ICT – Internal Components of a Computer – Part 3

1 of 21 – Welcome

Welcome to this session on the internal components of a computer (part 3).

By the end of this session, you will:

* Know the different types of in-built memory used by a computer
* Understand the functions of different storage devices
* Understand how mobile devices use a number of these same components

2 of 21 – Introduction to memory and storage

**What is meant by memory and storage?**

The memory and storage devices that are used within a computer can have a huge impact on the general performance of the machine as a whole.

The speed and capacity – meaning how much data they can hold and process – will eventually make for a better performance and therefore a better overall user-experience when using a computer, or similar device (such as a laptop).

There are a number of different storage devices that can be used within your computer, which we’ll think about more in the following sections.

3 of 21 – Computer memory

Common examples of computer memory are things such as:

* RAM (random access memory)
* Cache memory
* ROM (read only memory)

All of these are examples of solid state devices. This means that the memory types listed above are all microchips, constructed without any moving parts. Each of these memory-types are useful for a number of different reasons, and one may be more useful than another depending on what data and information your computer needs to store. They can also be broken down into further types and categories. For example, RAM can be further divided into dynamic RAM and static RAM (sometimes called flash memory).

4 of 21 – Dynamic RAM

Regardless of the type of RAM you are using, both dynamic and static work to keep a hold of any programs or data that the central processing unit (CPU) is currently processing, or that the user has accessed previously – so RAM stores both old and new data for a CPU to access. Dynamic RAM is often used in:

* Personal computers
* Laptops
* Game consoles

Dynamic RAM relies on a certain type of transistor which needs an on-going electrical charge for it to work properly – meaning it can only store data when the computer or device is turned on. When the computer is turned off, the data inside the RAM is deleted.

5 of 21 – Static RAM

Static RAM – or flash memory – is typically used in:

* Mobile phones
* Digital cameras
* Games consoles

The transistor used by static RAM can retain data even when there is no electrical charge or power supply being delivered – meaning that even when your machine is turned off, static RAM is still able to store your data.

Static RAM is typically a little more expensive than dynamic RAM, and it can be physically larger as well. However it is a faster option, and uses less power than dynamic RAM does, making static RAM particularly useful if you’re only working on a small device.

6 of 21 – ROM

ROM stands for Read-Only Memory, and this memory-type is another example of storage that keeps a hold of data even when the computer itself (or rather, the power source) is turned off.

ROM is attached to a computer’s motherboard and it is typically kept running by a small but long-life battery that is stored somewhere inside the computer.

Generally speaking, ROM is used to store start-up information – meaning it contains the data needed to get a PC to boot up or turn on.

ROM can hold different software and different program instructions, which will dictate how the computer is turned on – for example, a computer might start up either with the hard drive, or alternatively with the DVD drive, depending on the operation that a user needs to complete.

7 of 21 – Other storage devices

There are other storage devices used inside a computer that should be remembered.

As the RAM cannot store everything – and sometimes cannot store anything at all when the machine itself is turned off – other storage devices are relied on to store information, which can then be fed back into the RAM when the computer is turned on again.

When data and programs have been reloaded back into the computer’s RAM, they can then be redirected to the central processing unit which will run the programs as normal. Storage devices that can do this are:

* Hard disk drives
* Solid state drives
* Optical drives

8 of 21 – Hard disk drives (HDD)

A hard disk drive (HDD) goes by a number of different names, such as: hard disk, hard drive, or fixed disk.

The hard disk drive relies on a magnetic method of storing data, as it uses small magnetic dots on the disk’s surface to collect data safely and securely.

A hard disk drive has moving parts and it can both read and write data to its surface.

The moving elements of this device mean that as the disk spins, allowing a series of circular tracks to be made, the magnetic data-dots are either written (if you’re trying to store data) or they are read (if you are trying to retrieve it).

9 of 21 – Solid state drives (SSD)

Solid state drives work by storing data in flash memory microchips – you might remember this term from an earlier section. These microchips contain different transistors – some of which can store data when the machine is turned off, but some of which cannot.

The solid state drive allows data to be stored permanently, even when the machine powers down.

USB drives are often featured alongside SSDs, as they both use flash memory. However, it is worth noting that although the memory type is the same, USB drives are typically less reliable and slower to use than the SSD alternatives.

10 of 21 – Optical drives

Optical drives alone cannot store or write data, but they do provide a way of doing this by allowing users to write or read data from discs.

Optical drives can read CDs, DVDs, and a number of other similar alternatives. By reading them, the data stored on them can be retrieved and accessed through your computer.

Another use for optical drives might be to install new software – which typically involves inserting a disc into your computer – or even to make disc back-ups of your stored files, and so, in that way, the optical drive can be a useful tool in data storage.

11 of 21 – HDD versus SSD

Hard disk drives have historically been preferred over the solid state drive alternatives; however, that is now beginning to change.

While hard disk drives are reliable – and they are also cheaper and known to have larger capacities than other storage types – the solid state drive is starting to catch up in terms of its capabilities.

Solid state drives are the same physical size as hard disk drives and they largely have the same abilities and functions.

However, solid state drives – given their lack of moving parts – are thought to work much more quickly and make less noise than hard disk drives now. Some technology users have even commented that solid state drives tend to be more reliable too.

12 of 21 – What difference do these things make to overall performance?

While these individual components all perform their own important functions inside a computer, the performance of the machine cannot be said to be because of the performance of one particular device.

Computer performance relies on a combination of:

* Memory size
* Word size
* Clock speed
* Number of processors
* Bus capacity
* Storage

Only when these elements work effectively together will the performance of your computer be improved, making your user experience an even better one.

13 of 21 – Internal components of mobile devices

Many of the internal components that we find inside computers can also be found in mobile devices. However, the components that we find in other devices are being used in a slightly different way to how they are used inside a personal computer.

For example, mobile devices are now being constructed with system on a chip technology. This is a type of chip that takes the central processing unit (CPU) and the graphical processing unit (GPU), and puts them both onto one chip.

This has many benefits when used inside technology devices that are much smaller than the average computer. Not only does system on a chip fit better inside the smaller device, but it is also easier for companies to build, it allows faster technology in a number of different devices, and it also requires less power (which is particularly useful for stretching battery life a little further).

14 of 21 – Internal components of mobile devices 2

For mobile devices the battery life is a very important thing to consider. The power that it takes to process a traditional platform – like a personal computer – is less of a concern, given that the machine is connected to a main electricity outlet. However, for mobile devices, the battery needs to be able to run the device for a prolonged period of time.

Charging batteries is something that takes time, and it can be an inconvenience for users – especially when they need to be on the move.

With all of this in mind, mobile device developers have to be particularly careful when they’re putting different technology components into their machines. The processor requirements and the battery life have to be properly matched for the mobile device to work properly.

Remember, mobile devices have to carry all of this technology around in an even smaller package!

15 of 21 – Question 1

Different types of RAM provide different types of storage.

Categorise the technology devices below according to their most appropriate type of RAM, either **dynamic** **RAM** or **static RAM**.

Personal computers

Mobile phones

Laptops

Digital cameras

The correct answers are:

Personal computers and laptops are technology devices which have **dynamic RAM**.

Mobile phones and digital cameras are technology devices which have **static RAM**.

16 of 21 – Question 2

Indicate whether the following statements are true or false.

Read-Only Memory can hold stored data even when the computer is turned off.

True

False

The correct answer is: True

Hard disk drives rely on a magnetic method of storing data.

True

False

The correct answer is: True

Solid state drives have moving parts that write and read data from disks.

True

False

The correct answer is: False

Optical drives are reliable places to store sensitive data.

True

False

The correct answer is: False

17 of 21 – Question 3

What are the benefits of system on a chip technology?

Choose all that apply:

1. Easier to build
2. It automatically increases battery life
3. Allows for faster technology
4. Needs less power
5. Mobile devices become cheaper

The correct answers are A, C and D, easier to build, allows for faster technology and needs less power.

18 of 21 – Question 4

Which two components have to be matched properly in a mobile device?

Choose all that apply:

1. Central processing unit
2. Processor requirements
3. Battery life
4. Operating system
5. Graphical processing unit

The correct answers are B and C, processor requirements and battery life.

19 of 21 – Question 5

Using the following choice of words; **together**, **memory**, **mobile devices**, **storage type**, **components**, **capacity** and **performance**, fill in the blanks for the paragraph below:

Individual components inside a computer contribute to the **blank** of the machine. However, for the best level of performance overall, the components need to work **blank**. Computer performance relies on a combination of components, such as **blank** size, word size, bus **blank**, **blank**, and more. This is not only the case for computers but applies to **blank** too as they now have many of the same **blank**.

The correct paragraph should read:

Individual components inside a computer contribute to the **performance** of the machine. However, for the best level of performance overall, the components need to work **together**. Computer performance relies on a combination of components, such as **memory** size, word size, bus **capacity**, **storage type**, and more. This is not only the case for computers but applies to **mobile devices** too as they now have many of the same **components**.

20 of 21 – End

Well done. You have completed this session on the internal components of a computer (part 3).

In this session we have covered:

* The different types of in-built memory used by a computer
* The functions of different storage devices
* How mobile devices use a number of these same components

If you have any questions about any of these topics, make a note and speak to your tutor for more help.