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Q-NO-1(a)

Addressable Units:-

In some systems, the addressable units is the word. However, many systems allow addressing at the byte level. In any case, $2^A = N$.

UNIT OF TRANSFER:-

For main memory this is the number of bits read out of or written into memory at a time. The unit of transfer need not equal a word or an addressable unit

WORD:-

The "natural" unit of organization of memory. The size of a word is typically equal to the number of bits used to represent an integer and to the instruction length.

Q.No-1(b)

Replacement Algorithms:

A number of algorithms have been tried. We mention four of the most common. Probably the most effective is least recently used (LRU): Replace the line in the set that has been in the cache longest with no reference to it. Still another possibility is least frequently used (LFU): Replace that block in the set that has experienced the fewest references. LFU could be implemented by associating a counter with each lines.

Q-NO-1(c)

SRAM:

The SRAM address line is used to open or close a switch. The address line controls two transistors (T_5 and T_6). When a signal is applied for this line, the two transistors a switched on, allowing a read or write operation.

For a write operation, the desired bit value is applied to line B, while its complement is applied to line $\bar{B}$. This forces the four transistors (T_1, T_2, T_3, T_4) into the proper state. For a read operation, the bit value is read from line b.

Q-NO-1(d)

Discuss 16-Mbit DRAM (4M×4) organization [redacted].

DRAM:

It is a type of random access semi-conductor memory that stores each bit of data in a memory cell consisting of a tiny capacitor and a transistor. Only 4 bits are read/written to this DRAM, there must be multiple DRAMs connected to the memory controller to read/write a word of data to the bus.

All the DRams require a refresh operation. A simple technique for refreshing is in effect to disable the DRAM.

Q-No-1(e)

DvD's Capacity: Over CD:

DvD's storage data is higher for a few interrelated reasons.

DvD uses a red, rather than infrared, laser. Red light has a shorter wavelength than infrared light.

DVD has a smaller numerical aperture than CD does.

Q-NO-2(a)

Ans **EEPROM**

* EEPROM uses NOR type memory.
* EEPROMs are seldom rewritten
* EEPROM is used when only small amounts are needed
* EEPROM is a type of memory devices that uses and electronic device to erase & write digital data.

Flash Memory ::

* Flash is just one type of EEPROM
* Flash uses NAND-type memory
* Flash is block-wise erasable
* Flash is constantly rewritten
* Flash is used when large amounts are needed.

Q-NO-2(b)

HARD FAILURE ::

Hard failures are errors that occurs through process defects or circuit bugs. hard failure are repeatable with the correct sequence of actions within the microcontroller.

Soft Errors :-

Soft errors occurs through no failure of the circuit or defect but due to an external source that causes data to change.

Q.NO-2(c)

Magnetic Disk :-

A magnetic disk is a storage device that uses a magnetization process to read, write, rewrite and access data.

Q-NO-2(d)

Parallel Access and Independent Access RAID Schemes :-

In parallel access, all the disks are accessed at once, whereas in independent access, the disks run independently of each other.

Q.NO.2(e)

HD DVD and Blu-ray DVD :-

HD DVD players have been much cheaper than Blu ray machines, but Blu-ray discs have

more storage and more advanced protections against piracy. Both versions deliver sharp resolutions.

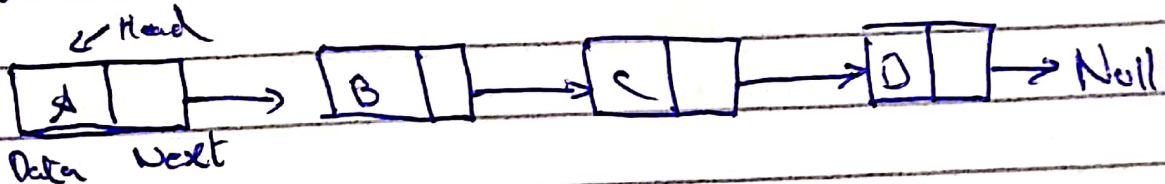
Q-No-3(a)

MEMORY Access Methods:.

These are 4 types of memory access.

(i) Sequential Access:.

In this method, the memory is accessed in a specific linear sequential manner, like accessing in a single linked List.



(ii) Random Access:.

In this method, any location of the memory can be accessed randomly like accessing in Array. Physical locations are independent in this acces method.

(iii) DIRECT Access:.

In the method, the particular location of the memory can be accessed directly like accessing in Array.

iv) Associate Access :-

In this memory, a word is accessed rather than its address. This access method is special type of random access method.

Q.No-3(b)

PRINCIPAL OF Locality :-

Locality of Reference also known as the principle of locality, the phenomenon of the same value or related storage locations being frequently accessed. Locality occurs in time (Temporal locality) and in space (Spatial locality).

- **TEMPORA Locality :-**
  refers to the reuse of specific data or resources.

- **Spatial Locality :-**
  refers to the use of data elements within relatively close storage locations.

Q-NO-3(c)

Cache Coherence::

In computer architecture, cache coherence is the uniformity of shared resource data that ends up stored in multiple local caches. When clients in a system maintain caches of a common memory resources, problems may arises with incoherent data, which is particularly the case with CPUs in a multiprocessing system.

Q-NO-3(d)

Practical Issues Peculiar to SSDs.

- SSD performance has a tendency to slow down as the devices is used.
- The entire block must be read from the flash memory and placed in a RAM buffer.
- Before the block can be written back to flash memory, the entire block or flash memory must be erased.
- The entire block from the buffer is now written back to flash memory.

Q-No-3(e)

CD Read and Write Operation..

CD-RW (Compact Disc-Rewritable) is a digital optical disc storage format introduced in 1997. CD-RW Compact discs (CD-RWs) can be written, read, erased and re-written.

CD-RWs, as opposed to CDs, require specialized readers that have sensitive laser optics. Consequently, CD-RWs cannot be read in many CD readers built prior to the introduction of CD-RW.

Q-No-4(a)

Ans.. In our example

Suppose 95% of the memory access are found in level 1. Then average time to access a word can expressed as.

$$(0.95)(0.01\ \mu s) + (0.5)(0.01\ \mu s + 0.1\ \mu s) =$$

$$0.095 + 0.0055 = 0.015\ \mu s$$

The average access time is much closer to 0.01 ms than to 0.1 ms, as derived.

Q-NO-4(b)

Total block in the cache = 8kbytes/16bytes
$= 2^3 \times 2^{10} / 2^4 = 2^9 = 512$
Number of set = number of block in cache/2

Number of Set = 512/2
Number of Set in cache = 256
Number of Set in cache = 2^8
Number of Set = 8
Size of block = 16 = 2^4
Size of memory = $2^6 \times 2^{20} = 2^6$
Tag = size of memory - size of block
Tag = 26 - 8 - 4
Tag = 14

tag	Set	Size of block
14	8	4

Q.No-4(c)

Ans :-

Sol :-

$M = 8$

$2^k - 1 >= k + m$

$2^4 - 1 >= 4 + 8$

$15 >= 12$

1	2	3	4	5	6	7	8	9	10	11	12
1	0	1	1	1	0	0	1	0	0	1	0

The check bits are in a bit numbers 1, 2, 4 & 8

Check bit 8 calculated by values in bit numbers 9, 10, 11, and 12.

check bit 4 calculated by values in bit numbers 5, 6, 7 and 12.

check bit 2 calculated by values in bit numbers 3, 6, 7, 10 and 11.

check bit 1 calculated by values in bit numbers : 3, 5, 7, 9, 10 and 11

Thus, the check bits are left.

Q-NO-4(d)

Sol:-

7200 revolution in 60 sec
1 revolution in 60/7200 or
1 revolution in 6ms
1 revolution = Covering one entire track = 500 sectors

500 sectors = 6ms
1 sector = 8 microsecond

Now there are 2 different things

(i) 2500 sectors so time = 2500 x 8ms = 20ms

(ii) 1.28 MB = 1342177028 Bytes or
2621.44 sectors = 2622 sectors = 20.976 ms

Total time case:

Case (1) 4+2+20 = 26ms
Case (2) 4+2+20.976 = 26.976ms