

AQA Computer Science A-Level
4.6.1 Hardware and software
Advanced Notes



Specification:

4.6.1.1 Relationship between hardware and software:

Understand the relationship between hardware and software and be able to define the terms:

- Hardware
- Software

4.6.1.2 Classification of software:

Explain what is meant by:

- System software
- Application software

Understand the need for, and attributes of, different types of software.

4.6.1.3 System software:

Understand the need for, and functions of the following system software:

- Operating systems (OSs)
- Utility programs
- Libraries
- Translators (compiler, assembler, interpreter)

4.6.1.4 Role of an operating system (OS):

Understand that a role of the operating system is to hide the complexities of the hardware.

Know that the OS handles resource management, managing hardware to allocate processors, memories and I/O devices among competing processes.



Relationship between hardware and software

Computer systems are composed of **two parts**: hardware and software.

Hardware

Hardware is the term given to the **physical components** of the computer system. If you can touch a part of a computer, it's hardware.

Hardware includes the **internal components** of a computer system like the hard drive and the sound card as well as **external components** like printers and speakers.

Software

Software is the name given to **program code**. **Sequences of instructions** which are executed in order to **perform a task**.

Each part of a computer system can be classified into hardware, software or hardware & software. Some examples of each category are shown in the table below.

Hardware	Software	Hardware & software
Monitor	Word processor	Wireless router
Processor	Web browser	Wireless keyboard
Graphics card	Image editor	
Webcam	Video editor	



Classification of software

There are **various categories** into which different software packages can be placed.

Application software

System software

Operating systems

Utility programs

Library programs

Translators

Application software

Application software is the name given to programs that complete a **specific task** for the user. Examples of application software include word processors, web browsers and spreadsheet software.

Note

In an exam, use generic terms like “**word processor**” rather than specific software names like “**Microsoft Word**”.

System software

System software **operates**, **controls** and **maintains** the computer and its components. System software includes the computer’s **operating system** as well as the categories **utility programs**, **library programs** and **translators**.

Operating system

A computer’s operating system allows its user to **control the computer** with ease. It does this by providing what’s called a **virtual machine**, hiding the **true complexity** of the computer from the user.

Synoptic Link

Interrupts are signals sent to the processor when an important event occurs.

Interrupts are covered in more detail under **computer organisation and architecture**.

The operating system also **manages** and **controls** access to the computer’s **resources**. This includes the tasks of memory management, processor scheduling (allocating processor access to different applications) and handling **interrupts**.

Utility programs

Utility programs are used for completing **housekeeping** tasks in a computer system. Such tasks include data backup, defragmenting hard drives (reorganising data on a hard drive in order to improve speed of access), data compression and encryption.



Library programs

Libraries contain **useful functions** that are **frequently used** by a program. Programmers can make use of libraries when developing a program to simplify the process. Should a programmer wish to make use of a library, they must first **import** it within their program code.

Translators

Translators are pieces of software which translate **between different types of language**. This course covers three types of translator: **compilers**, **assemblers** and **interpreters**.

Synoptic Link

Compilers, assemblers and interpreters are covered in the notes for **types of program translator**.

