

Date: / /

Final Assignments

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Date

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Q No 1

(A) Word: The natural unit of organization of memory. The size of word is typically equal to the number of bits used to represent an integer and to the instruction length.

Addressable unit: In some systems the addressable unit is the word. However many systems allow addressing at the byte level. In case $2A = N$

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.

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(B) LFRU: Least frequent recently used
 The (LFRU) (11) cache replacement
 Scheme combine the benefit of
 LFCU and LRU Scheme. LFRU
 is suitable for in network cache
 application such as information
 Centre networking (ICN) content
 delivery networks (CDN) and
 distributed network in general.
 In LFRU the cache is divided
 into two partitions called privileged
 and unprivileged partition.
 The privileged partition can be
 defined as a protected partition
 if content is highly popular.
 it is pushed into the privileged
 partition. Replacement of the privileged
 partition is done as follows.

The basic idea is to filter out the
 locally popular contents with LFRU
 Scheme and push the popular contents
 to one of the privileged partitions.

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part c)

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How read and write operation are performed in SRAM cell?

Read operation:

In SRAM for any operation to be performed the word line should be strobed to perform.

read operation initially

write operation:

consider the memory bit consists of $Q=0$ and $Q=1$.

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Q No 1

(D) Here only 4 bits are read/write to this DRAM there must be multiple DRAMs connected to the memory controller to read/write a word of data to the bus.

~~operation~~ A Simple

All the DRAM require a refresh operation. A Simple techniques for refreshing is in effect, to disable

the DRAM chip while all data cells are refreshed the refresh counter steps through all of the row values this cause each cell in row to be refreshed.

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(e) The DVD greater capacity is due to three difference from CD's.

(1) The DVD employ a spiral layer of pits and lands on top of the first layer.

A dual layer or Top by the reflective layer and by adjacenting focus the lasers in DVD device can read each layer respectively.

(2) Bits are present more closely in a DVD. The spacing between loops of a small spiral on a CD is $1.6 \mu\text{m}$ and the minimum distance between pits along the spiral is $0.834 \mu\text{m}$.

(3) The DVD Rom can be two sides where as data are recorded on only one side a CD this brings optical capacity into upto 17 GB.

Ques 2 Differentiate of following Page 6

(A) EEPROM: EEPROM device can erase any byte of memory at any time.
EEPROM uses Nor type memory.
EEPROM is rewritable.

Flash memory: Flash memory can only erase an entire chunk or sector of memory units at a time.
Flash uses NAND type memory.

(B) Hard failure and soft error.

A hard failure is a permanent physical defect so that the memory cell or cell affected cannot reliably store data but become stuck at 0 or 1.

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Soft errors:- Soft error is a random, non-destructive event that alters the contents of one or more memory cells without damaging the memory. Soft error can be caused by power supply problems or alpha particles.

(c) Read write Mechanism for magnetic Disk.

Reads:- information is retrieved from CD or CD-Rom by a low powered laser housed on optical disk player, or drive unit. The laser shines through the clear polycarbonate while a motor ~~shuts~~ spins the disk past it. If the laser beam falls on a pit, which has a somewhat rough surface,

Writes

Recall that on a magnetic disk, information is recorded in concentric tracks with the simplest constant angular velocity (CAV) system the number of bits per track is constant.

① parallel access and independent access RAID Schemes -
parallel access -

All member disks participate in the execution of every I/O request. Typically the spindles of the individual drives are synchronized so that each disk head is in the same position.

Independent access -

Each member disk operates independently so that separate I/O requests can be satisfied in parallel.

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② HD DVD and Blue Ray DVDs

HD DVD player have been much cheaper small then Blue Ray machines but Blue-ray discs have more storage space and more advanced protections against piracy

Blue-ray has 25 GB capacity (50 GB for dual layer) and is more expensive

HD DVD has 15 GB (30 GB for dual layer) and is cheaper than Blue-ray.

Q no 3 write Note shorts

①

Memory access Methods:

Each memory type is a collection of ~~number~~ numerous memory location. To access data from any memory, first it must be located and then the data is read from the memory location. also have some Methods like:

① Random access: in which each memory location has a unique address.

② Direct access: in which information stored in tracks

③ Sequenton access: This method allow memory access in a sequent or in order

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(B) principle of locality:

In computer science locality or reference also known as the principle of locality is the tendency of a processor to access the same set of the memory locations repeatedly over a short period of time.

Temporal locality refers to the reuse of specific data and/or resources within a relatively small time duration.

(C) possible approaches to cache coherence

In computer architecture cache coherence is the uniformity of shared resource data that's ends up stored in multiple local address caches. when clients in a system maintain caches of a common memory resource.

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① practical issues peculiar to SSDs

There are two type of issues

① SSD performance has a tendency to slow down as the device is used.

• The entire block must be read from the flash memory and placed in a Ram buffer.

② Flash memory becomes unusable after a certain number of writes.

Techniques for prolonging life front ending the flash with a cache to delay and group writes operations

• Bad block management techniques

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(c) CD Read and write operation:

Normal CD can't be modified they are read only device. A CD-R disc needs to allow the drive to write data onto the disk. For a CD-R disk to work there must be a way for a laser to create a non-reflective area on the disk. A CD-R disk therefore has an extra layer that the laser can modify.

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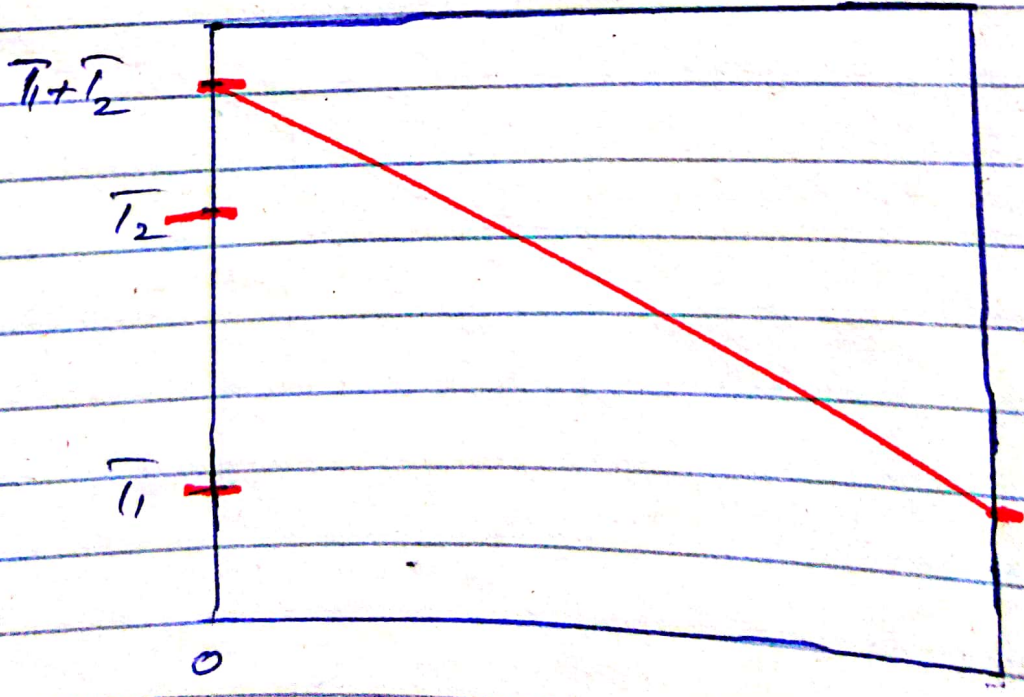
Q no 4

(A)

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

$$(0.95)(0.01 \mu s) + (0.05)(0.01 \mu s + 0.1 \mu s) =$$
$$= 0.0095 + 0.0055 = 0.015 \mu s$$

So the average access time is much closer to 0.01 μs the 0.1 μs as desired



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(B) Main Memory address

2 9F3A7C4

10011111001101011101100

Tag	Set	word
10011110	011010111011	00

9 bits

15 bits

2 bit.

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(c)

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Solution.

$$m = 8$$

$$2^k - 1 \geq k + m$$

$$2^4 - 1 \geq 4 + 8$$

$$15 \geq 12$$

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 bit are in a bit numbers

1, 2, 4, 6, 8

check bit 8 calculated by value
in bit number 9, 10, 11 and 12

check bit 4 calculated by value
in bit number 5, 6, 7 and 12

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

check bit 1 calculated by value in bit
number 3, 5, 7, 9, 10, and 11

Thus the check bits are

1011

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Q4

①

7200 revolution in 60 Sec
 1 revolution in $60/7200$ or
 1 revolution in 60 ms
 1 revolution = covering one entire
 1 track = 500 sectors.

500 Sector = 6ms

1 Sector = 8 micro Second

Now there are 2 different things

① 2500 Sectors so time = $2500 \times 8 \text{ms} = 20 \text{ms}$

2) 1.28 MB = 1342177088 bytes or

2621.44 Sector = 2622 Sector =

20.976 ms

Total time case

Case ① $4 + 2 + 20 = 26 \text{ms}$ Case ② $4 + 2 + 20.976 = 26.976 \text{ms}$