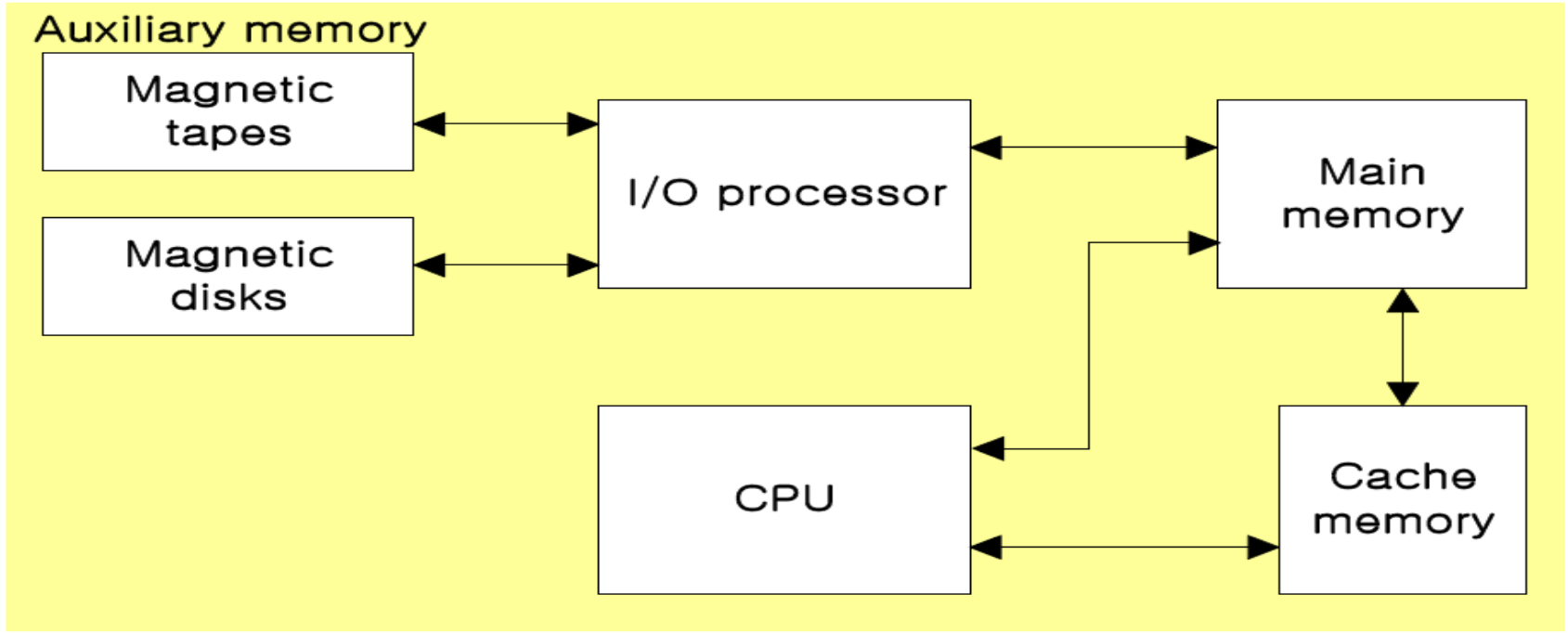
Memory Organization

12.1 Memory Hierarchy
12.2 Main Memory
12.3 Auxiliary Memory
12.4 Associative Memory
12.5 Cache Memory
12.6 Virtual Memory
12.7 Memory management hardware

Memory Hierarchy



The overall goal of using a memory hierarchy is to obtain the highest-possible average access speed while minimizing the total cost of the entire memory system.

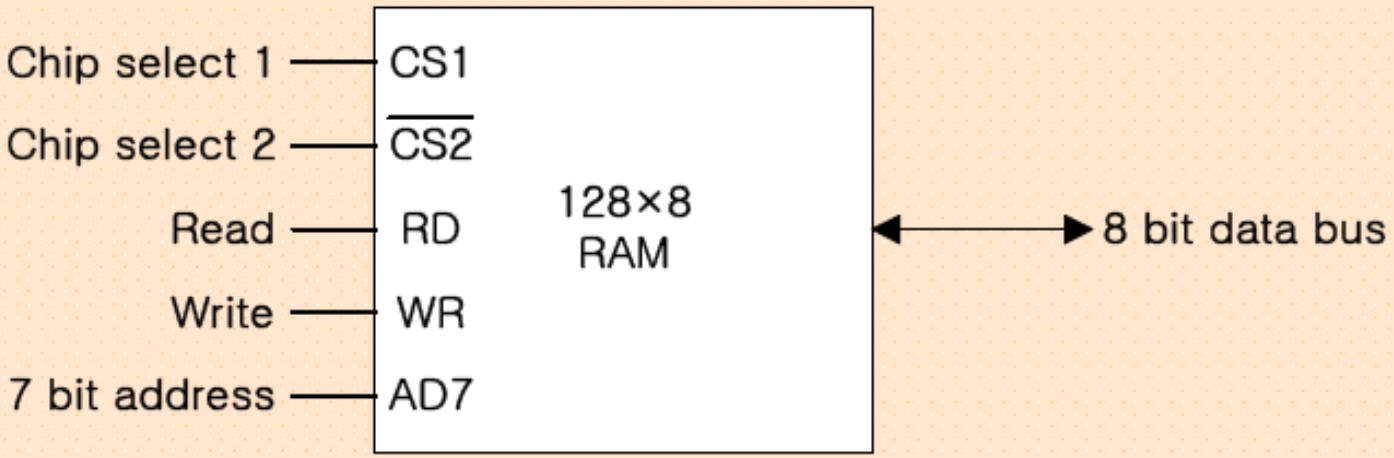
Which of the following is a synonym for RAM?

a) Main Memory
b) Primary Memory
c) Secondary Memory
d) Both a and B

Cache memory is used to enhance the efficiency of the computer processor by storing the frequently used data.

TRUE
FALSE

Main memory

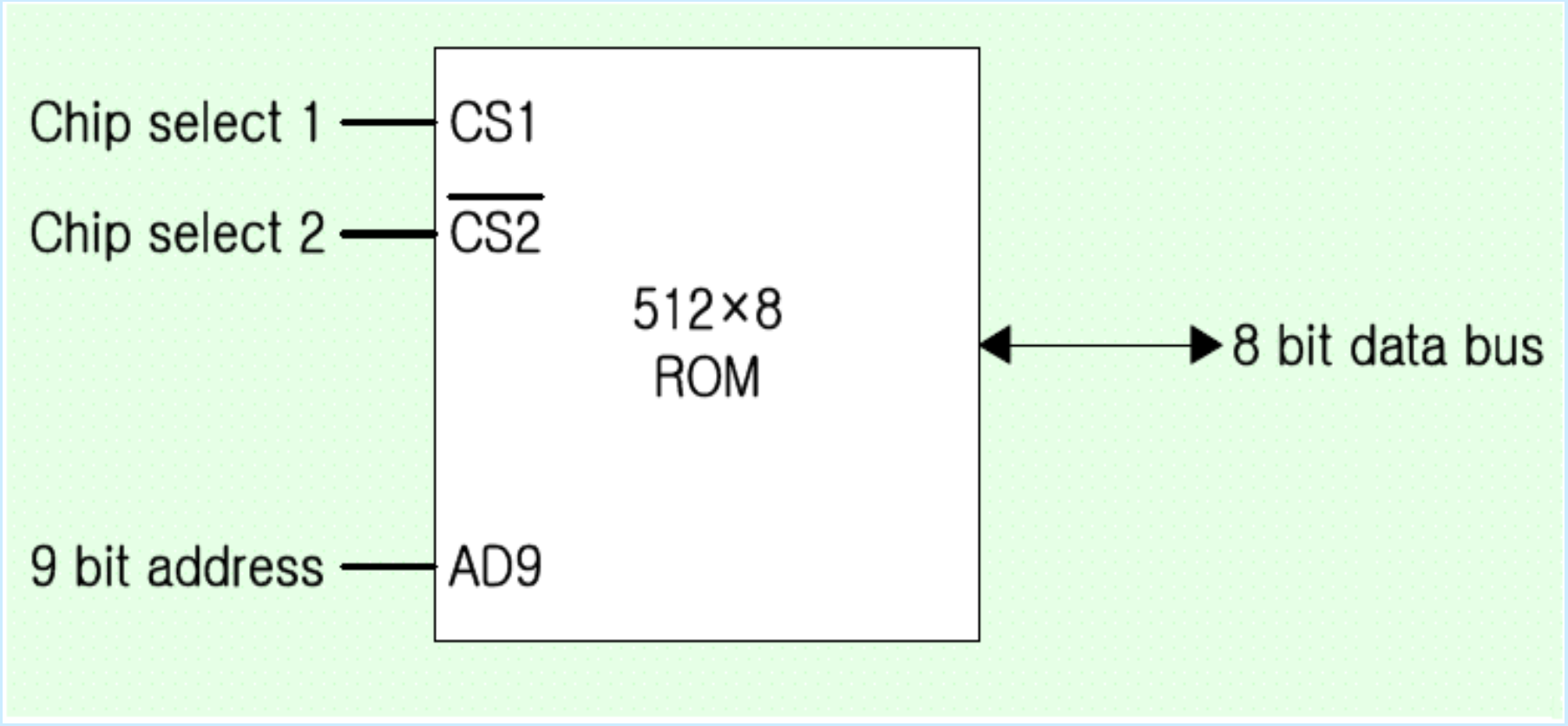


(a) Block diagram

CS1	$\overline{CS2}$	RD	WR	Memory function	State of data bus
0	0	×	×	Inhibit	High-impedance
0	1	×	×	Inhibit	High-impedance
1	0	0	0	Inhibit	High-impedance
1	0	0	1	Write	Input data to RAM
1	0	1	×	Read	Output data from RAM
1	1	×	×	Inhibit	High-impedance

(b) Function table

ROM Chip


Chip select 1
CS1
Chip select 2
CS2
512×8
ROM
8 bit data bus
9 bit address
AD9

Suppose a computer is having memory size as 512*32. In such a computer, How many bits would be there in the memory word?

a) 8
b) 16
c) 32
d) 64

Memory Address Map

The designer of a computer system must calculate the amount of memory required for the particular application and assign it to either RAM or ROM.

The interconnection between memory and processor is then established from knowledge of the size of memory needed and the type of RAM and ROM chips available.

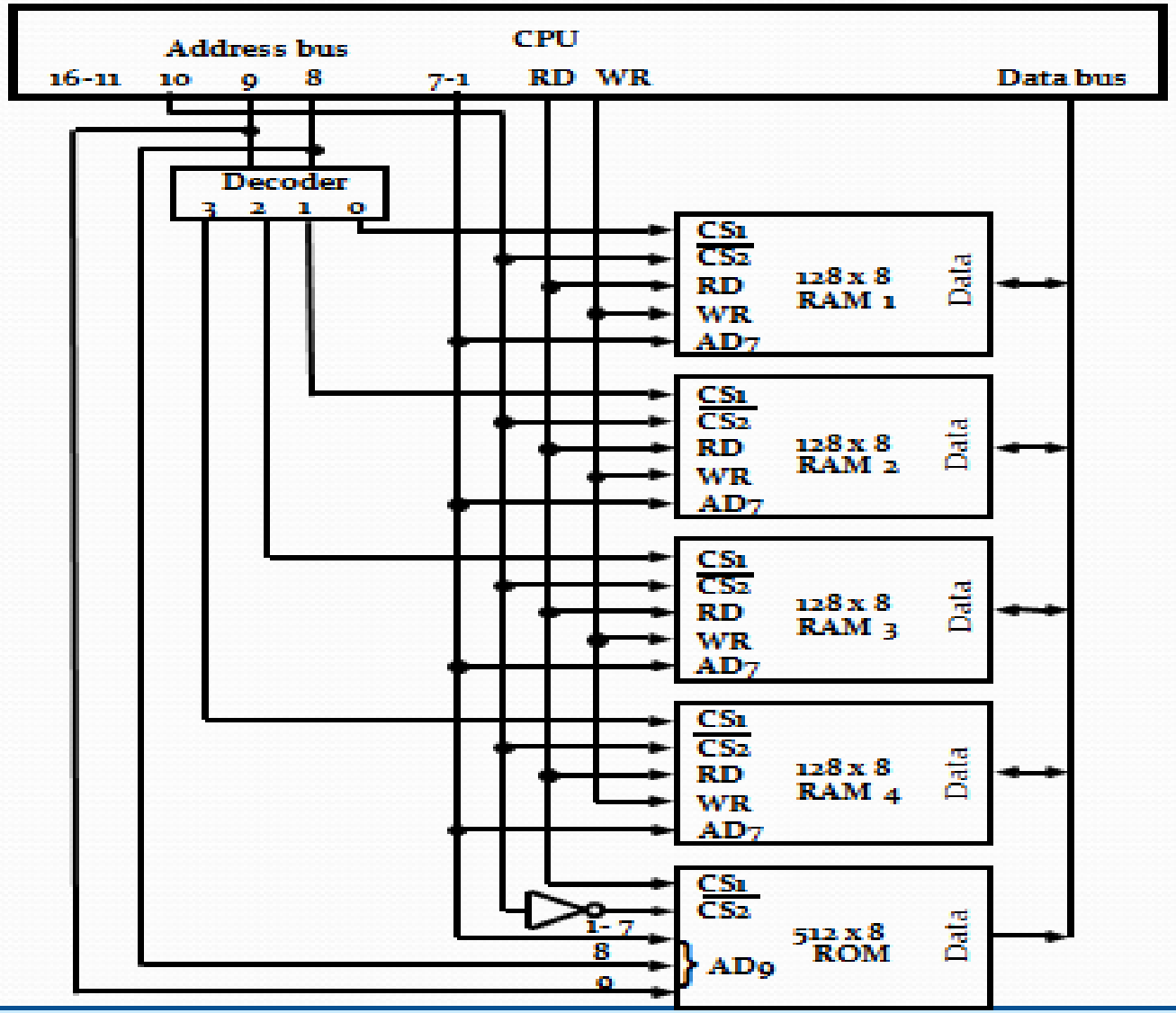
The addressing of memory can be established by means of a table that specifies the memory address assigned to each chip.

The table, called a memory address map, is a pictorial representation of assigned address space for each chip in the system.

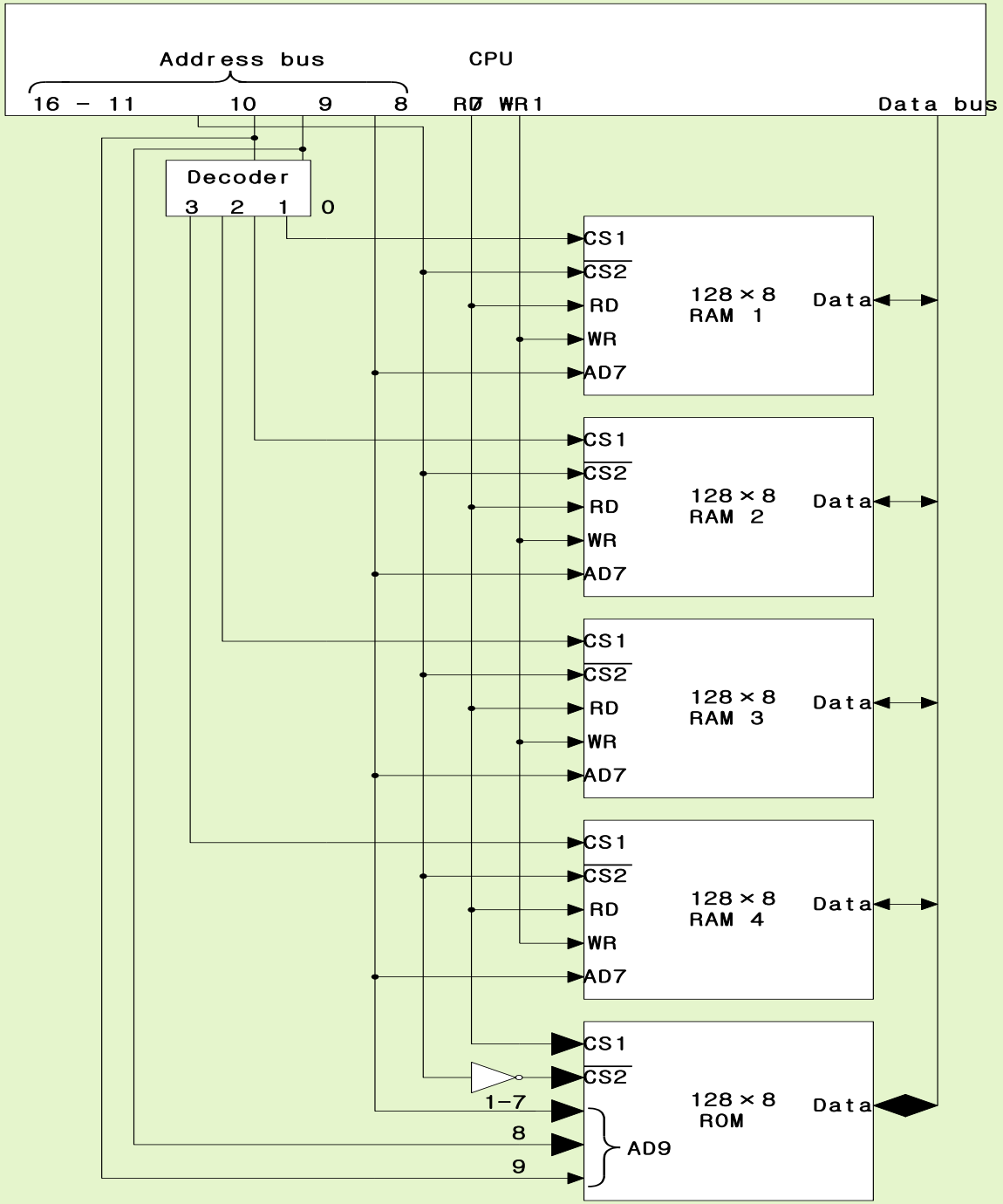
Memory Address Map

		ADDRESS BUS									
COMPONENT	HEXA DECIMAL ADDRESS	10	9	8	7	6	5	4	3	2	1
RAM 1	0000-007F	0	0	0	X	X	X	X	X	X	X
RAM 2	0080-00FF	0	0	1	X	X	X	X	X	X	X
RAM 3	0100-017F	0	1	0	X	X	X	X	X	X	X
RAM 4	0180-01FF	0	1	1	X	X	X	X	X	X	X
ROM	0200-03FF	1	X	X	X	X	X	X	X	X	X

Connection of Memory to CPU



Memory connections to the CPU



In context of memory connections to CPU, if the 10th bit in the address bus is 1 then ROM will be selected for fetching the data.

TRUE
FALSE