

Computer Architecture

Solution of CT #1

Question

Class Test-I

Course: CSE 2231 (Computer Architecture and Organization)

Total marks: 15; Time: 20 min

1. Define memory hierarchy? Why DRAM is slower than SRAM?
2. Consider that your computer needs 256B of RAM and 128B of ROM. Only RAM chip of size 128B and ROM chip of size 64B are available. Draw the memory connection using 8 bit data, controls (RD/WR) and required number of address lines.
3. What is happened if the size of cache is same as RAM? If 120 memory references out of 400 are not found in the cache calculate the cache performance.

Answer No : 01

Memory hierarchy is the arrangement of different types of memories based on accessibility in a computer system.

Order according to speed:

Cache>Main Memory>Auxiliary memory

Order according to size:

Cache<Main memory<Auxiliary memory

DRAM is slower than SRAM because :

1. DRAM requires the stored information to be periodically re-written, or refreshed, otherwise it would vanish.
2. At the time of periodic refresh, the CPU cannot access or read/write data from DRAM until it finishes. Also, it requires computational power of the CPU which slows down the overall performance.
3. DRAM stores data on capacitive circuits which is comparatively slower than the flip flop of SRAM.

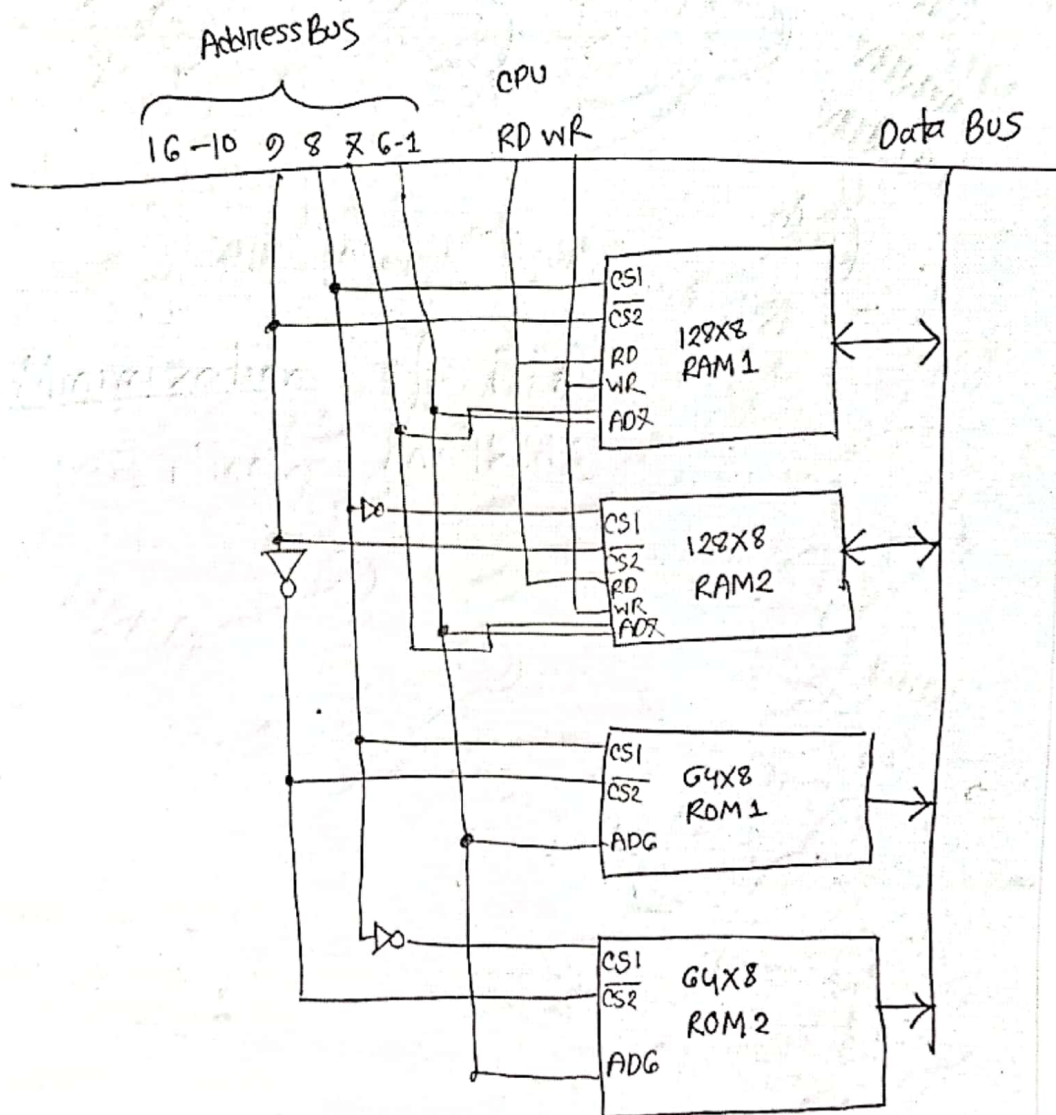
Answer No. 02

Given,

The computer needs 256B of RAM and 128B of ROM.

But only RAM chip of size 128B and ROM chip of size 64B available.

So, it requires 2 RAMS of 128B and 2 ROM of 64B.



Answer No : 03

If the size of cache is the same as RAM, then the computer becomes slower because of searching in a large space.

It is much easier for a CPU to check the data in a smaller size of cache. When the cache size is the same as RAM, the CPU needs to search in a very large cache to find its data. So it becomes harder and comparatively time consuming to get the data.

On the other hand, if the cache size is the same as RAM, the whole data of RAM will be loaded on the cache. Then, each time, the CPU will only check on cache for the data instead of RAM because the whole data of RAM will be already loaded on cache. As both cache and RAM are same in size, because of having SRAM in cache, it will be faster than using a DRAM.

Given,

Total Memory References = 400

Not Found or Miss = 120

Hit = 400 - 120 = 280

$$\text{Cache performance} = \frac{\text{Hit}}{\text{Miss}} = \frac{280}{400} = 0.7 = 70\%$$