Chapter 2.1

Storage Devices

Aim

To equip students with the basic understanding on types of storage devices, various forms of storage media and devices that play a crucial role in forensics investigation

Instructional Objectives

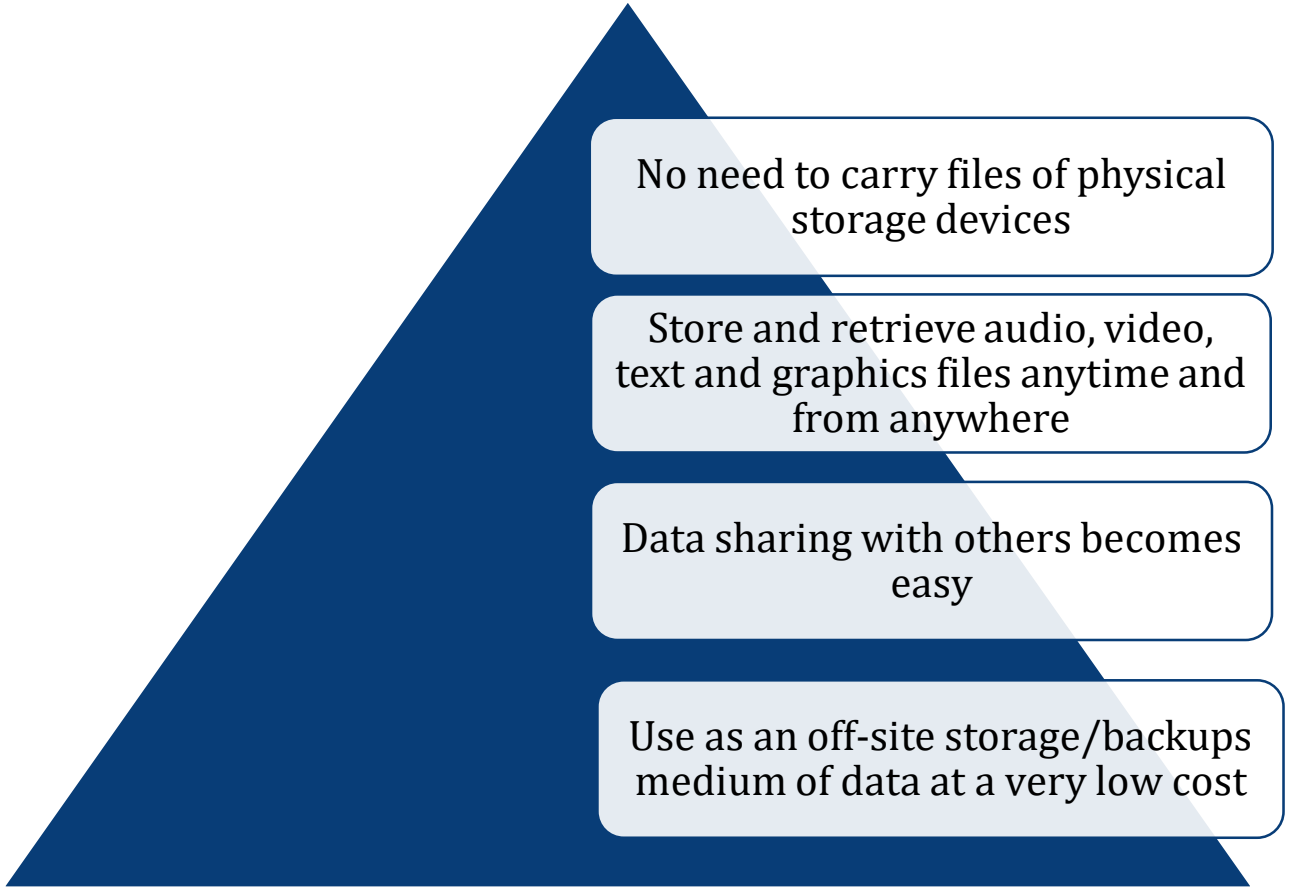
After completing this chapter, you should be able to:

- Explain the various storage devices with an example
- Explain the working of storage devices
- Explain on File conversion and number formatting concepts
- Elaborate on the windows registry and boot process
- Compare hard disk drive and removable memory

Types of Storage Media Devices

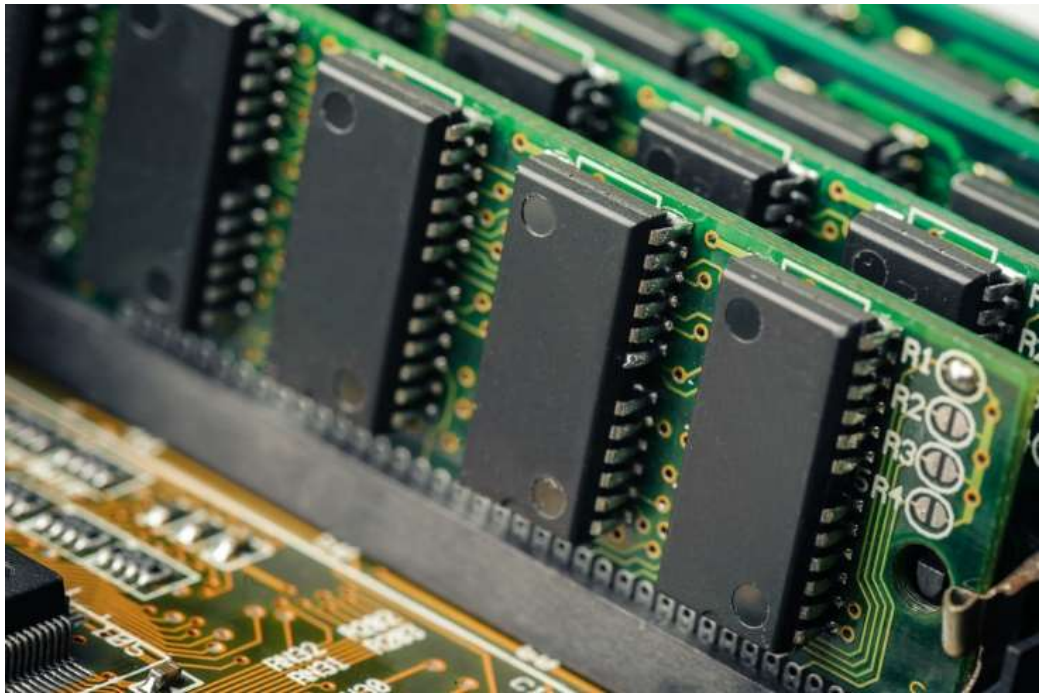
Cloud Based Storage

Advantages



Random Access Memory

RAM is a very fast and volatile storage media as the data within will be lost when powered off.



Random Access Memory

Magnetic Medium

Magnetic storage devices uses different encoding patterns of magnetization on a specific magnetic material to store data.

Hard disc

Floppy Disc

Tape drives

Magnetic stripes

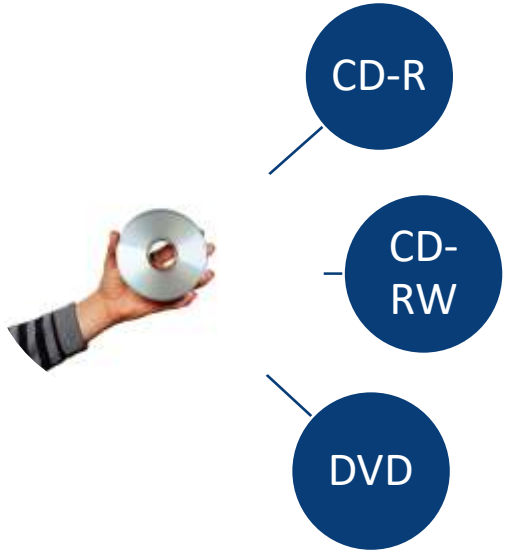
Example : Magnetic Storage Media

Tape drives

Contains a magnetically-coated plastic ribbon and is capable of storing large volume of data at a low cost

Optical Medium

Optical storage medias are basically plastic discs which contains data similar to magnetic disc in the form of 0’s and 1’s.



Examples.1 for compact discs

Example 2. Blu-ray Disc

Difference between CD-ROMs, CD-RWs and DVD-ROMs, DVD-RW, Blu-ray

Disc/Feature	CD-R	CD-RW	DVD-R	DVD-RW
Write	One time	Many times	One time	Many times
Capacity	700MB	4.7GB	4.7-17 GB	4.7-17 GB
Data Transfer Rate(1x=150KB/s) : based on 1x speed	0.15MB/s	1.32 MB/s	1.32 MB/s	1.32 MB/s
Full read Time(minutes)	80 min	80 min	57 min	57 min

Quiz / Assessment

1) _____ medias are basically plastic discs which contains data similar to magnetic disc in the form of 0's and 1's.

a) Optical storage

b) Octal storage

c) Track

d) Clusters

Quiz / Assessment

2) _____ storage devices uses different encoding patterns of magnetization on a specific magnetic material to store data.

a) Optical
b) Magnetic
c) Hard drive
d) USB

Quiz / Assessment

3) RAM is a very fast and volatile storage media as the data within will be lost when powered off. State true or false.

a) True

b) False

Working of Storage Devices

Working of Storage Devices

Platters

Head Assembly

Spindle Motor

Quiz / Assessment

1) The _____ are the actual disk in the drive that stores the magnetized data with the help of heads.

a) Tracks

b) Optical

c) Magnetic

d) Platter

Quiz / Assessment

2) Each _____is broken up into smaller areas called sectors.

a) Track

b) Headers

c) Read/write heads

d) Sector

Quiz / Assessment

3) The precision of the spindle motors determine the capacity. State true or false.

a) True

b) False

File Conversion and Numbering Formats

Number Systems

Following are the number system used in file conversion and numbering format:

- **Binary number system**
- **Octal number system**
- **Decimal number system**
- **Hexadecimal number system**

Quiz / Assessment

1) Octal number system uses _____ digits.

a) 0-8

b) 0-7

c) 1-8

d) 1-7

Quiz / Assessment

2) The base of _____ number system is 10.

a) Decimal

b) Octal

c) Binary

d) Hexagon

Quiz / Assessment

3) In binary number system _____ digits are used.

a) 0 and 1

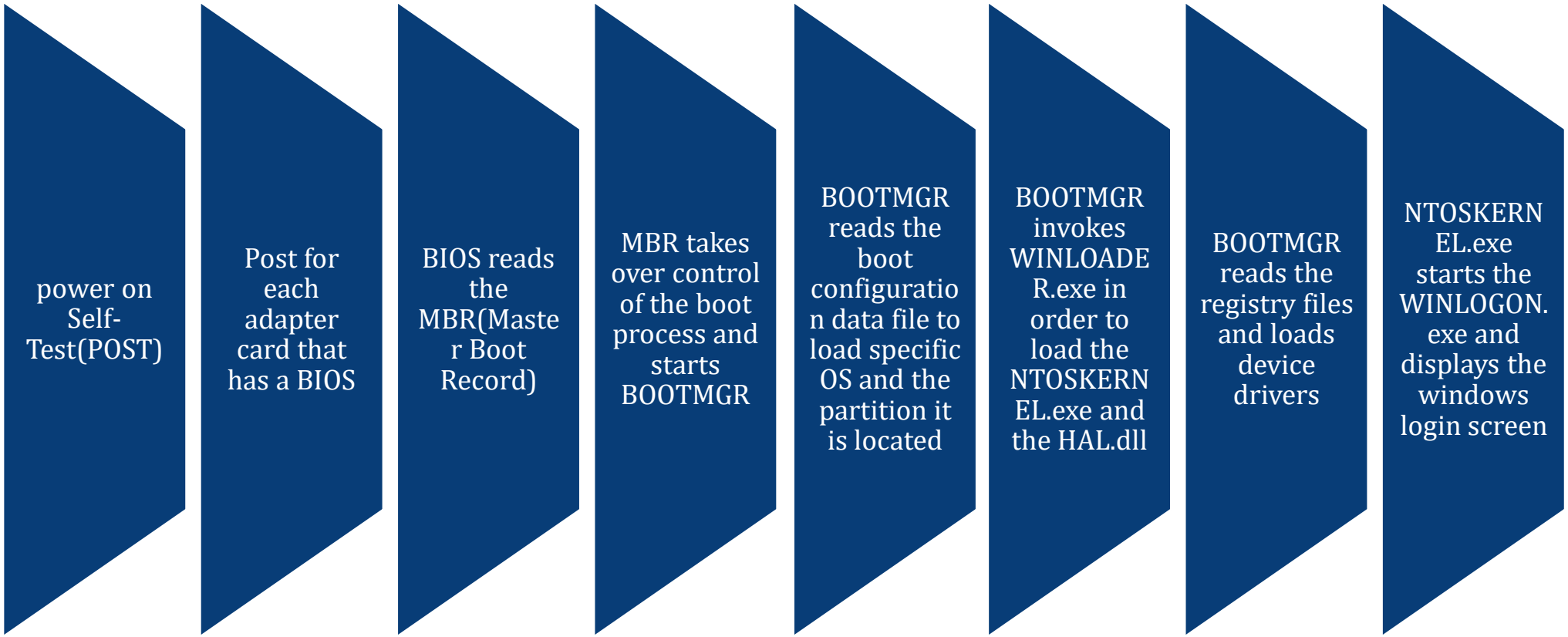
b) 10 and 2

c) 0 and 0

d) 2 and 4

Windows Registry and Boot Process

Demonstrate the Boot Process



Quiz / Assessment

1) _____ invokes WINLOADER.exe in order to load the NTOSKERNEL.exe and the HAL.dll.

a) BOOTMGR

b) SICON

c) MBR

d) BIOS

Quiz / Assessment

2) Windows registry contains _____.

a) Hives

b) Data

c) Key

d) Sub-keys

Quiz / Assessment

3) Windows registry can be edited using _____.

a) Regedit.exe

b) Notepad

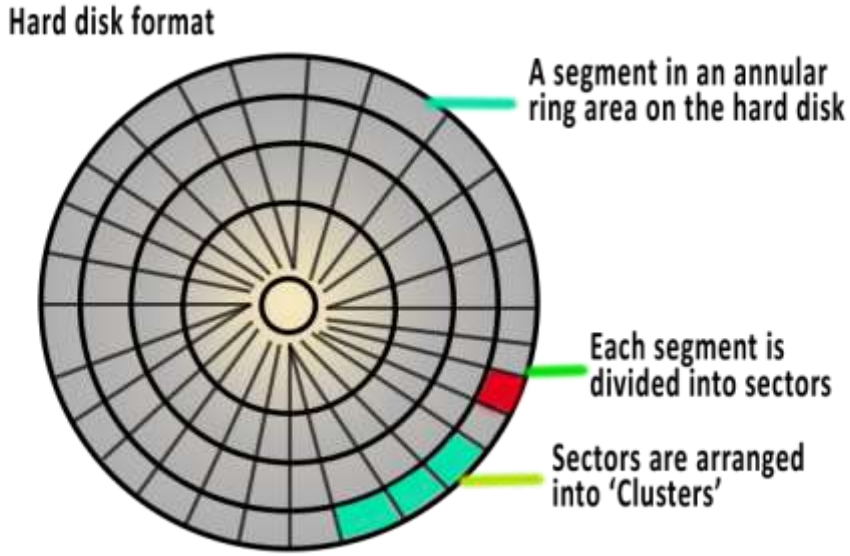
c) Ms config

d) NTOSKERNEL.dll

Hard disk drives and removable memory

Hard Disk Drive

Hard disks are a non-volatile storage device, and are the most common type of storage device found on most of the computer.



Structure of a Hard Drive

Quiz / Assessment

1) A collection of_____ are usually called Clusters.

a) Tracks

b) Sectors

c) Discs

d) Platters

Quiz / Assessment

2) Each _____ is divided into multiple concentric circles, usually known as tracks as described below on the image.

a) Platter

b) Sector

c) Clusters

d) Tracks

Quiz / Assessment

3) The _____ is a thin magnetic material coating on top of the platter on both sides, where the actual data is stored.

a) Media layer

b) Concentric layer

c) CD-layer

d) Track layer

Activity

Online/Offline

Online Activity
(30 min)

- Description: Write an assignment on the following topics
- Difference between storage and memory
- Purpose of disk storage
- Windows Booting process
- Working of various storage devices

Note: Refer Table of Content for the activities

Summary

- ✓ Storage devices or storage media are integral part of modern computer devices and are used to store various forms of data namely: texts, numbers, music files, video files, images and much more.
- ✓ Today most businesses depend on computer networks and internet. The different types of storage devices are magnetic medium, Non-magnetic medium and Optical medium.
- ✓ There are various types of storage devices, including primary, secondary storage devices including their working, capabilities and limitations.
- ✓ The different kinds of media devices, number system used in computers to process internal data are namely, binary, octal, decimal, hexadecimal etc.
- ✓ The windows boot process and system restore function are mainly used to restore previous system state during various system malfunction.

e-References

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- *Blu-ray Information*. (2016). *Cd-info.com*. Retrieved 29 June 2016, from http://www.cd-info.com/blu-ray/

- *Number System in computer*. (2013). *Byte-Notes | Computer Science learning platform*. Retrieved 29 June 2016, from http://www.byte-notes.com/number-system-computer

- *Windows 7 Registry Forensics: Part 6*. (2012). *Forensic Magazine*. Retrieved 29 June 2016, from http://www.forensicmag.com/articles/2012/08/windows-7-registry-forensics-part-6

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External Resources

1. Hayes, D. D. (2005) *A Practical Guide to Computer Forensics Investigations.* US: Pearson Education, Inc.

2. Nelson, B., Phillips*, A.,* & Steuart, C. (2010) *Guide to Computer Forensics and Investigations (4 ed.)*. USA: Cengage Learning.

3. Philipp, A., Cowen, D., &Davis, C. (2010) *Hacking Exposed Computer Forensics (2 ed.).* New York: McGraw-Hill.