CS & IT ENGINEERING

COMPUTER ORGANIZATION AND ARCHITECTURE

Basics Of COA

Lecture No.- 04

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Recap of Previous Lecture

Topic CPU Registers → AR, DR

Topic Memory Addressing

add. = $\log_2$ (no. of cells)

Topic Memory Access

- Read
- write

Topics to be Covered

Topic Architecture Type (Based on Size of Input)

Topic Micro Operation

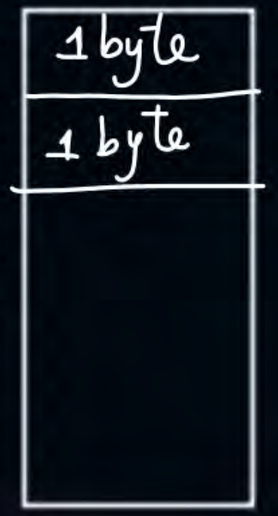
Topic Memory Access

Topic : Memory Types

1. Byte Addressable → on each address one byte is stored.
2. Word Addressable :- Each word has an address in memory
   or
   on Each address in memory one word is stored

Word Addressable

Byte Addressable



assumption :-

word addressable memory

⇒ 4 cells

⇒ 1 word = 2 bytes

ex:- no. of cells = 64 ⟹ add. size = 6 bits

word addressable

word size = 4B

memory capacity = 64 * 4B

= 256 B

memory capacity = no. of cells * Data per cell

= 4 * 2B

= 8 Bytes

ex:-

no. of cells = 128 ⇒ add. size = 7 bits

byte addressable

memory capacity = 128 * 1B

= 128 bytes

$$\text{no. of cells} = \frac{\text{Total mem. Capacity}}{\text{Data per cell}}$$

ex:- memory capacity = 32 bytes

memory is byte addressable

$$\text{no. of cells} = \frac{32\ B}{1\ B} = 32$$

add. size = 5-bits

[NAT]

Ans = 8

#Q. Consider a memory with size 256 bytes. The address size to access memory, if memory is byte addressable, is _____ bits?

$$\text{no. of cells} = \frac{256\ B}{1\ B} = 256 = 2^8$$

$$\text{add. size} = \log_2 2^8 = 8 \text{ bits}$$

[NAT]

Ans = 7

#Q. Consider a memory with size 512 bytes. The address size to access memory, if memory is word addressable(1 word = 4 bytes), is _____ bits?

$$\text{no. of cells} = \frac{512\,B}{4\,B} = \frac{2^9}{2^2} = 2^{9-2} = 2^7 = 128$$

$$\text{add. size} = \log_2 2^7 = 7 \text{ - bits}$$

[NAT]

Ans = 22

#Q. Consider a memory with size 4Mbytes. The address size to access memory, if memory is byte addressable, is _____ bits?

no. of cells = 4M = $2^2 \cdot 2^{20} = 2^{22}$

add. size = $\log_2 2^{22}$ = 22 bits

[NAT]

Ans = 15

#Q. Consider a memory with size 64Kbytes. The address size to access memory, if memory is word addressable(1 word = 2 bytes), is _____ bits?

$$\text{no. of cells} = \frac{64\,KB}{2\,B} = 2^5 \cdot 2^{10} = 2^{15}$$

$$\text{add. size} = \log_2 2^{15} = 15 \text{ bits}$$

ex:-

byte addressable memory

add. length = 16 bits

mem. capacity = ——

no. of cells = 2^{16}

Total mem. capacity = $2^{16} * 1B$

$= 2^6 \cdot 2^{10} B$

$= 64 KB$

ex:-

add. length = 23 bits

word addressable memory

word size = 4 bytes

memory capacity =

no. of cells = 2^{23}

mem. capacity = $2^{23} * 4B$

$= 2^{23} * 2^2 B$

$= 2^{25} B$

$= 2^5 \cdot 2^{20} B = 32 MBytes$

2 mins Summary

Topic Architecture Type (Based on Size of Input)

Topic Micro Operation

Topic Memory Access

Happy Learning

THANK - YOU