

Computer Systems: Hardware and Software

Make sure you can write simple, 1 mark definitions of:

- computer system,
- hardware
- software

There is an important relationship between hardware and software:

- hardware needs software to make it useful - to display, process or store data
- software needs hardware to run on - to give it the ability to do the job it was written to do

Computer systems are made up of hardware and software.

Hardware is the physical parts of a computer system - the things you can touch. This includes **input devices** such as a keyboard, mouse, microphone or graphics tablet and **output devices** such as monitors, speakers or printers. It also includes the components inside the computer which make it work and the memory.

Software is the non-physical parts of a computer system. It is the programs which run on a computer. You can't touch these, but the computer system couldn't do its job without them.

By **computer system** we mean any computer device. A desktop or laptop computer is an obvious system, and it's often easiest to think about these during this unit. These are called **general purpose computer systems** - they can do lots of different things.

Phones, tablets and other mobile devices are other obvious examples of general purpose computers. They can't do quite as much, but they can still do lots of different jobs.

The term computer system also refers to systems which are less obvious: the computers which help run cars; those which run the tills in a shop or the ATM on the high street; or the computer systems in fridges, TVs or microwave ovens. These are called **embedded systems**.

Activity 1:

- Write definitions of the terms **computer system**, **hardware** and **software**
- Write definitions of and give three examples each of **input devices** and **output devices**
- Explain the **relationship** between hardware and software
- Explain the **differences** between a **general purpose computer system** and an **embedded computer system**. Give examples of each.

Types of Software

There are two types of software you need to know about:

- System software** are the programs that a computer system needs to make it function. This includes the operating system, program language translators and utility software.
- Application software** is any software which allows a user to complete a task. For example, word processing software, image manipulation software or a web browser.

It's OK to give brand names of pieces of software (e.g. Word or Photoshop), but it's better if you can talk about the type of software.

Operating Systems

An **operating system** is a collection of pieces of software which control a computer system and manage the hardware and software resources on it. Operating systems are an important example of **systems software**.

Operating systems are essential. Without them there is no way of controlling a computer system. The jobs they do include:

- providing an **interface** between the user and hardware - a way for the user to control the computer system
- managing input and output devices
- controlling access by software to the **Central Processing Unit (CPU)** so that more than one program can run at a time
- managing the use of **memory** – where data is stored and how it is retrieved from memory when a user opens a file
- providing a platform for **application software** to run on
- managing **security systems**, including anti-virus and firewall software and how different users log on to the system
- dealing with software **updates**
- managing **network access** through the Network Interface Card (whether by LAN, WLAN or Bluetooth)

Modern OS use **Graphical User Interfaces** which are designed to be as easy as possible for non-specialist users to operate.

Utility Software

Utility software is systems software which deals with the basic jobs that the Operating System needs to do to function effectively.

Examples of utility software include:

- device management software - the hardware drivers which allow you to use a keyboard, mouse, trackpad etc...
- file management software - controls how data is stored and how files can be created, renamed or deleted
- disk management software - the software that lets you format, defragment and manage your hard drive
- secondary storage management software - the software that allows you to use a CD, DVD, USB drive or portable hard drive
- anti-virus and firewall software
- compression software

Examples of operating systems include Windows, OS X (Macs), Linux, Android, iOS etc...

An **interface** is the way that a user views and uses the OS. Most modern OS use a **Graphical User Interface (GUI)** with icons and windows onscreen

Five key OS jobs:

1. **Apps**
2. **Memory**
3. **Processors**
4. **I/O devices**
5. **Security**

Although users can do some of these jobs by hand, most of the time the OS deals with them in the background.

Activity 2:

- a) Explain the difference between systems and application software
- b) Explain why an Operating System is needed
- c) Describe the 5 main jobs of an operating system
- d) Give four examples of utility software