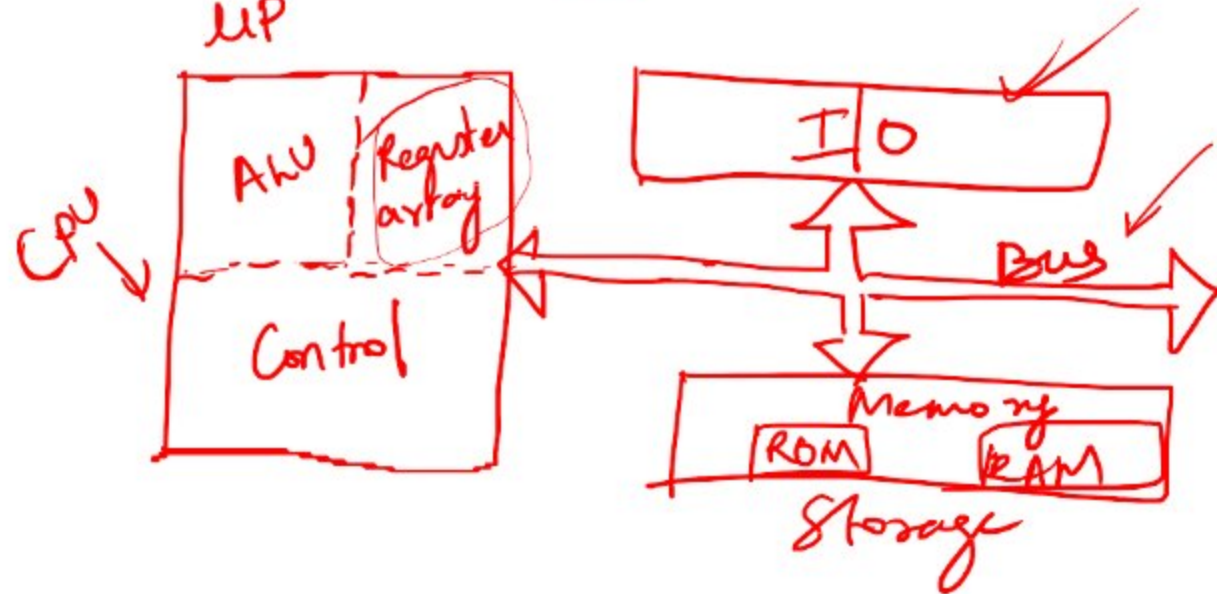


8085/8086
Primary mly

Secondary mly
Auxiliary mly
Cache

B, D, C, H, L

MP based system (Microcomputer)



3500	45		
4000		30	

Read
write

functionality

Address bus ✓

Data bus

Control bus

3500

Read signal

Write

Address

Data

Control — write

BUS

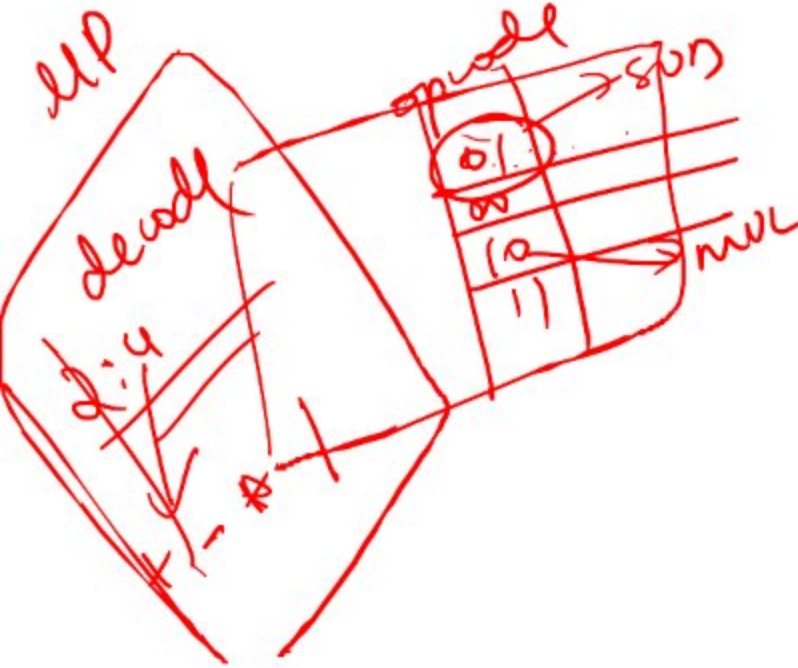
The interconnections (known as Interfacing) between the 5 units of computer system is carried by 3 basic buses i) Address Bus ii) Data Bus iii) Control Bus. A bus (from the Latin *omnibus*, meaning "for all") is essentially a set of wires which is used in computer system to carry information of the same logical functionality. The function of the 3 buses is

- ✓ The **address bus** selects memory location or an I/O device for the CPU.
- ✓ The **data bus** transfers information between the microprocessor and its memory or I/O device. Data transfer can vary in size, from 8-bits wide to 64 bits wide in various members of microprocessors.
- ✓ The **Control bus** generates command signals to synchronize the CPU operation with IO and Memory devices

How does a microprocessor work?

MP

- 1) fetch
- 2) decode
- 3) execute



001 → ADD
01 → SUB
10 → MUL
11 → DIV

ADD (217)

Instructions / data

HLL → compiler
Interpreter

ASSEMBLY → assembler

Instruction

opcode
00100000
data

MOV A, B
ADD A, B

operand

Intel 8086 Microprocessor

Key Features:

- ✓ Introduction date: March 1978
- ✓ It is 16-bit HMOS microprocessor implemented with 29,000 transistors
- ✓ It can be operated with clock Frequency of 5MHz
- ✓ Technology: HMOS
- ✓ Number of Pins: 40
- ✓ It has 20-bit Address lines and hence it can address $2^{20} = 1$ Mbytes memory location.
- ✓ It can generate 16-bit address for IO devices and can address $2^{16} = 64K$ IO ports.
- ✓ It can be operated in two Modes : Maximum and Minimum
- ✓ It has two stage pipeline architecture.
- ✓ Number of Instructions: 135 instructions with eight 8-bit registers and eight 16-bit registers
- ✓ DC Power Supply +5v



memory banks → 2 banks
memory segmentation
code segment
stack segment
data segment
fetch
execute

256 interrupts

16 bit I/O address

$2^{16} \rightarrow$ I/O ports \rightarrow 65536

→ 00000
00001
:
:
:
→ FFFFFH

$$2^1 = 2$$

$$2^2 = 4$$

$$2^8 = 256$$

$$2^9 = 512$$

$$2^{10} = 1024 = \boxed{1K}$$

$$2^{11} = 2 \times 2^{10} = 2K$$

$$2^{15} = 2^5 \cdot 2^{10} = 32K$$

$$\underline{\underline{2^{20}}} = 2^{10} \cdot 2^{10} = 1K \times 1K$$

$$= 1MB_{\text{mega}}$$

8086 can access 1MB of memy

$$2^{24} = 16MB$$

$$2^{30} = 2^{10} \cdot 2^{20}$$

$$= 1K \times 1M$$

$$= 1Giga$$

$$2^{40} = 2^{10} \cdot 2^{30}$$

$$= 1K \times 1G$$

$$= 1Tera$$

20

2^{20} add res.

↓
1MB

00000

FFFFF h

4 bit no

0	→ 0000	→ 0
1	→ 0001	
2	0010	
3	:	
4	:	
5	:	
6	:	
7	:	
8	:	
9	1001	
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255		

1111 → F

00
01 - 2
10
11

0-1 → 3
0-9 → 4

2⁴ = 16

8 bit no

00 → 0000 0000

FF h

1111 1111

20 bit

↓

1MB

↓

00000 H

↓

FFFFFF H

16 bit no

0000

0000 0000 0000 0000

20 bit no

00000

FFFF h

1111 1111 1111 1111

FFFFFF h

4 bit → 0-F

8 bit → 00-FF h

16 bit → 0000-FFFF h

20 bit → 00000-FFFFFF h

Target

9999

↓

9559

FFFF
IIII IIII IIII IIII
clean-
lengthy

↓

65536