

3 Storage devices

Unit	page
10 Magnetic storage	48
11 Optical storage	52
12 Flash memory	57

Learning objectives

In this module, you will:

- learn about different types of magnetic drive and disk.
- give instructions and advice on how to protect data.
- use technical vocabulary associated with optical storage devices and media.
- learn and use more discourse connectors.
- learn about the technical details of flash memory and its uses.
- learn different ways of making new words: affixation, conversion and compounding.
- describe flash-based devices.

1 Types of magnetic drive

A Look at the pictures and descriptions below and find the following.

- 1 the name of the hard drive on a PC platform
- 2 the type of hard drive that plugs into a socket at the back of a computer
- 3 the system that works in sequential format
- 4 the size and storage capacity of a floppy disk

A 3.5" floppy drive and diskette



A floppy disk drive uses 3.5" disks, which can store 1.44MB of data; it is usually assigned to the A: drive. Floppy drives are becoming increasingly rare.

The inside of a hard drive



Most PCs have one internal hard drive, usually called C: drive. It is used to store the operating system, the programs and the user's files in a convenient way. A hard drive can hold hundreds of gigabytes of data.

A portable external hard drive



External hard drives are connected to the USB or FireWire port of the computer. They can be as small as a wallet but can have as much capacity as internal drives; they are typically used for backup or as secondary storage.

Magnetic tapes and drive



A tape drive reads and writes data on tapes. It is sequential-access – i.e. to get to a particular point on the tape, it must go through all the preceding points. Tapes can hold hundreds of gigabytes of data and are used for data collection, backup and archiving.

B Complete these sentences with words from the box.

capacity storage archiving hold secondary

- 1 There are basically three types of magnetic _____ device available to the computer user – hard drives, diskettes and tapes.
- 2 The _____ of a 3.5" floppy disk is only 1.44MB.
- 3 Hard drives can _____ hundreds of times more data than floppy disks.
- 4 A portable hard drive is a good choice for _____ storage.
- 5 Magnetic tapes are used for _____ information that you no longer need to use regularly.

2 Buying a portable hard drive

A  Sue (see Unit 4) wants to buy a new drive. Listen to her conversation with the sales assistant. Does she buy anything?

B  Listen again and answer these questions.

- 1 What is the storage capacity of the Iomega eGo portable hard drive?
- 2 How much information can be stored on the Edge DiskGo model?
- 3 Which hard drive is good for mobile professionals?
- 4 How much does the Iomega eGo drive cost?
- 5 How much does the Edge DiskGo cost?



The Iomega eGo portable hard drive.

3 Magnetic storage

A Read the text and then identify a sector and a track in Fig. 1.

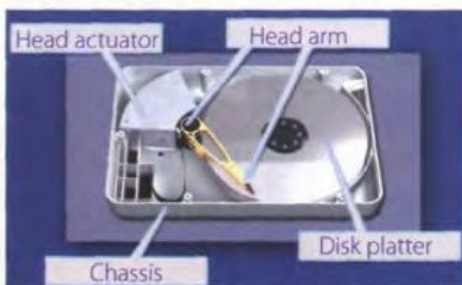
B Read the text again and decide whether these sentences are true or false. Correct the false ones.

- 1 A hard drive spins at the same speed as a floppy disk drive.
- 2 If you format a hard drive that has files on it, the files will be deleted.
- 3 Hard drives cannot be partitioned to run separate operating systems on the same disk.
- 4 *Seek time* and *transfer rate* mean the same thing.
- 5 Disk drives are not shock resistant, especially in operating mode.

Magnetic storage

Magnetic storage devices store data by magnetizing **particles** on a disk or tape.

A **floppy disk** is so called because it consists of a flexible sheet of plastic, coated with iron oxide – a magnetizable material. A floppy disk drive spins at 360 revolutions per minute (rpm), so it's relatively slow. However, a **hard drive** spins at over 7,200 rpm and stores data on a stack of metal rotating disks called **platters**. This means you can store much more data and retrieve information much faster.



The inside of a hard drive

New disks need to be **formatted** before you can use them, unless they come preformatted from the manufacturer. When the disk is formatted, the operating system (OS) organizes the disk surface into circular **tracks** and divides each track into **sectors**. The OS creates a **directory** which will record the specific location of files. When you save a file, the OS moves the **read/write head** of the drive towards empty sectors, records the data and writes an entry for the directory. Later on, when you open that file, the OS looks for its entry in the directory, moves the read/write heads to the correct sector, and reads the file in the RAM area. However, formatting erases any existing files on a disk, so do not format disks on which data that you don't want to lose is stored.



Fig. 1

The OS allows you to create one or more **partitions** on your hard drive, in effect dividing it into several logical parts. Partitions let you install more than one operating system (e.g. Windows and Linux) on your computer. You may also decide to split your hard drive because you want to store the OS and programs on one partition and your data files on another; this allows you to reinstall the OS when a problem occurs, without affecting the data partition.

The average time required for the read/write heads to move and find data is called **seek time** (or **access time**) and it is measured in milliseconds (ms); most hard drives have a seek time of 7 to 14 ms. Don't confuse this with **transfer rate** – the average speed required to transmit data from the disk to the CPU, measured in megabytes per second.



Toshiba's 1.8" hard drive; mini hard drives are used in small gadgets, such as PDAs and wristwatches

How to protect your hard drive

- Don't hit or move the computer while the hard drive is spinning. Hard drives are very sensitive to vibration and shocks, especially when they are operating; when the read/write head touches the rotating disk, it can scratch and damage the disk surface. This is known as **head crash**.
- You shouldn't turn your computer off and on quickly. Wait at least ten seconds to ensure that the drive has stopped spinning.
- Check your hard drive regularly for logical and physical errors. To check and repair a drive, you can use a disk diagnosis utility like Windows ScanDisk.
- To minimize the risk of data loss or corruption, you should install an up-to-date virus scanner. You should also **back up** your hard drive regularly.

C Match these words (1–5) with the definitions (a–e).

- | | |
|-------------------|--|
| 1 formatted | a a file system that defines the structure for keeping track of the files |
| 2 directory | b the part of a drive that reads and records data on a disk |
| 3 read/write head | c to make a copy of data or software in case the original disk is damaged |
| 4 head crash | d initialized; when the tracks and sectors on magnetic disks are set |
| 5 back up | e a serious disk malfunction; when the read/write head touches the rotating disk |

4 Language work: precautions

A Look at the HELP box and then match the instructions (1–6) with the pictures (a–f).

- Do not expose discs to heat or direct sunlight.
- Check for viruses before opening files you receive from the Web or via email.
- Make backup copies of your files.
- Don't shake or move the computer violently while the hard drive is spinning.
- Keep your discs away from water and humidity.
- Hold discs by the edges, or by one edge and the centre hole.



HELP box

Precautions

- We use the imperative to give precautions and warnings.

Check your hard drive regularly for logical and physical errors.

*... formatting erases any existing files on a disk, so **do not format** disks on which data that you don't want to lose is stored.*

- We use **should** + infinitive without *to* to give advice or to talk about what we think is right.

*... you **should** install an up-to-date virus scanner.*

- We use **shouldn't** + infinitive without *to* to give advice or to talk about what we think is wrong.

*You **shouldn't** turn your computer off and on quickly.*



B In pairs, discuss what you should or shouldn't do to protect your data. Use the suggestions below.

Example: discs on top of each other (stack)

You shouldn't stack discs on top of each other. / Don't stack discs on top of each other.

- 1 your anti-virus program regularly, since new viruses are created everyday (update)
- 2 discs in a protective case (store)
- 3 passwords and security devices to protect confidential information (use)
- 4 on discs with permanent marker pens (write)
- 5 the disc into the disc drive carefully (insert)
- 6 floppies or hard drives near magnets; they can damage the data stored on them (leave)

Note: disc (optical media); disk (magnetic storage media)

5 Word building

Look at the words in the boxes. Are they nouns, verbs, adjectives or adverbs? Write *n*, *v*, *adj* or *adv* next to each word and then complete the sentences below. For more about word building, see Unit 12.

magnet _____	magnetic _____	magnetically _____
magnetism _____	magnetize _____	magnetized _____

- 1 _____ is the science of magnetic phenomena and properties.
- 2 Floppy disks and hard drives are _____ storage devices.
- 3 Data is recorded on a disk in the form of _____ spots called *bits*.

fragment _____	fragmentation _____
defragmenter _____	fragmented _____

- 4 After you create, delete and modify a lot of files, the hard drive becomes _____, with bits and pieces spread all over the disk.
- 5 _____ slows down the speed at which data is accessed because the disk drive has to work harder to find the parts of a file stored in many different locations.
- 6 To reorganize your hard drive, you can use a disk optimizer or _____; this will reorder your files into continuous clusters.



In a fragmented disk, a file is stored in non-continuous sectors



In a defragmented disk, a file is stored in neighbouring sectors

6 Explaining hard drive precautions



A friend has sent you an email explaining that she has just lost all of the information on her PC because of a head crash. Write a reply explaining the following.

- Why the head crash happened
- What precautions she should take with her new PC to avoid similar problems in the future
- What steps she could take to back up her files