Introduction to Microprocessor

☑ Where you can find MPU?

→ whenever there is a place where you need programming you will find out; you have MPU/MCU

→ fan, tubelight ✗

→ PC, Phone, remote control ✓

☑ Execute A program you need MPU

→ Most recent MPU is Intel core i9, Intel xeon.

// 8085 → 1st commercial MPU.
complete → baby step taken by Intel → several attempts were made problem was +5V power supply.

// 8086 → single handedly change the scenario.

// Intel combined with IBM;

History

8086
↓
80186
80 × 286
80 × 386 → will learn at the later stage.
80 × 486
80 × 586 →

- Pentium 1
- Pentium 2
- Pentium 3
- Pentium 4
- Core 2 Due
- Dual Core
- Core i3
- Core i5
- Core i7
- Core i9

→ 1993
Entertainment picture angle
multimedia function came into play.

video games

Basic Concepts

→ we all have keyboard & Mouse

→ if we need to add two numbers; 0 ~~are~~ will they add?

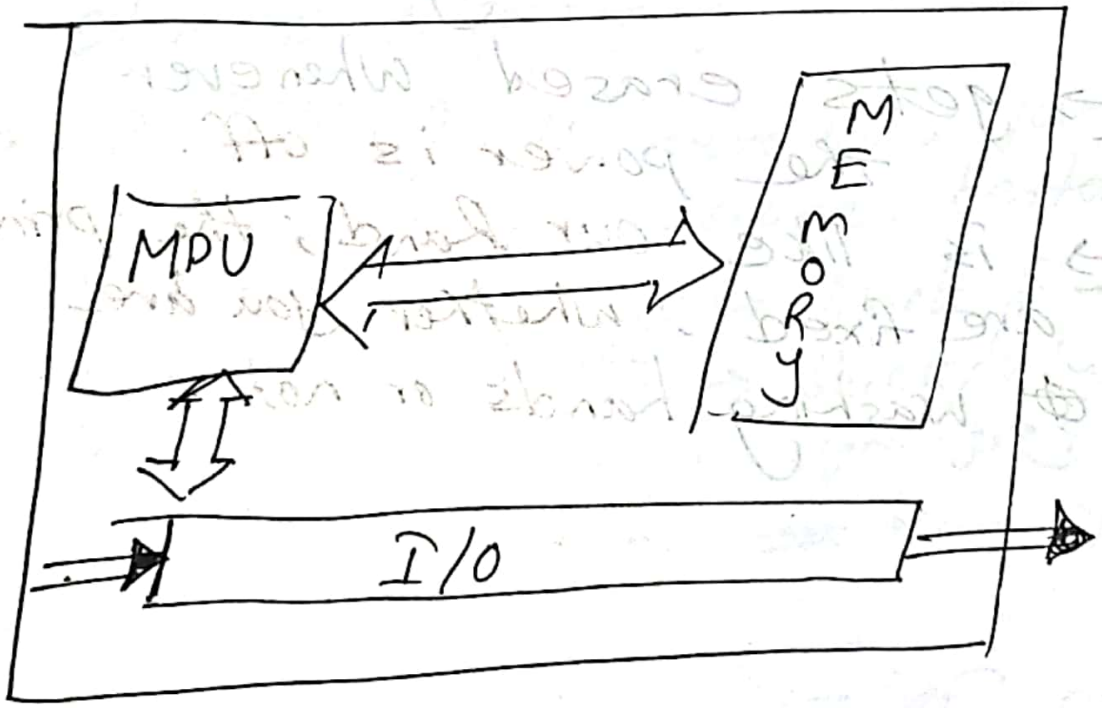
⇒ ANS: NO, the MPU will add.

→ but they will be required to give the inputs (input devices)

→ similarly: Monitor/Printer (o/p devices)

When we get rid of the cover we see:

Computer System



1] Memory ⟹ 1) stores programs
2) stores data
everything stored in memory

2] Whatsapp → programs
the number & chats → data.

3] MS WORD → prog.
docx → data.

4] Memory ⟹ Primary memory
RAM / ROM
→ Secondary

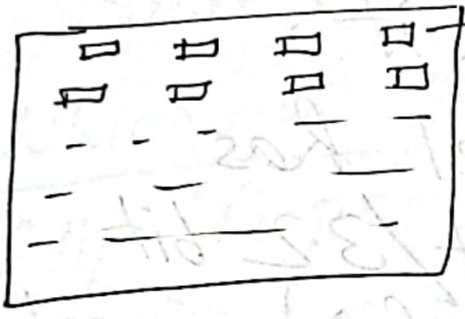
we will learn thoraugh the course.

* RAM → gets erased whenever the power is off.

* ROM → is like our hand; the prints are fixed. whether you are washing hands or not.

So, whenever we say 'memory' plz make sure you keep 'RAM' in mind.

Pixel → picture element
→ rectangular shaped
→ bec. our vision is like that.



→ each pixel has a colour.
→ the more pixel, the more enhanced quality.

How do you store a colour?

⇒ 2 bit
4 bit
8 bit
16 bit
24 bit

} the more bit; you will have more better quality.

2 bit → black & white
4 bit → black/white/grey light grey
8 bit → ~~you~~ more options

24 bit → lots of options.

Whenever we downloaded a high resolution wallpaper, you will see file size of 8 MB; larger than a song file.

→ why? because of the resolution, it will not crack whenever you try to zoom it.

→ bec. each pixel has either 64 bit/32 bit.
i.e. it becomes high resoluted.

So, you need to know
→ how to store a bit.
→ Not, how to store a movie/song.

How do you SRAM & DRAM?

SRAM → static RAM stores data in flipflops

SR
JK

DRAM → dynamic RAM

→ store data in capacitors.

→ capacity → hold charge → logic 1 (+5v)

→ discharge → hold → logic 0 (0v)

→ combines of millions of capacitor stores a movie.

Which is faster ?

→ flip-flops or SRAM is faster.

→ bec. capacitors takes time to charge & discharge

→ but DRAM is cheaper

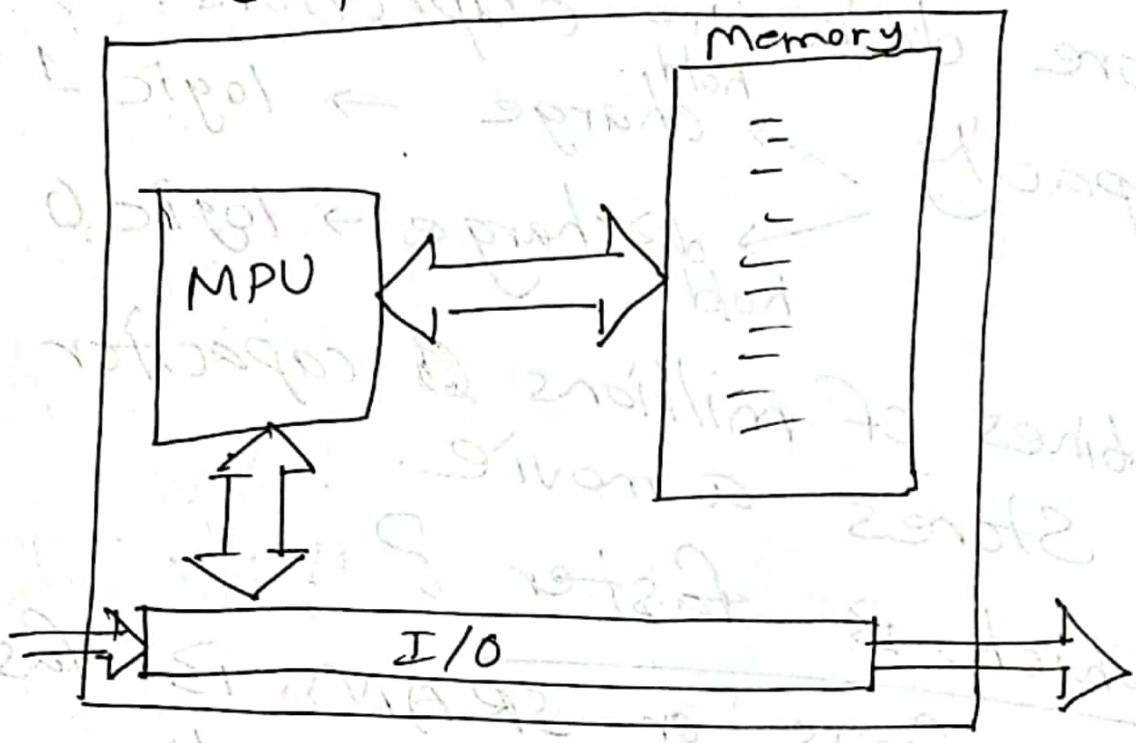
What is Programs ?

→ its a set of instructions.

→ where the prog stored in memory.

→ Now, we will see, how the programs are executed by MPU.

Computer System



So, the 1st thing the MPU does is
(1) fetching instructions from memory
(2) decode the instructions
(3) execute it.

Q What is decoding?

→ People think: converting instructions into 0s & 1s.

→ NO: the instructions are there already in 0's & 1's.

We do writing like:

// A = B + C ; High level lang.

// ADD B, C ; ASM: Assembly lang. (Sublevel)

// 0110 1011 ; (opcode)

Lower level lang.
machine code
object code
Binary lang.

compiler

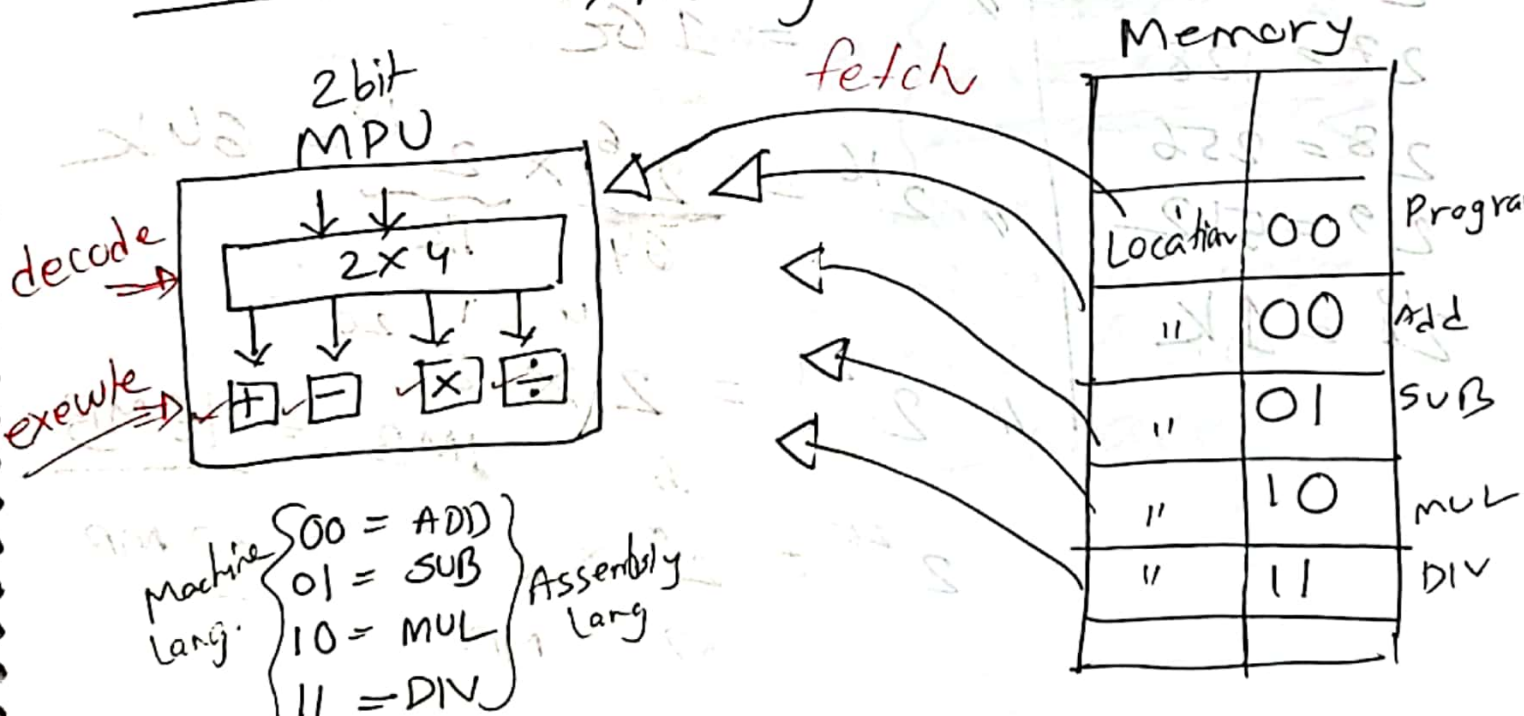
Assembler

Compiler ⇒ you compile a prog.

Assembler ⇒ to convert the prog. into machine language.

2

Decoding → understanding the opcode.
→ making sense of opcode



(+) (−) (×) (÷) ⇒ these are ready made circuits ; available in ALU.

→ which one needs to be triggered; depends on the opcode which has to be decoded.

$2^0 = 1$

$2^1 = 2$

$2^2 = 4$

$2^3 = 8$

$2^4 = 16$

$2^5 = 32$

$2^6 = 64$

$2^7 = 128$

$2^8 = 256$

$2^9 = 512$

$2^{10} = 1k$

// $2^{11} = 2^1 \times 2^{10} = 2k$

// $2^{12} = ?$ $2^{14} = ?$

// $2^{20} = 2^{10} \times 2^{10} = 1MB$

1k 1k

// $2^{30} = 2^{20} \times 2^{10}$

$= 1G$

// $2^{16} = \frac{2^6}{64} \times \frac{2^{10}}{1k} = 64k$

// $2^{24} = 2^4 \times 2^{20}$

16 1MB $= 16MB$

$2^{25} = 2^5 \times 2^{20} = 32MB$

32 MB