

Activity – Main Memory and Mass Storage

Activity One – Understanding Main Memory

1. Assume that the memory cell whose address is 5 contains the value 8 (0x08).

- What will happen if you write the value 5 into memory cell 6?

The value 0x05 will be in memory cell 6.

- What will happen if you move the contents of memory cell 5 into memory cell 6?

The value 0x08 will be in memory cell 6.

2. Suppose you want to interchange the values stored in memory cells 2 and 3. What is wrong with this algorithm to do that?

- Move the contents of cell number 2 to cell number 3.
- Move the contents of cell number 3 to cell number 2.

The contents of memory cell 3 will be lost in the process. Step one overwrites the original contents with what is in memory cell 2. Step two then becomes redundant as cells 2 and 3 have the same value at that point.

3. How many bits would be in the memory of a computer with 4KB of RAM?

$$10^{10} = 1024 * 4 = 4096 \text{ Bytes} * 8 = 32,768 \text{ bits}$$

4. The following table represents the addresses and contents (using hexadecimal notation) of some cells in the machine's main memory. Starting with this memory arrangement, follow the sequence of instructions and record the final contents of each of these memory cells.

Address	Contents	End
0x00	0xAB	0x02
0x01	0x53	0x53
0x02	0xD6	0x01
0x03	0x02	0x53

- Step1: Move the contents of the cell whose address is 0x03 to the cell at address 0x00.
- Step2: Move the value 0x01 into the cell at address 0x02.
- Step3: Move the value stored at address 0x01 into the cell at address 0x03.

5. How many cells can be in a computer's main memory if each cell's address can be represented by two hexadecimal digits? What if four hexadecimal digits are used?

$$16 * 16 = 256$$

$$16 * 16 * 16 * 16 = 65,536$$

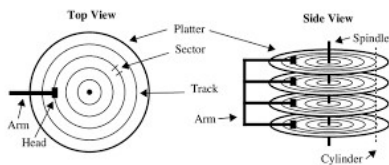
Activity Two – Types of Memory

1. Magnetic HDs have three main performance values that are measured
 - Seek time
 - Rotational Delay
 - Transfer Rate

If you doubled the rotational speed of a magnetic HD which one(s) of those three values will change?

Rotational Delay and Transfer Rate

2. Most magnetic hard drives consist of multiple, parallel platters as illustrated below. If the computer is writing a large sized file does it make more sense to write the file on one platter or divide it among multiple platters? Why?



Divide among multiple platters. That is, write one cylinder in its entirety before moving to the next cylinder/ring. This is because there is a time cost to switching to new cylinders/rings but no time cost when switching from platter to platter.

3. Magnetic hard drives are rapidly being replaced by solid state drives. What are the advantages of SSD over magnetic drives (alternately, what are the disadvantages of magnetic drives over SSD?)

You can talk about several issues including speed, reliability, durability, power efficiency, size, noise, fragmentation, etc.

The chief disadvantages are cost and limited numbers of read/write cycles.

4. Consider the following memory types. For each of these, would it be appropriate storing inventory data for an individual Hy-Vee store? Why or why not?
 - Magnetic hard drive
 - CD
 - DVD
 - Flash memory
 - SSD

Magnetic HD, Flash, and SSD all would be appropriate and have their own advantages. CD and DVD are problematic due to speed, memory, physical size, and the progression towards being obsolete.

5. Consider the memory listed in the previous problem. For each of these, would it be appropriate storing the works of William Shakespeare? Why or why not?

All are fine here. CD and DVD no longer suffer from storage size (memory) limitations.