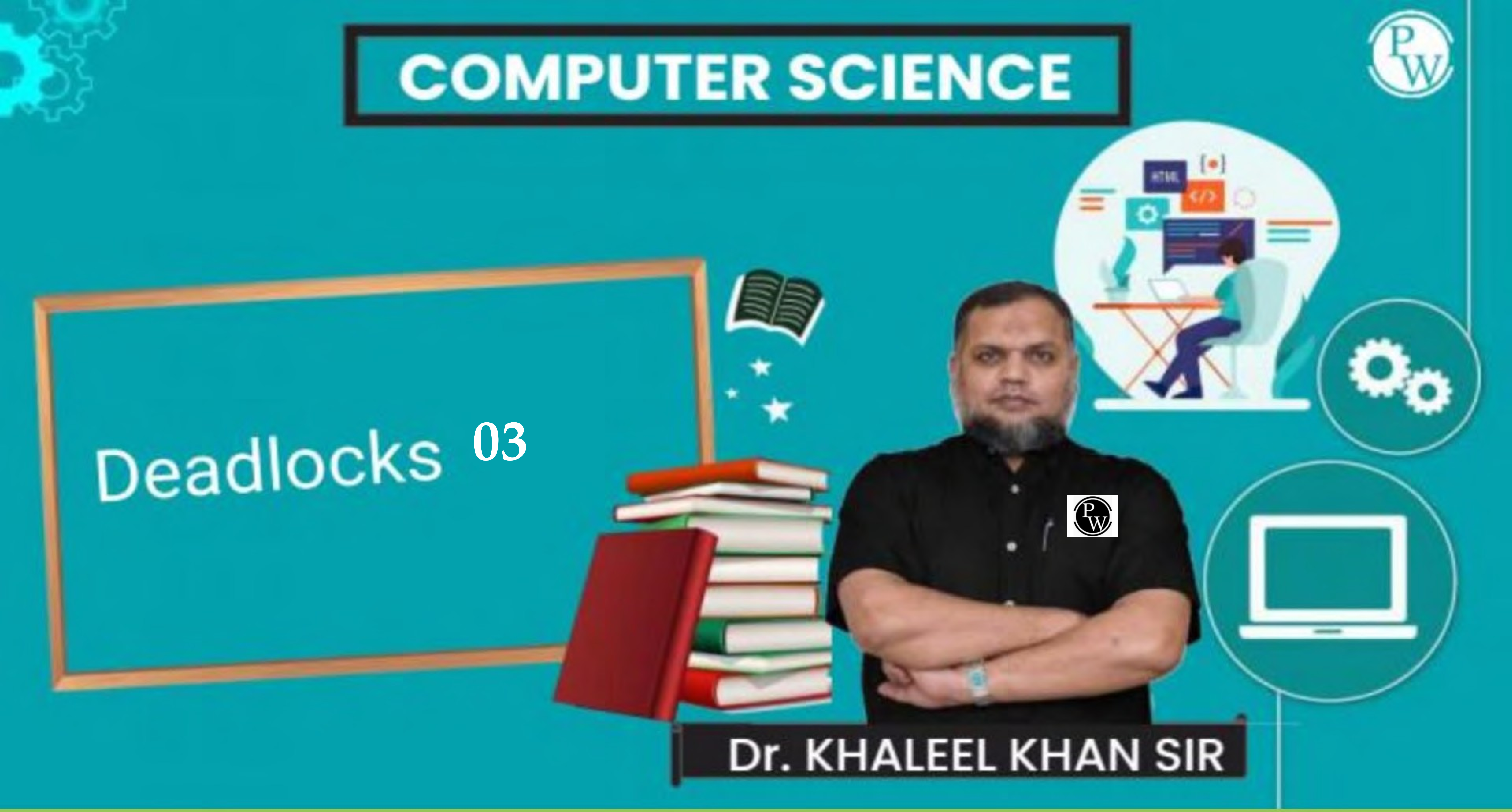

COMPUTER SCIENCE
Deadlocks 03
Dr. KHALEEL KHAN SIR

TOPICS TO BE COVERED

1.deadlock characterization

Memory orgn

Primary

volatile

Smaller

faster

costly

RAM; ROM; Cache; Registers

Physical

Main

Secondary

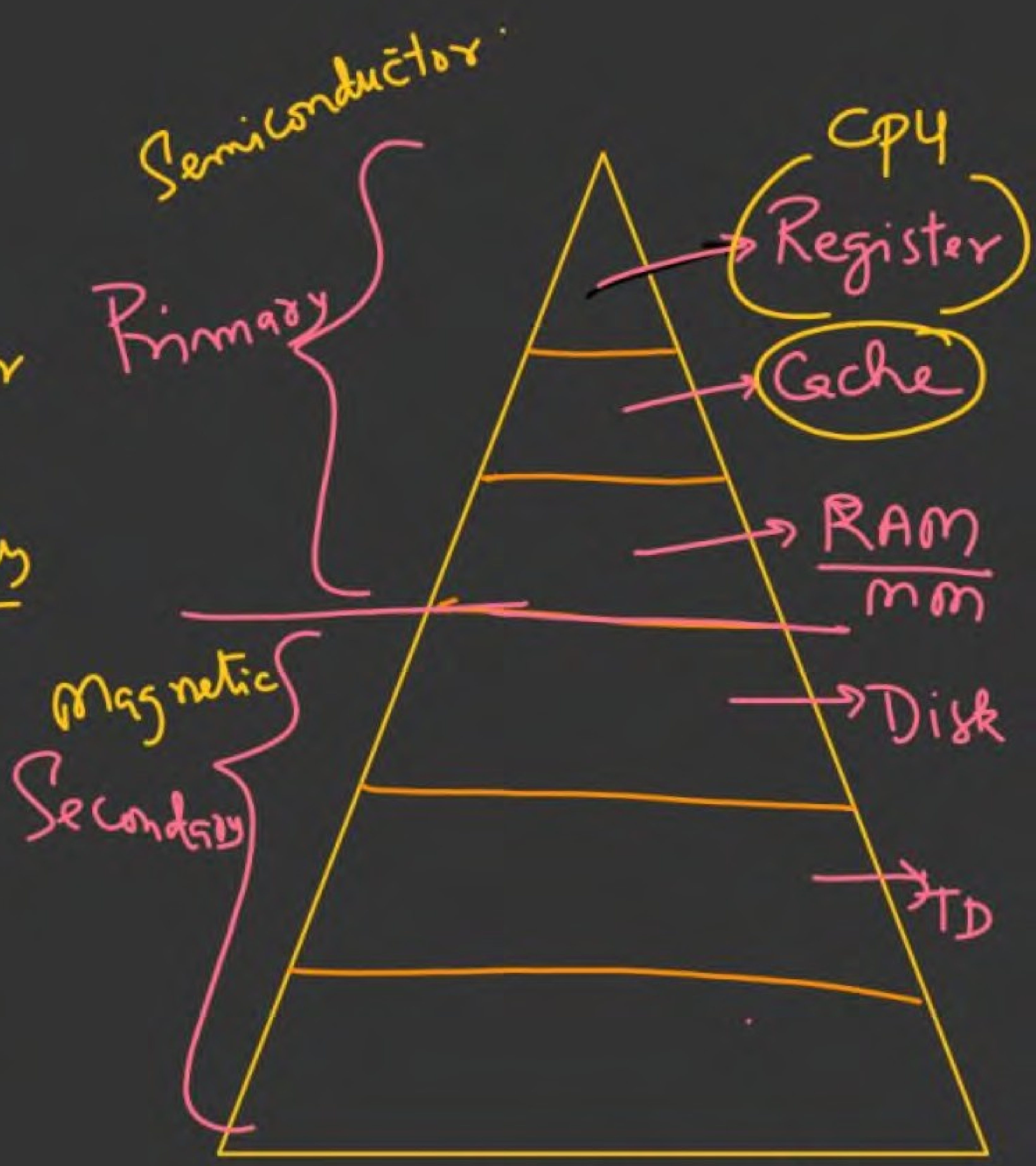
Non-volatile

larger

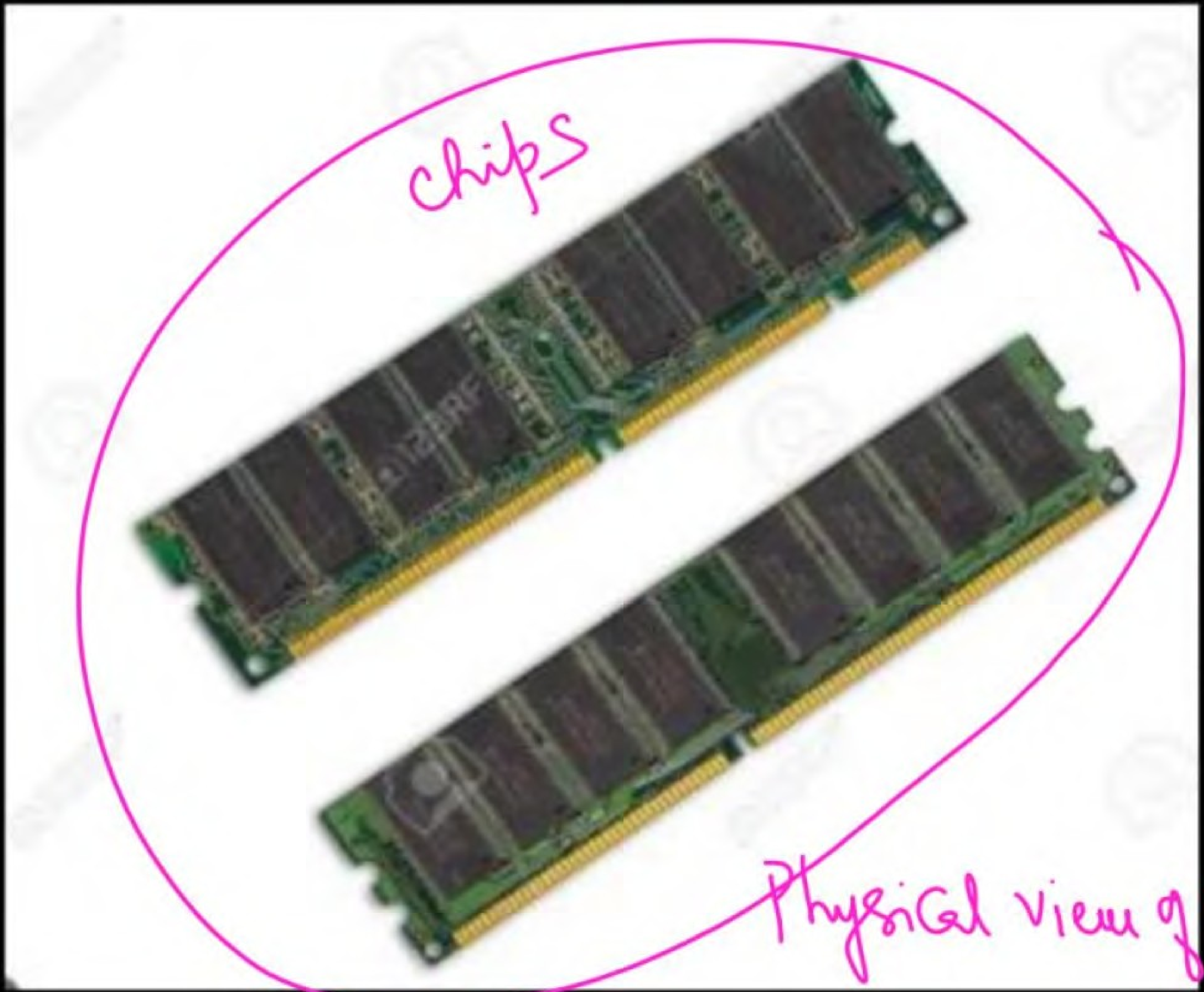
Slower

less costly

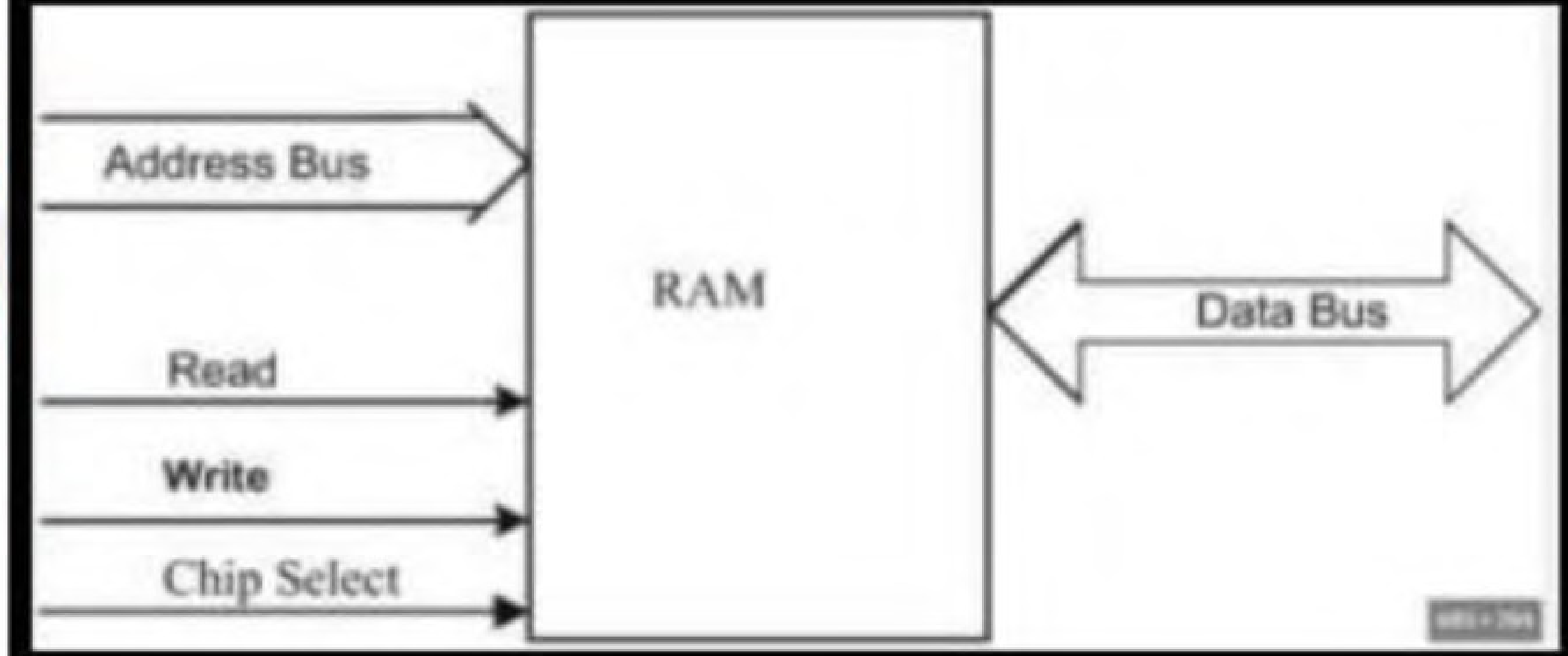
HDD + P.D + Tape + Cartridges + DVD's



Mem. Hierarchy.



Physical view of Memory

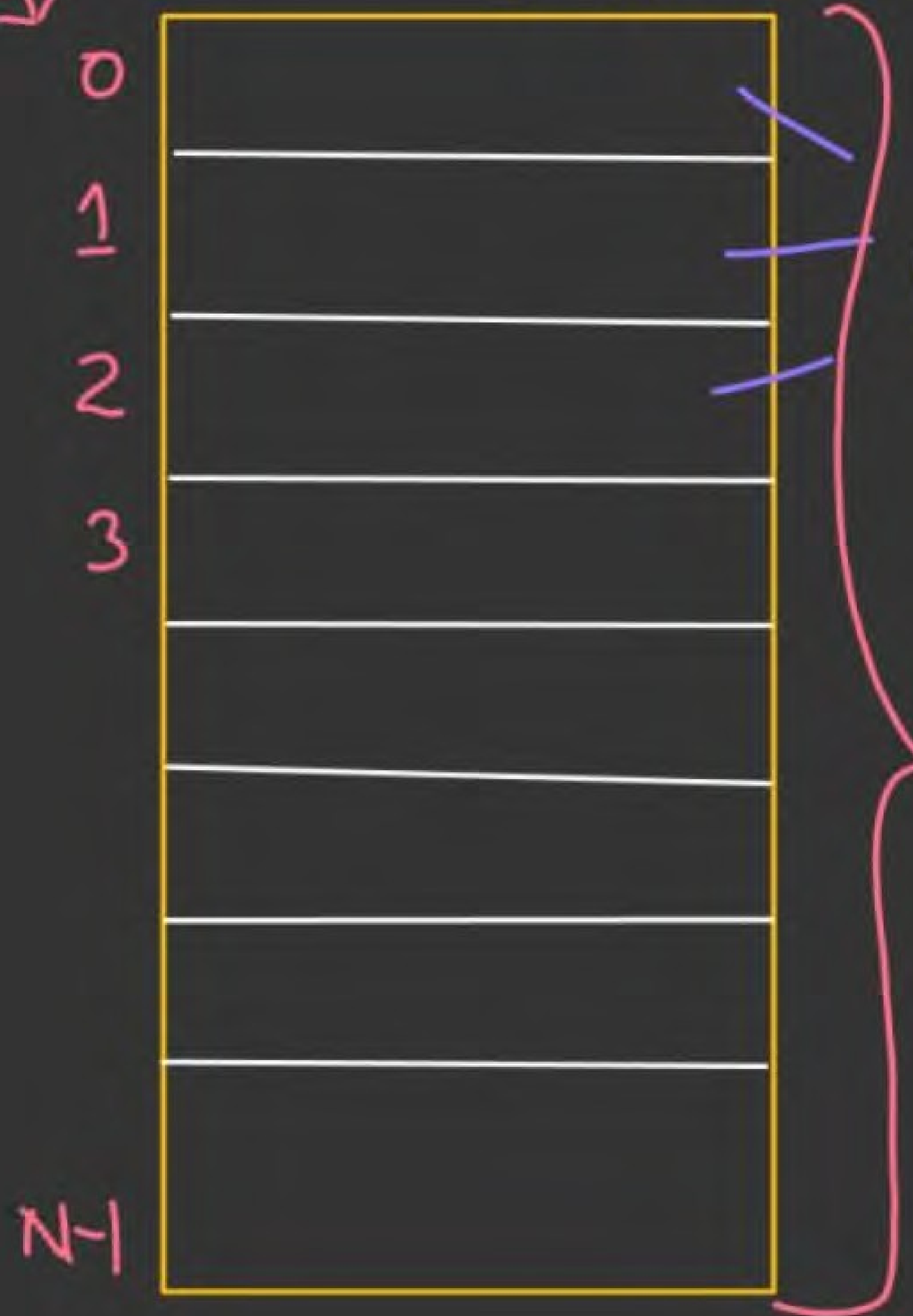


Abstract view of Memory (Foundation)

8 bits = 1 Byte

1-Dim. linear Array of words

Addresses



Words / Locations / Cells

'N' = Total # of words / Capacity

'm'-bits

word-length/width of word

'n'

Address (n-bits) | Instn/Data content | bits (Bytes)

word

→ (Smallest Addressable unit is a Byte)

$\boxed{\text{Mem. Specification: } N \times m}$

I. $N \propto n$

$N = 8$ words
$n = 8$ bits

Length of Address (n) = '3' bits

$N = 2^n$ words
$n = \log_2 N$ bits

3 bits

000	W_0
001	W_1
010	W_2
011	W_3
100	W_4
101	W_5
110	W_6
111	W_7

0
1

00
01
10
11 — 4

000
:
111 — 8

$2^5 = 32W$
$2^6 = 64$
$2^7 = 128$
$2^8 = 256$
$2^9 = 512$

$2^{10} = 1024 \sim 10^3 = 1K$
$2^{20} \simeq 10^6 = 1M$
$2^{30} \sim 10^9 = 1G$
$2^{40} \sim 10^{12} = 1T$
$2^{50} \sim 10^{15} = 1P$

II. $N = 16KW$ (2^4, 2^{10})

$n = \log_2(16K) = \log_2 2^4 \times 2^{10}$

$= \log_2 2^{14} = 14 \cdot \log_2 2$

$= 14$

$n = 4 + 10 = 14$ bits ✓

III. $n = 23$ bits

$N = 2^{23} = 2^3 \times 2^{20} = 8MW$ ✓

IV: $N = 100KW$

$n = 7 + 10 = 17$ bits

Q) $n = 19$ bits

$N = 2^{19} = 2^{9} \times 2^{10} = \underline{\underline{512\,KW}}$

if $\underline{1W = 1B}$:

$\therefore \underline{512\,KB}$

Q) $N = 1000\,GB$

$n = 10 + 30$

$= \underline{\underline{40 \text{ bits}}}$

$N = 2^{n}$

$n = \log N$

Q) $N = 'Z'$ Bytes

$n = \log_2 Z$ bits

Q) $N = \log_2 x$ words

$n = \log(\log_2 x)$

Q) $N = 2^{K}$ words

$n = K$ bits

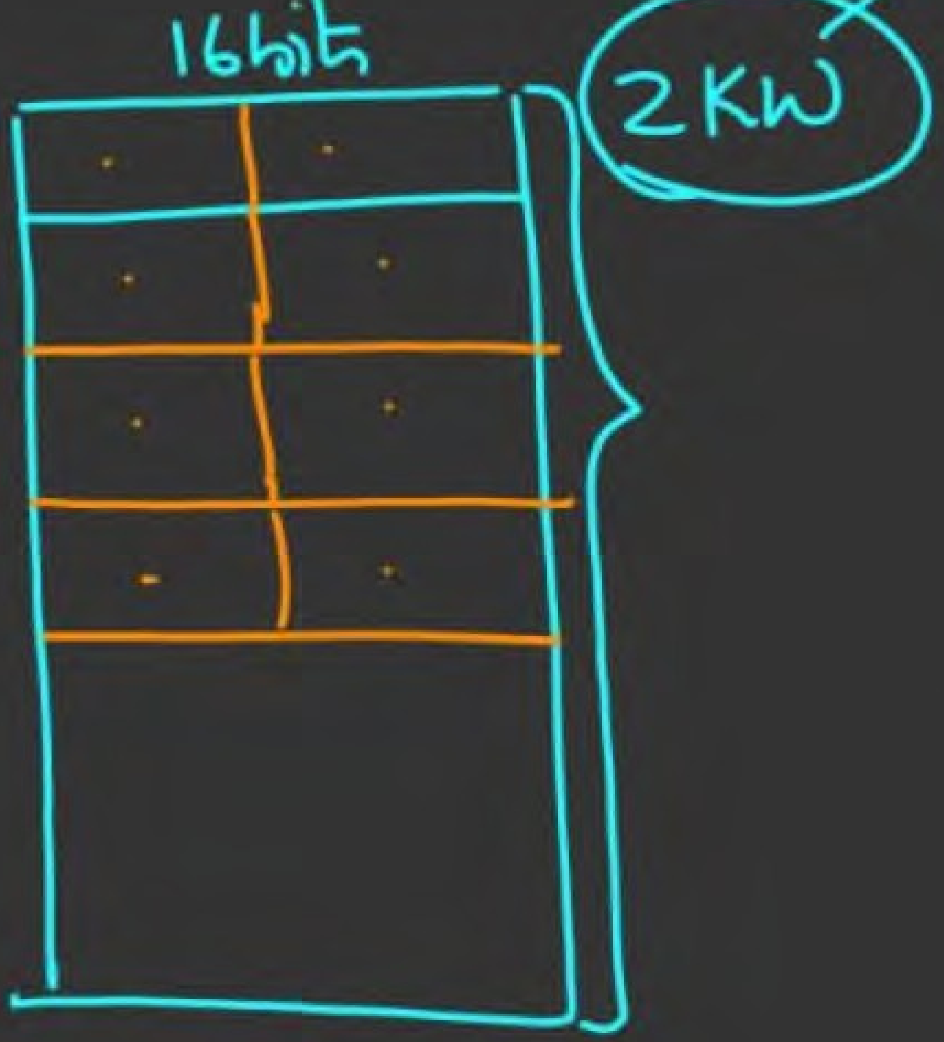
$\log_2 2^{K} = K$

Q) $N = (2\,KW) = n = 1 + 10 = 11$ bits

$m = (16 \text{ bits})$ $\quad 1W = 16 \text{ bits} = 2B$

1) $n_w = 11$ bits

2) $N_{Bytes} = 4KB$



$1W = 2B$

$2KW = ?$

$2K \times 2B = 4KB.$

$4W$

$1W = 2B$

$8B$

2) $n = 16$ bits to refer one word $\Rightarrow N_W = 2^{16} = 64\,KW$

$m = 32$ bits ; $1W = 32$ bits $= 4B$

$1w \rightarrow 4B$

$64KB \rightarrow ?$

$64K \times 4B$

$256KB$

Q1) $N_W = 64KW$

Q2) $N_B = 256KB$

$N = 2^n$

$n = \log N$

Q3) How many address bits needed to refer a Byte? $8+10 = 18$ bits

$N = 256\,MB$

$m = 8B$ (Divided into words of 8 B)

$$N_W = \frac{256\,MB}{8\,B} = \frac{2^{28}}{2^{3}} = 2^{25} = 32\,MW$$

$m = 2B$

$N = 8B$

w_0	B_1	B_2
w_1	B_3	B_4
w_2	B_5	B_6
w_3	B_7	B_8

$N_W = 4$

$$N_W = \frac{8}{2} = 4$$

$N = 512\,G\,\text{bits} = \frac{512G}{8} = \frac{2^{39}}{2^{3}} = 2^{36}\,GB$

$\cancel{\frac{128}{8} = 16}$

6:40pm

$m = 128\ \text{bits}$ $\quad 1W = 16B$

$N = 8\ \text{bits}$

$m = 2\ \text{bits}$

$N_B = 4G \times 16B = 64GB$ ✓

$N_W = 4 = \frac{8}{2}$

$N_W = \frac{2^{39}}{2^{7}} = 2^{32} = 4GW$

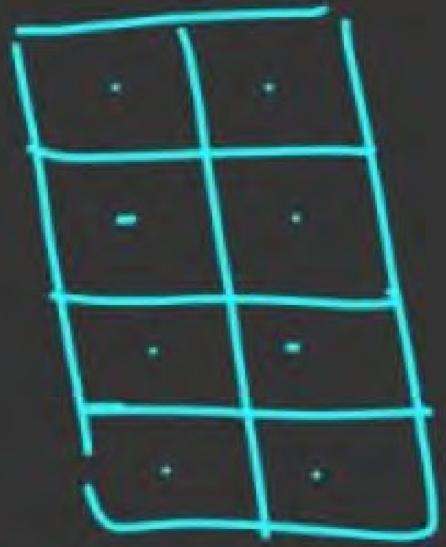
$n_W = 32\ \text{bits}$

$n_B = 36\ \text{bits}$

$N = 2^{n}\, w$

$n = \log N\ \text{bits}$

W ~ Byte ~ bits



THANK YOU!