Week 18

- Computing system :-

  - processor
  - memory
  - I\O prephrals

Types of computing system :-

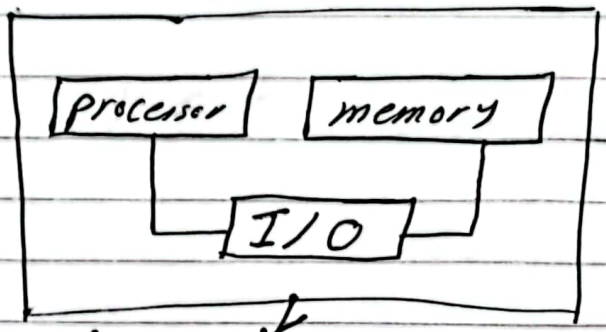
↳ General purpose	↳ Specific purpose (Embedded sys)
↓	↓
Ex :- Laptop	Ex : Fridge
↓	↓
Multiple functions on same Hardware	i/p → process → o/p

constrains of Es :-

- power
- cost
- Speed / Time
- size

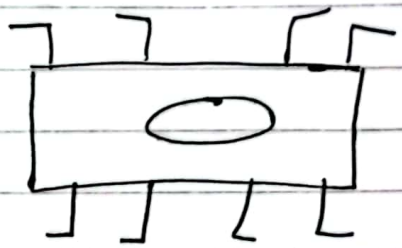
Embedded System

System on Board (SB)



(Bread Board)

System on chip (SoC)



(IC)

S	SB	SoC
Size	↑	↓ (L)
Cost	↑	↓ (L)
power	↑	↓ (L)
performance	(=)	(=)
Config	(L)	(X)

Date :
No:

Defenitianors :-

- IC :- Integrated Circuit

ex :-(555, op-amp)

VLSI :- Very large scale IC

(MILLion transistors)

Still same size — High functionality

IC → (Mp, Mc, Soc, RAM, Rom)

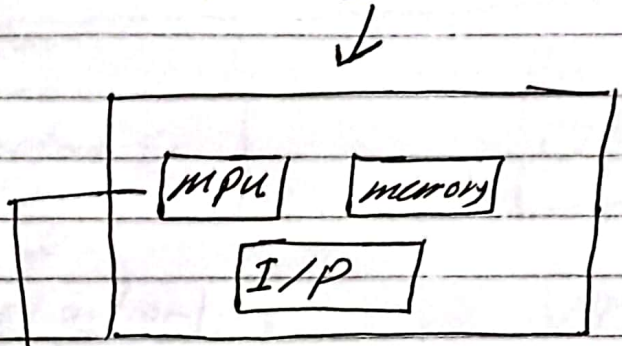
- MPU :. Micro processor Unit

Types :-

- processor → Old school → bit → 0 / 1
- Micro p → New p → Transistors
- CPU → primary P → M → S S S

Date :
No:

MCU :- Computing system



→ If it's only processor then it's CPU → primary p

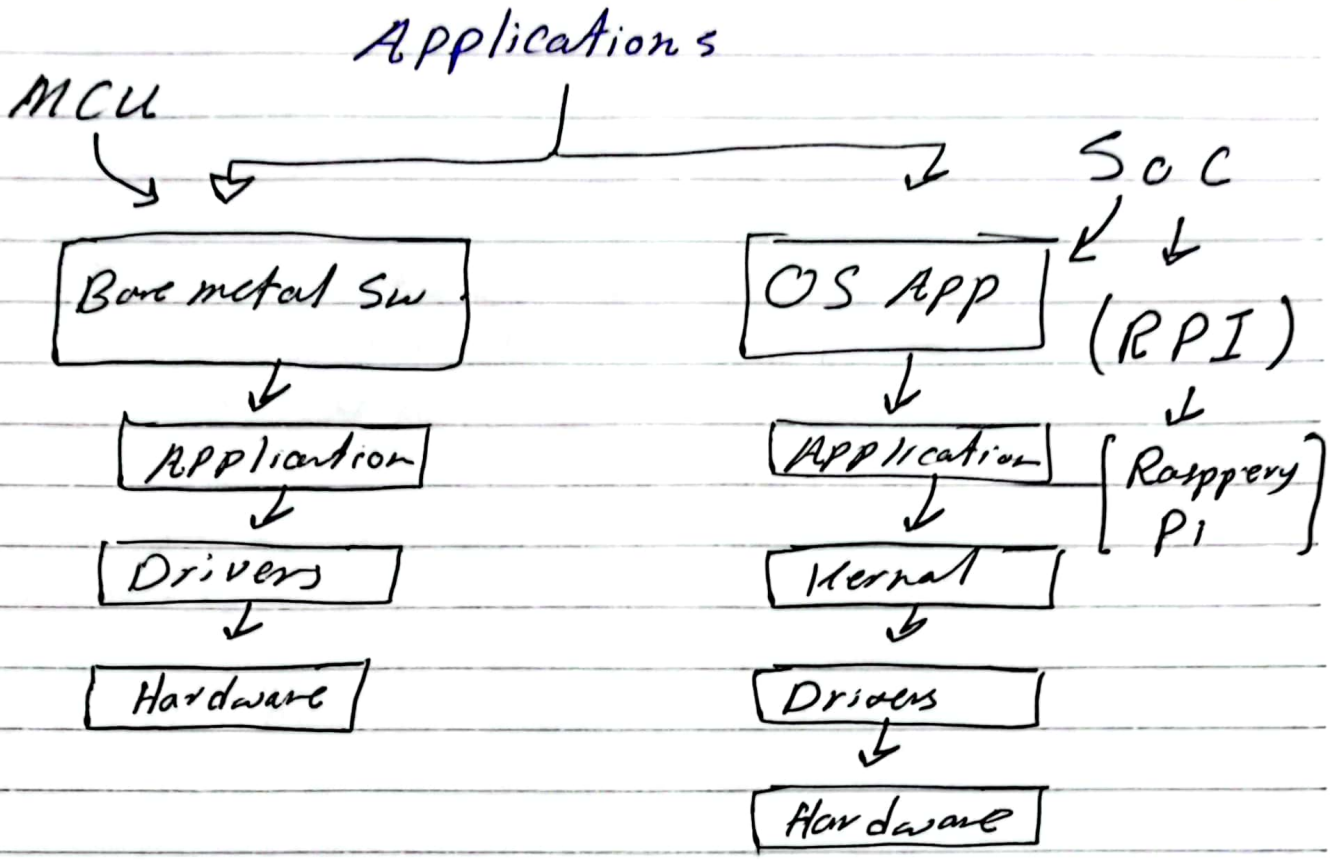
→ if there's ; ; GPU, DSP

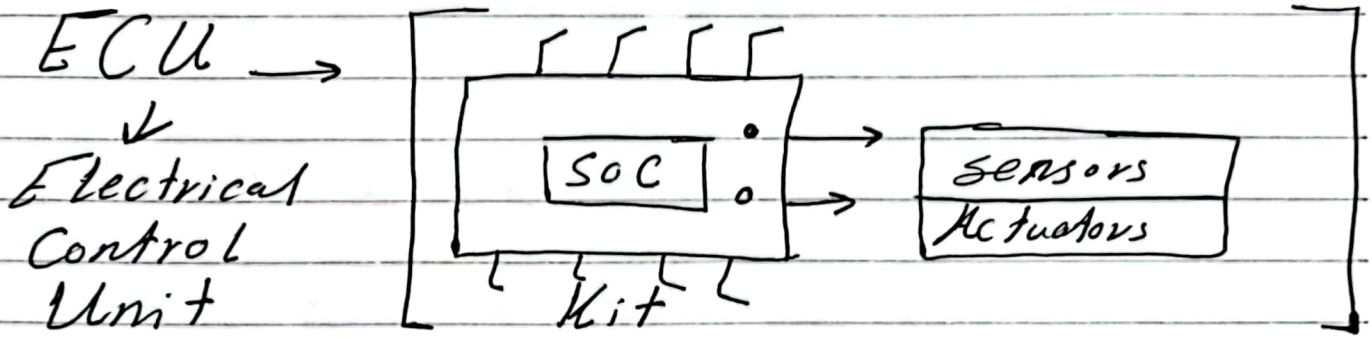
Secondary Processor

MPU consists of :-

- ALU → Arthimetic and Logic Unit
- CU → Control unit
- Register files →

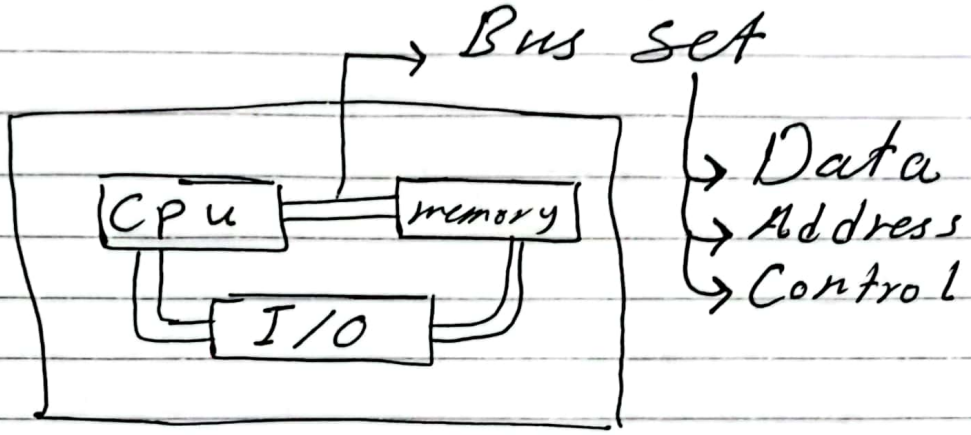
- hint :-
DSP :- For complex ALU
GPU :- For graphics


Applications
MCU
Bare metal sw
Application
Drivers
Hardware
SoC
OS App
(RPI)
Application
Kernal
Drivers
Hardware
Raspberry Pi

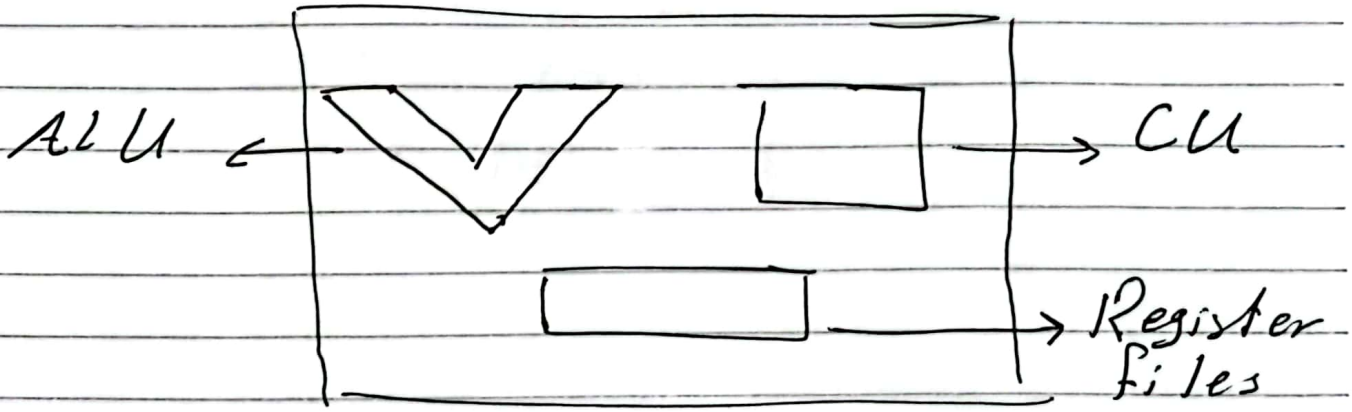

ECU
Electrical Control Unit
SoC
Kit
Sensors
Actuators

Date :
No :

Saif



. Processor .



→ Instruction life cycle :- [f → d → e]

1) program counter → (register file) (next inst) → ROM

(Rf)

fetch

IR ← CU

ALU

excution

ID → Inst set, Inst format → Signal

decode

Instructure Set Arch (ISA)

RISC (Reduced Inst set comp)

inst (↓)

ID ↑, ALU ↓

Sw ↑, Hw ↓

Same

ALU ↓, ID ↑

CISC (complex " " ")

inst (↑)

ID ↓, ALU ↑

Sw ↓, Hw ↑

Same

ALU ↑, ID ↓

Size

Cost

Power

perfor

(The Same)

decode → ID

Hardwired (logic gates)

i\p → [L.G] → o\p

RISC

need strong compiler

memory mapped

inst

search

CISC

no need for Strong compiler

Register files

- GPR
  - Data
  - Store
  - temp
- SPl FR
  - specific
  - purpose

SFR :-

PC :- program counter → next instructions

SP → stack pointer → appointing last inst

ACC → Accumulator → store data temp

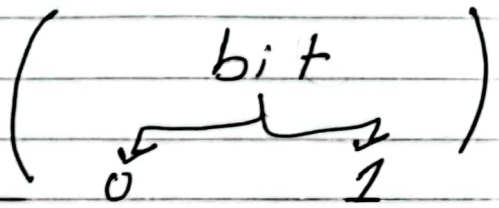
IR → Instractoin regis → fetch

PSw → processor status word

- flags → signs
  - 0 → +
  - 1 → −

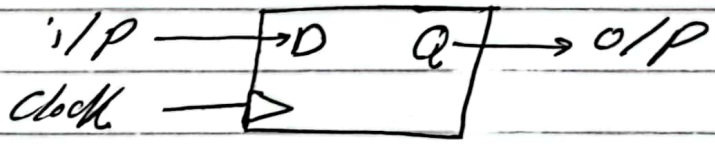
↳ Memory ↲

1 byte → 8 bit

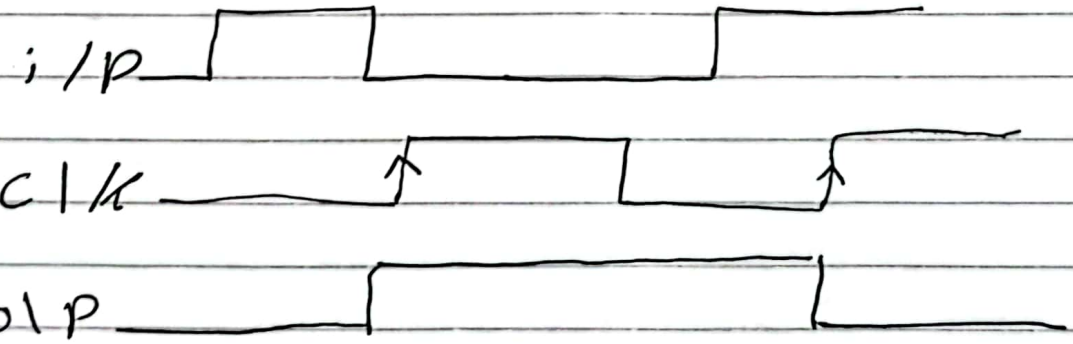


Access time → (R, W)

Basic main element → Flip Flop (D)

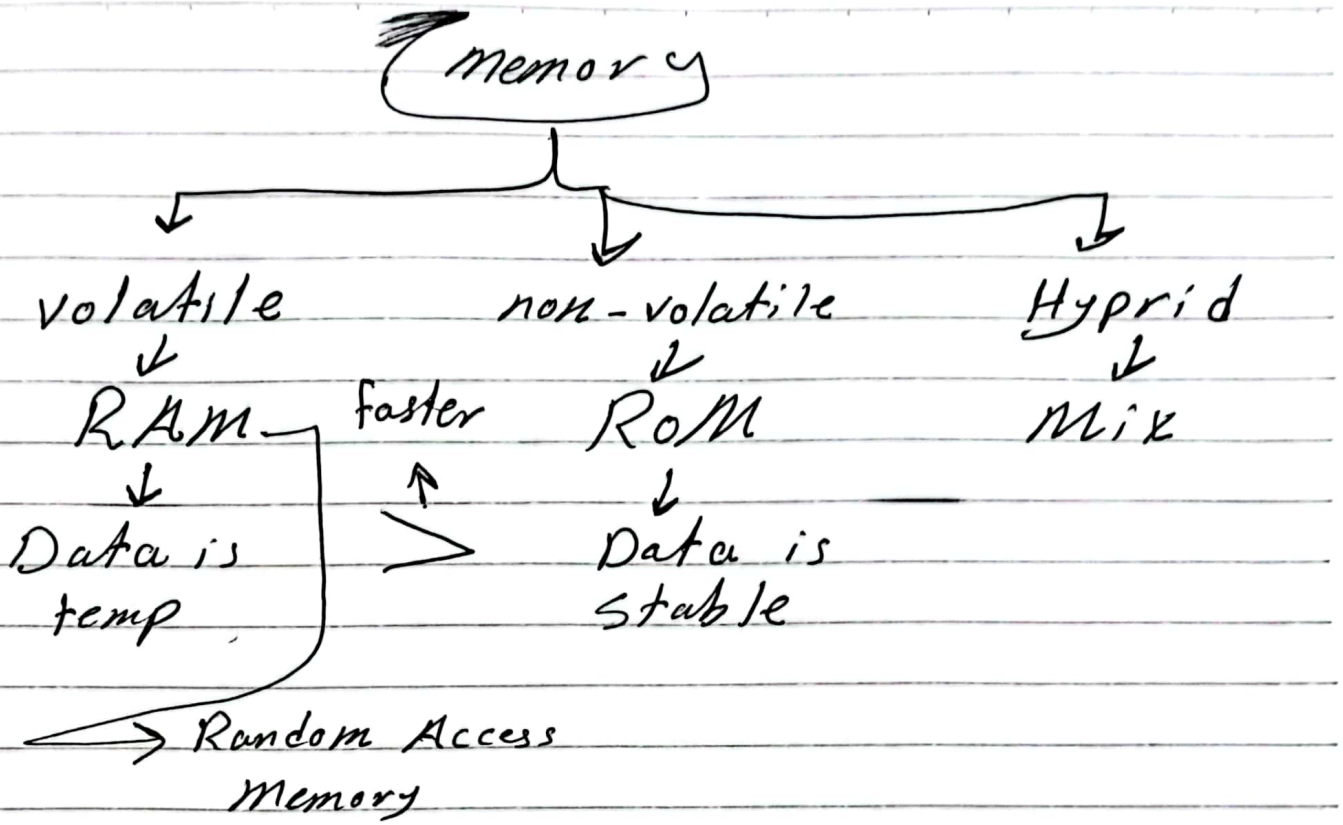


↳ change with rising edge



1) Capacity 2) Speed

3) organization



RAM Types

- SRAM → usually used in (ES) (cache)
  - static
  - Transistors
  - faster than DRAM → No refresh circuit
  - high cost
- DRAM
  - Dynamic
  - Capictors
  - Refresh circuit to refresh 1 value after time

لو شحون ← 1 → لو بفرغ → 0

Adv :- Simple Hw
- Low cost Per bit
- high density - Low power cons

	SRAM	DRAM
Size	↓	↑
Cost	↑	↓
power	↑	↓
perfor	↓	↑