Chapter 7 Answers

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| **Num** | **Multiple Choice Answers (Book)** | **Matching Answers (Book)** |
| 1 | A | E |
| 2 | B | I |
| 3 | A | J |
| 4 | A | F |
| 5 | A | B |
| 6 | C | A |
| 7 | A | C |
| 8 | A | G |
| 9 | C | D |
| 10 | C | H |

**Open Ended Questions:**

1. **Compare primary storage and secondary storage and discuss the most important characteristics of secondary storage.**

Storage is the ability to save, to back up and even to transport files consisting of data or programs from one location or computer to another.

* **Primary storage** - Random-access memory (RAM) holds or stores data and programs that the CPU is currently processing. RAM is sometimes referred to as primary storage. Unfortunately, most RAM provides only temporary or volatile storage – its contents are lost as soon as there is no electrical current going into the system.
* **Secondary storage** provides permanent or nonvolatile storage. Using secondary storage devices, data and programs can be retained after the computer has been shut off.
* Important characteristics of secondary storage
  + **Media** - are the actual physical material that holds the data and programs.
  + **Capacity -** measures how much a particular storage medium can hold.
  + **Storage** **devices** - are hardware that reads data and programs from storage media. Most also write to storage media.
  + **Access speed** or access time - measures the amount of time required by the storage device to retrieve data and programs.

1. **Discuss hard disks including density, platters, tracks, sectors, cylinders, head crashes, internal, external, and performance enhancements.**

* Hard disks save files by altering the magnetic charges of the disk’s surface to represent 1s and 0s. Hard disks retrieve data and programs by reading the charges from the magnetic disk.
  + **Density** - refers to how tightly these charges can be packed next to one another on the disk.
  + **Platters** - Rigid metallic platters that are stacked one on top of another.
  + Store and organize files using tracks, sectors, and cylinders.
    - **Tracks** are rings of concentric circles without visible grooves.
    - **Sectors** - Each track is divided into wedge-shaped sections called sectors.
    - **Cylinders** - A cylinder runs through each track of a stack of platters. Cylinders are necessary to differentiate files stored on the same track and sector of different platters.
  + **Head crash** - A head crash occurs when a read/write head makes contact with the hard disk’s surface or with particles on its surface.
  + Two basic types of hard disks:
    - **Internal hard disk (fixed disk)** 
      * Located inside the system unit.
      * Almost all of today’s powerful applications are designed to be stored on and run from an internal hard disk. To ensure adequate performance of your internal hard disk, you should perform routine maintenance and periodically make backup copies of all important files.
    - **External hard drives**
      * Typically connect to a USB or FireWire port on the system unit, are easily removed, and effectively provide an unlimited amount of storage.
      * Use the same basic technology as internal hard disks and are used primarily to complement an internal hard disk.
  + **Performance Enhancements** - Three ways to improve the performance of hard disks are:
    - 1. Disk caching
* Improves hard-disk performance by anticipating data needs.
* Improves processing by acting as a temporary high-speed holding area between a secondary storage device and the CPU.
* Requires a combination of hardware and software.
* Frequently used data is read from the hard disk into disk (cache). When needed, the data is then accessed directly from memory.
* The transfer rate from memory is much faster
* Increases system performance by 30 percent
  + - 1. Redundant arrays of inexpensive disks (RAID)
* Improves performance by expanding external storage, improving access speed, and providing reliable storage.
* Several inexpensive hard-disk drives are connected to one another. These connections can be by a network or within specialized RAID devices.
* The computer system interacts with the RAID system as though it were a single large-capacity hard-disk drive.
* The result is expanded storage capability, fast access speed, and high reliability.
  + - 1. File compression and file decompression
* Increase storage capacity by reducing the amount of space required to store data and programs.
* File compression is not limited to hard disks systems.
* File compression helps speed up transmission of files from one computer system to another.
* File compression programs scans files for ways to reduce the amount of required storage.
* In file compression repeated patterns are replaced with a token, leaving enough tokens so that the original can be rebuilt or decompressed.
* File compression programs often shrink files to a quarter of their original size.
* Can be done with Windows and Mac utilities and special utilities such as WinZip

1. **Discuss optical discs including pits, lands, CDs, DVDs, Blue-ray, and hi def.**

* **Optical Discs**
* Can hold over 128 gigabytes of data.
* A laser beam alters the surface of a plastic or metallic disc to represent data. Optical discs use reflective light to represent data.
* **Pits and lands**: The 1s and 0s are represented by flat areas called lands and bumpy areas called pits on the disc surface.
* Disc is read by an optical disc drive using a laser that projects a tiny beam of light on these areas. The amount of reflected light determines whether the area represents a 1 or a 0.
* Optical discs typically use a single track that spirals toward the center of the disk. This single track is divided into equally sized sectors.

**Compact Disc (CD)** –

* Store 700 MB (megabytes) on one side of a CD.
* Three basic types of CDs:
  + Read only—CD-ROM - cannot be written on or erased by the user.
  + Write once—CD-R - can be written to once.
  + Rewriteable—CD-RW – can be written to many times.

**Digital Versatile Disc (DVD)**

* DVD stands for digital versatile disc or digital video disc
* Can store 4.7 GB (gigabytes) on one side of a DVD disc
* Capacity is 7 times that of a CD.
* Three basic types of DVDs:
  + Read only—DVD-ROM - cannot be written on or erased by the user.
  + Write once— DVD+R, DVD-R - can be written to once.
  + Rewriteable— DVD+RW, DVD-RW, DVD-RAM – can be written to many times.

**Blu-ray Disc (BD)**

* Have a greater capacity than DVDs.
* Next generation of optical disc is called hi def (high definition)
* The hi definition standard is Blu-ray Disc (BD).
* Blu-ray discs have a capacity of 50 GB on one side.
* Capacity is 10 times that of a standard DVD.
* Three basic types of Blu-ray:
  + Read only—BD - cannot be written on or erased by the user.
  + Write once—BD - can be written to once.
  + Rewriteable—BD – can be written to many times.

1. **Discuss solid-state storage, including solid-state drives, flash memory, and USB drives.**

**Solid-state drives** are designed to be connected inside a microcomputer system the same way an internal hard disk would be but contain solid-state memory instead of magnetic disks to store data, as with hard disks.

* **Solid State Storage** 
  + Solid state devices have no moving parts
  + Data and information are stored and retrieved electronically
* **Solid-State Drives (SSDs)**
  + Designed to be connected inside a micro computer system.
  + Contain solid-state memory instead of magnetic disks to store data.
  + Faster and more durable than hard disks.
  + Require less power
  + More expensive and generally have a lower capacity than hard disks
  + Widely used for tablets, such as the iPad.
* **Flash Memory Cards**
  + Credit card–sized solid-state storage devices widely used in portable devices.
  + Some of the cards are used within devices such as smartphones, digital media players, and GPS navigation systems. Other cards provide removable storage.
* **USB drives**
  + Connect directly to a computer’s USB port to transfer files.
  + Can have capacities ranging from 1 GB to 256 GB
  + Convenient size and large capacities, make USB devices very popular for transporting data and information between computers, specialty devices, and the Internet.

1. **Discuss cloud computing and cloud storage.**

* **Cloud Computing**
  + Many applications that would have required installation on your computer to run have moved to the Web. Web sites provide application services. This is known as cloud computing, where the Internet acts as a “cloud” of servers that supply applications to clients as a service, rather than a product.
* **Cloud Storage**
  + Servers provide cloud storage, also known as online storage.
  + No installation on local computer, only need Internet ready device to access applications and data.

1. **Describe mass storage devices including enterprise storage systems, file servers, network attached storage, RAID systems, organizational cloud storage, and storage area network systems.**

* **Mass storage** refers to the tremendous amount of secondary storage required by large organizations.
* **Mass storage devices are** specialized high-capacity secondary storage devices designed to meet organizational demands for data.
  + **Enterprise Storage Systems** are used to promote efficient and safe use of data across organizational networks within their organizations. Some mass storage devices that support this strategy include:
    - **File servers**—dedicated computers with very large storage capacities that provide users access to fast storage and retrieval of data.
    - **Network attached storage (NAS) –** similar to a file server except simpler and less expensive; widely used for home and small business storage needs.
    - **RAID systems**—larger versions of the specialized storage devices that enhance organizational security by constantly making backup copies of files moving across the organization’s networks.
    - **Organizational cloud storage -** high-speed Internet connection to a dedicated remote organizational Internet drive site.
  + **Storage Area Network (SAN)**
    - Architecture to link remote computer storage devices, such as enterprise storage systems, to computers such that the devices are as available as locally attached drives.
    - In a SAN system, the user’s computer provides the file system for storing data, but the SAN provides the disk space for data.
    - Key to a SAN is:
      * High-speed network, connecting individual computers to mass storage devices.
      * Special file systems prevent simultaneous users from interfering with each other.
      * Provide the ability to house data in remote locations and still allow efficient and secure access.