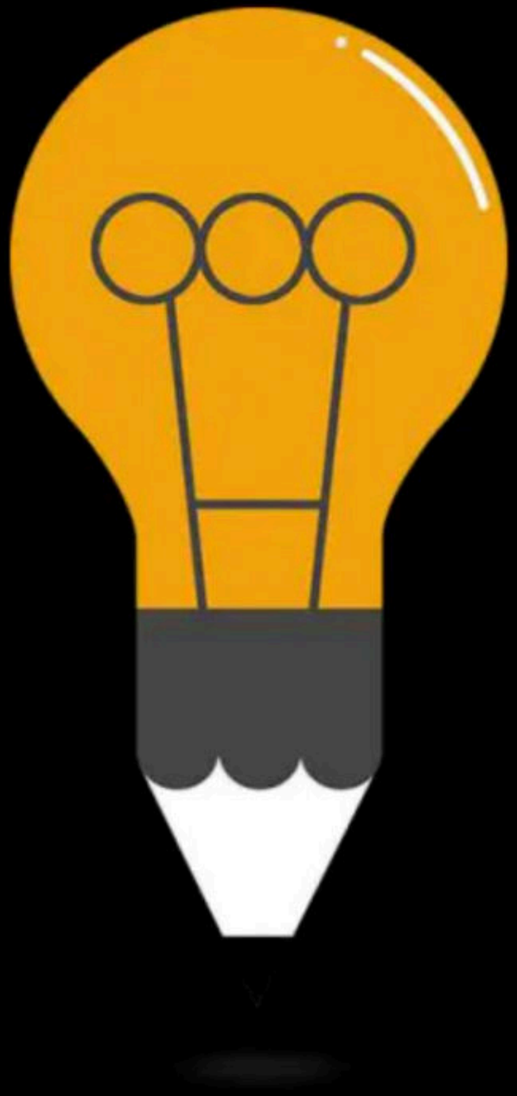
Basics & Components of Computer

Complete Course on Computer Organization & Architecture for GATE 2024 & 2025

Vishvadeep Gothi • Lesson 1 • Feb 13, 2023



Basics of Computer Systems

By: Vishvadeep Gothi

Routine

1. Lecture
2. self-study & revision
3. Every 4th class ⇒ practice & doubt
4. chapter over ⇒ PYQ's → special classes

weekend ⇒ Quiz ⇒ sunday
↳ Tough

Vishradeep (VD)

→ 3rd 682 2009

→ 4th 19 2010

→ 119,440

→ OS,
← DS,
DBMS

Fitness Trainer

→ IISc → D.S.

→ BITS Pilani 2018 – 2020

→ 2007 feb since Teaching (16)

2011
GATE
12+

Prerequisites

- Basic components of computer: CPU, memory (RAM, ROM, HDD), I/O
- Number system: Binary, Decimal, Hexadecimal etc.
- Digital logic basics: Mux, Decoder etc.
- logic gates, boolean algebra

Prerequisites

- Powers of 2:

Unit	Time	Bit or Byte
K (Kilo)	10^3	2^{10}
M (Mega)	10^6	2^{20}
G (Giga)	10^9	2^{30}
T (Tera)	10^{12}	2^{40}

final ans

final ans or anything

$2^0 = 1$

$2^1 = 2$

$2^2 = 4$

$2^3 = 8$

$2^4 = 16$

$2^5 = 32$

$2^6 = 64$

$2^7 = 128$

$2^8 = 256$

$2^9 = 512$

$2^{10} = 1024$

$2^{11} = 2048$

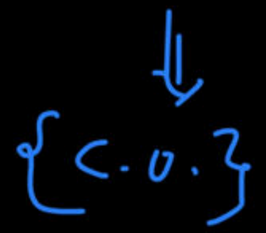
$2^{12} = 4096$

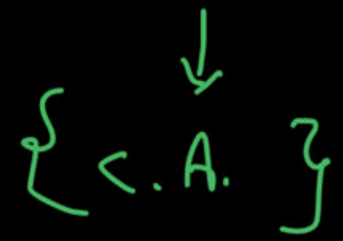
$2^{13} = 8192$

Why COA

- To understand: **How a computer works**
- To understand other courses: **OS, Compiler, Programming** etc.
- Help in real world development: **DBMS, Hardware Design, IoT problems** etc.

Computer Organization & Architecture

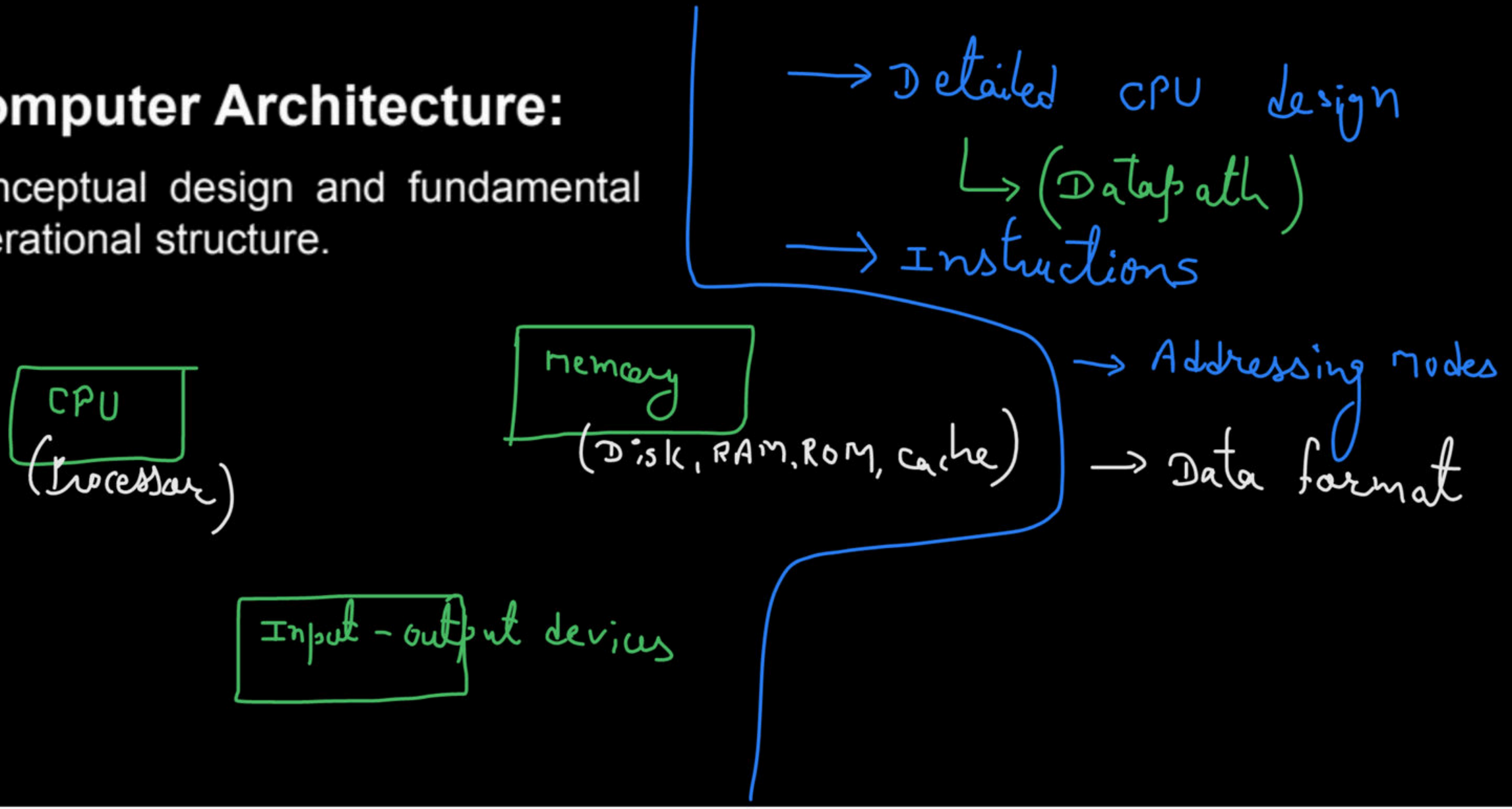




Computer Organization & Architecture

Computer Architecture:

Conceptual design and fundamental operational structure.



Computer Organization & Architecture

Computer Architecture:

Conceptual design and fundamental operational structure.

Computer Organization:

- Deals with physical devices and their interconnections
- With a perspective of improving the performance.
- implementation of architecture

Computer Organization & Architecture

Computer Architecture	Computer Organization
• CPU Design	• I/O Organization
• Instructions	• Memory Organization
• Addressing modes	• Performance
• Data format	

C.A.

- Basics
- Instruction
  - Addressing modes
- CPU
  - Datapath
  - control unit
- floating point Representation

C.O.

- I/O organizath
- memory organizath *
  - cache *
- pipelining *

Data In Computers (In binary)

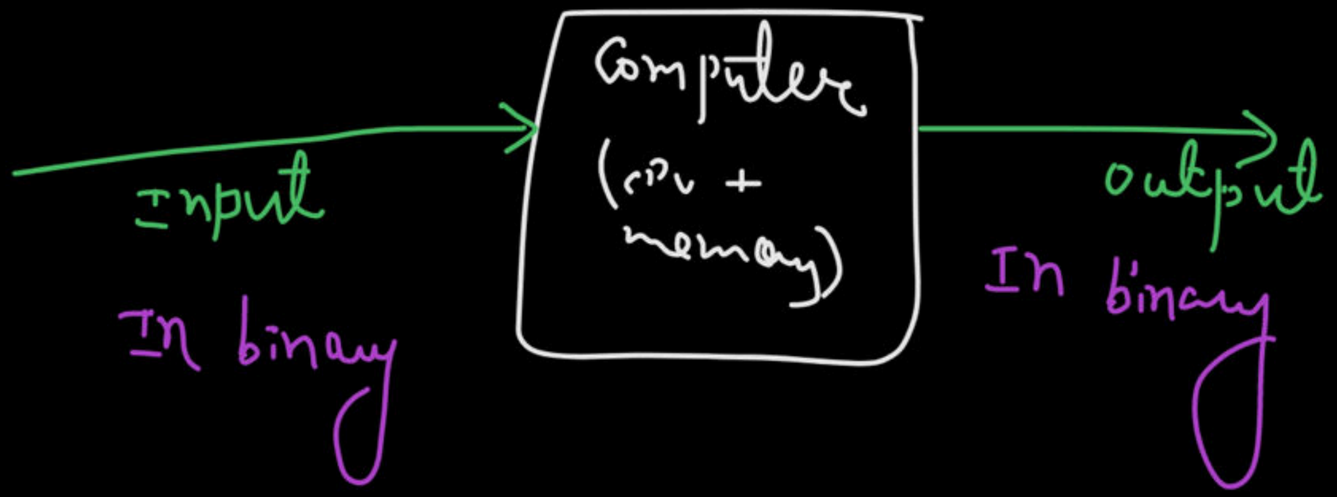
- Numbers
  - Fixed point Representation
    - Unsigned
    - Signed
      - Sign-magnitude
      - 1's complement
      - 2's — " —
  - Floating point Representation
- characters
  - A, B, C, ---, D, a, ~ ··· , z,
  - ? + − * / %
  - → ASCII
  - → EBCDIC

+5, −6, +15,

$5 \Rightarrow (101)_2$

$9 \Rightarrow (1001)_2$

Binary Numbers



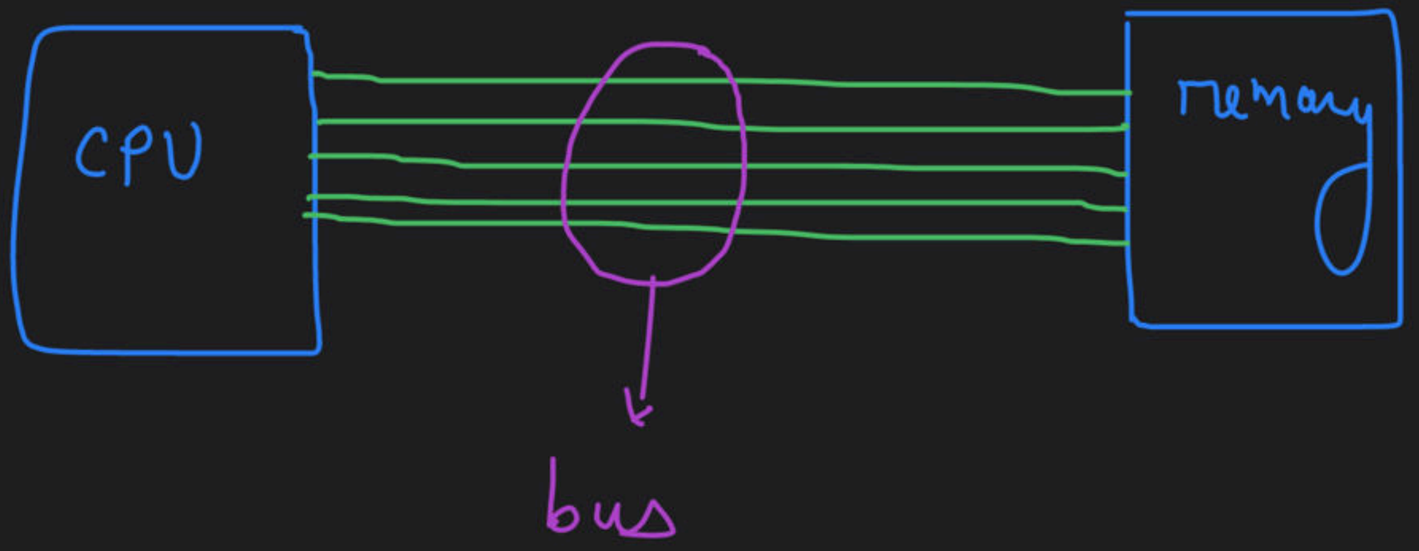
Components of Computer

- CPU (Central Processing Unit)
  - ALU (Arithmetic Logic Unit)
  - CU (Control Unit)
- Memory:
  - Primary / main memory => RAM, ROM
  - secondary => Disk (SSD, HDD)
- I/O Devices:
  - Input Devices
  - Input Devices

Other Components

- System Buses
- CPU Registers

System Bus



Collection of communication lines

Bus size => 5 bits

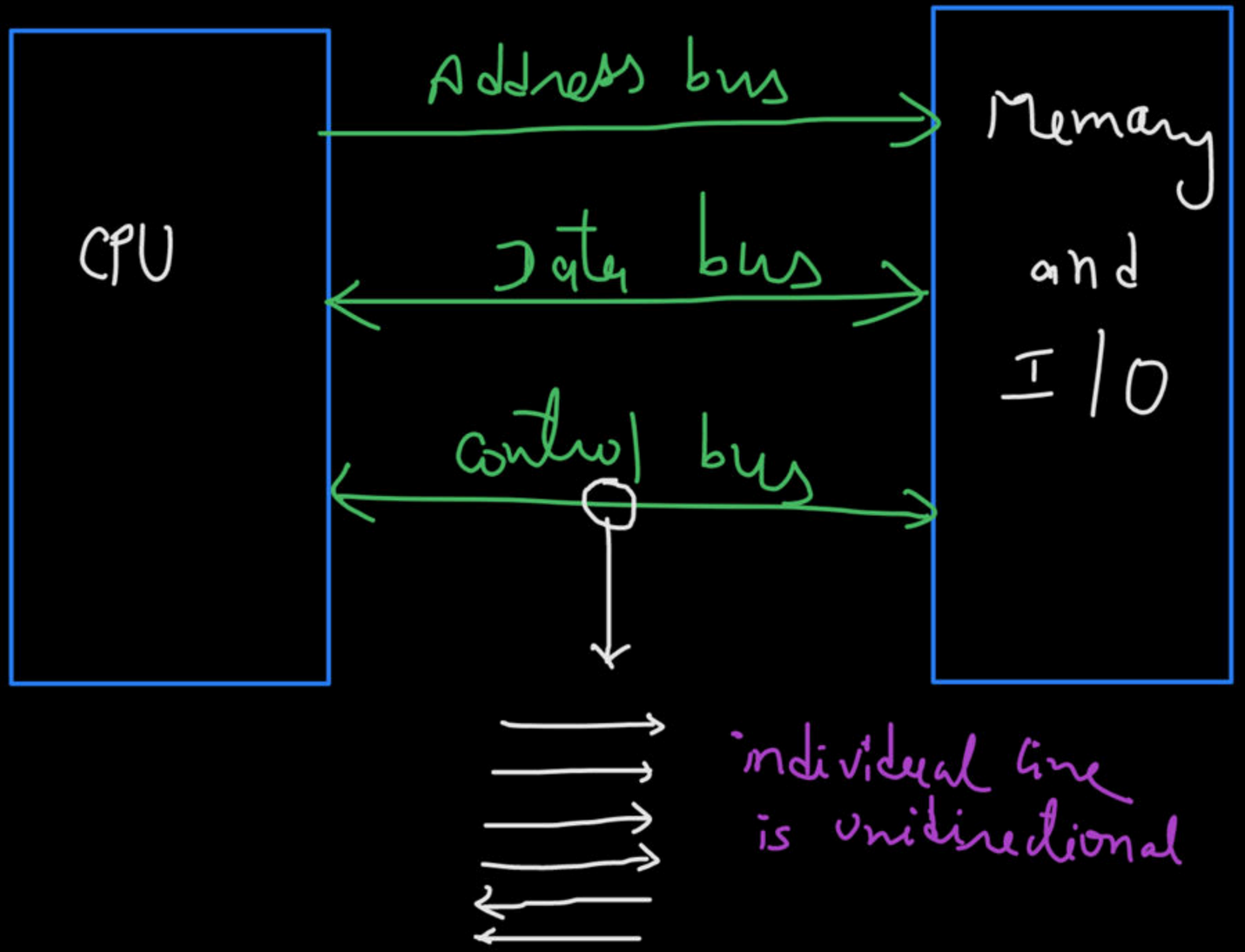
=> 5 lines

=> 5-bit wide bus / 5-line wide bus

Other Components

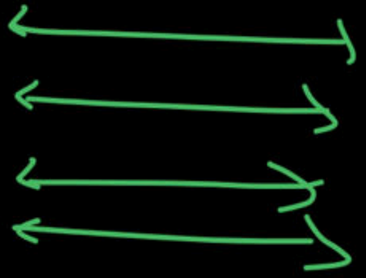
- System Buses:
  - Address Bus
  - Data Bus
  - Control Bus

System Buses



Add bus :-

Data bus:-



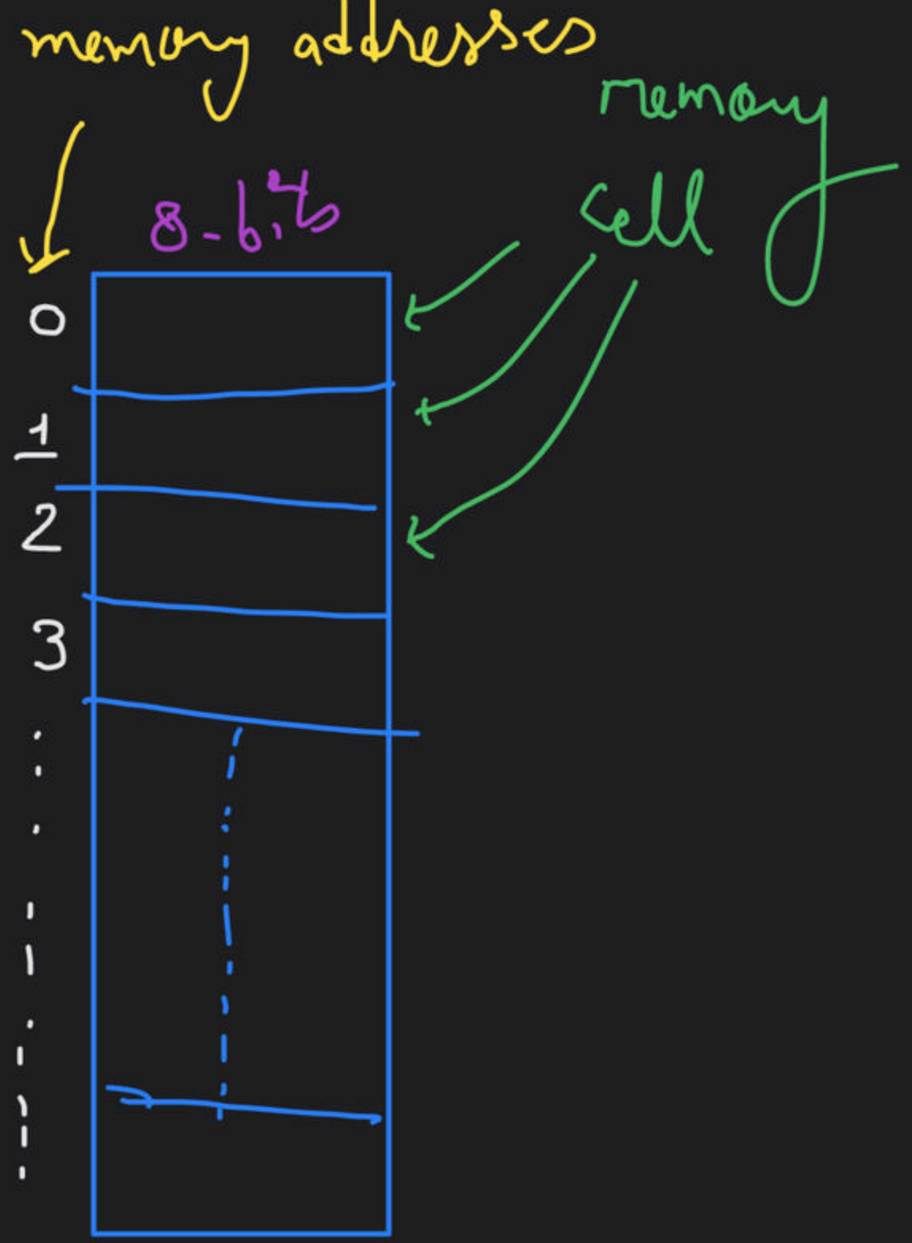
control signal => Read for memory — from CPU to memory
write —11— —11—

read for I/O — from CPU to I/O
write —11— —11—

wait
Ready } from memory to CPU

Interrupt } from I/O to CPU

memory system :-



Happy Learning.!

@vdeep_10