Social Science Computing Department — Faculty of Economics and Political Science
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SSC. 151
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Solution Key to Problem Set 3

1. MULTIPLE CHOICES (MCQs)

1)
Storage system can be located inside the system unit, i.e. _____, or located outside the system unit, i.e._____.

- device, medium
- internal, external
- RAM, ROM
- volatile, non-volatile

2)
Fill-in the appropriate storage capacity of each of the following media:

- Floppy Disk ____ [1.44MB, 240MB , 650MB, 750 MB, 4.7GB, 25GB, 15GB]
- SuperDisk ____ [1.44MB, 240MB , 650MB, 750 MB, 4.7GB, 25GB, 15GB]
- CD-R ____ [1.44MB, 240MB , 650MB, 750 MB, 4.7GB, 25GB, 15GB]
- Zip Disk ____ [1.44MB, 240MB , 650MB, 750 MB, 4.7GB, 25GB, 15GB]
- Typical DVD-R ____ [1.44MB, 240MB , 650MB, 750 MB, 4.7GB, 25GB, 15GB]
- Blue-ray Disk ____ [1.44MB, 240MB , 650MB, 750 MB, 4.7GB, 25GB, 15GB]
- HD-DVD ____ [1.44MB, 240MB , 650MB, 750 MB, 4.7GB, 25GB, 15GB]

3)
The circular rings on a magnetic disk on which data is stored are called _____.

- tracks
- sectors
- clusters
- pits

4)
A _____ consists of the collection of tracks located in the same location on a set of hard disk surfaces.

- cartridge
- sector
- cluster
- cylinder

5)
A_____ is a high-performance storage server individually connected to a network to provide storage for computers on that network.
- network attached storage (NAS)
- storage area network (SAN)
- RAID
- Cylinder

6)
EIDE is
- a high-capacity magnetic storage medium.
- a rewritable optical storage medium.
- a hard drive standard.
- all of the above.

7)
Disk access time is influenced by:
- seek time
- rotational delay
- data movement time
- All of the above

8)
One of the reasons for partitioning a hard drive is to :
- be able to use different operating systems.
- increase RAM.
- make circuits closer.
- all of the above

9)
All of the following is true about smart card, except:
- It is credit-card-sized piece of plastic that contains some type of computer circuitry.
- It holds less than a few gigabytes of data.
- It is commonly used to store prepaid amounts of digital cash or personal information.
- Smart card readers are attached to a PC or built into a cell phone, keyboard, or other device.

10)
In addition to speed and expense, the factors to consider when comparing storage alternatives also include

- portability
- storage capacity
- compatibility
- all of the above

2. TRUE OR FALSE (T / F)

1)
Storage devices are identified by names and/or letters (e.g. “C” for first hard drive).

True False

2)
The difference between random access and sequential access is in the order in which data can be retrieved.

True False

3)
Logical file representation refers to the actual physical way the data is stored on the storage media as viewed by the computer.

True False

4)
A CD-R disc can be written to and rewritten, similar to a magnetic floppy disk.

True False

5)
In optical disc systems, data is stored using Laser beams on a single continuous spiral track from the center of the disk outward.

True False

6)
RAID is used for increased performance and/or fault tolerance.

True False

7)
Holographic storage uses blue-laser beams to store data in 3D and can have 300 GB per cartridge.

True False

3. QUESTIONS

a) Compare between magnetic and optical storage systems. Give examples of each.

A storage system involves two physical parts: (1) a storage device and (2) a storage medium. The magnetic storage system uses magnetic disks, which are the most widely used storage medium in computers today. Data is stored on tracks over many sectors by magnetizing particles on the surface of the storage medium. Two common types are Floppy disk that has a 1.44 MB of storage capacity and Hard disk which could be fixed or removable with large storage capacity.
Magnetic disk storage systems also include zip disk system with storage capacity of 750 MB and SuperDisk system with storage capacity of 240 MB.

The optical storage system uses Laser beams to write and read data packed at very tight storage densities, many times finer than that of a typical magnetic storage medium. Data is stored optically on a continuous spiral track from the center of the disk outward. Two common types are CDs and DVDs, both use the red laser beam and typically have storage capacity of 650 MB and 4.7 GB, respectively. Blue Laser Disk (BD) is an emerging technology and has larger storage capacity of 25GB per disk. More recently, Holographic storage system uses blue-laser beams to store data in 3D, i.e. in layers within the depth of the storage medium, and can hold 300 GB per cartridge. Some optical media can only be written but data can not be erased, e.g. CD-R and DVD-R, while others such as CD-RW and DVD-RW, are re-writable similar to magnetic storage media.

b) What is RAID? What it is used for?

RAID stands for **R**edundant **A**rrays of **I**ndependent **D**isks, is a storage system commonly used for large computer systems (e.g. mid range servers ad mainframes) as well as networks. **RAID** uses several small hard disks in parallel to do the job of a high-capacity disk. It is designed in various levels. In particular, **RAID Level 0** can improve

performance by stripping, i.e. splitting data storage into several disks while **RAID Level 1** provides for fault-tolerance by mirroring, i.e. storing the data to two duplicate drives simultaneously. If a fault, such as unexpected crash of one storage system, occurred, RAID **level 1** will provide tolerance by instantly switching to another duplicate drive without loss of any data or service. RAID Levels beyond **Level 1** uses combination of stripping and mirroring.

c) Discuss briefly the meaning of "logical file representation" as compared to "physical file representation.

Logical file representation refers to the user's view of the way data is stored (filename, sub-folders, folders, etc.) on a particular drive. Users see a particular document file stored in a particular folder, on a particular drive with name (such as C). So we have

Drive name\folder names\file name

Physical file representation refers to the actual physical way the data is stored (magnetically, optically, etc.) on the storage media as viewed by the computer in tracks and sectors etc. The content of a file could be physically stored in many different pieces scatted across the hard drive. The computer keeps track of the various physical locations as well as the logical representation to identify that file.

d) What are the main factors to consider when comparing among storage alternatives?

Storage alternatives are often compared by weighting various factors. The main factors to consider when comparing among storage alternatives include:

1. Speed
2. Expense (per unit of storage, e,g, MB)
3. Portability
4. Storage capacity
5. Compatibility
6. Ease of use.

Thus, each storage alternative typically involves trade-offs. For instance, most storage systems with removable media are slower than those with fixed media and internal devices are typically faster than external devices. While cost is not often the most compelling reason to choose a particular technology, the introduction of holographic storage to store data in 3D with $ 18000 for the drive and $ 180 for each 300 GB cartridge brings cost back into perspective. Moreover, selecting the appropriate storage technology involves which devices or media are most appropriate to personal or business situation.