

Exercise walk-through

4.1

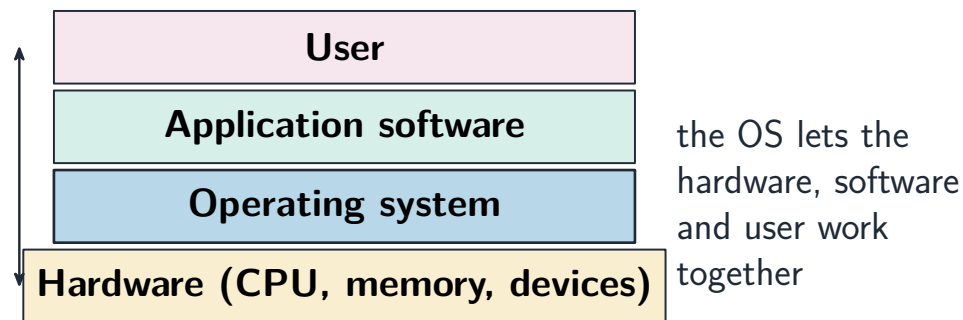
Types of software and interrupts

IGCSE Computer Science

Hardware and software

- **hardware** : the **physical** parts you can touch
- **software** : the **programs** that tell the hardware what to do

Hardware alone does nothing useful; software needs hardware to run on. **Both** are needed.



Hardware is the physical parts; software is

hardware
(physical parts)

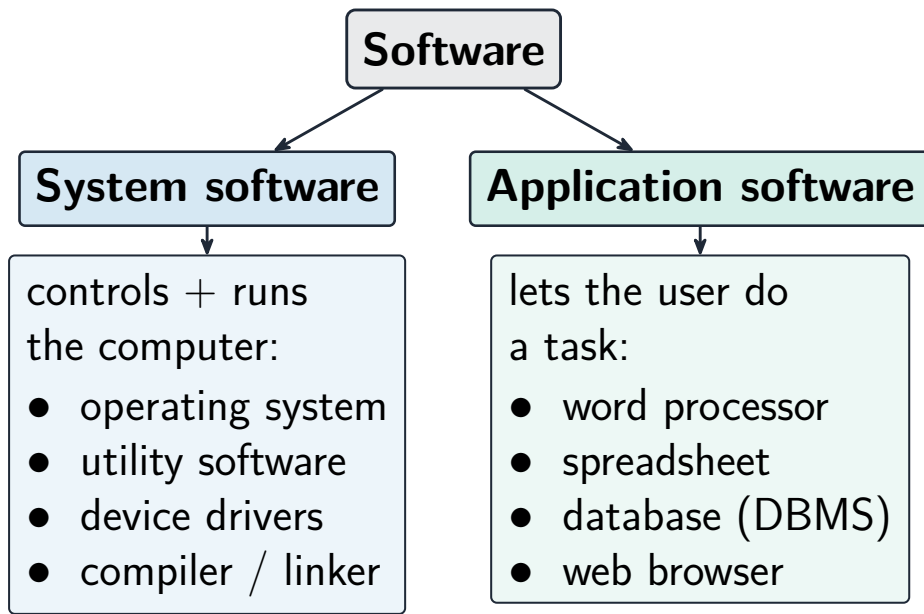
CPU, keyboard, RAM

software
(programs)

apps, the OS

Hardware is the physical parts; software is the programs

System vs application software



- **word processing**
software (writing documents);
- **spreadsheet**
software (working with numbers in a grid);
- **database management system**
(storing and searching data);
- **web browser**
(viewing web pages).

The layers of software

application software

does a job for the **user** – word processor, browser, game

the operating system

manages the machine: memory, processes, input and output, security, and **managing files** – saving, opening, naming, moving and deleting

utility software

small tools that **look after the computer** – anti-virus, backup, disk defragmenter, compression

device drivers

let the OS talk to a particular piece of hardware

firmware

sits **below** the operating system – software stored permanently on ROM or flash that runs the hardware at start-up

the bootloader

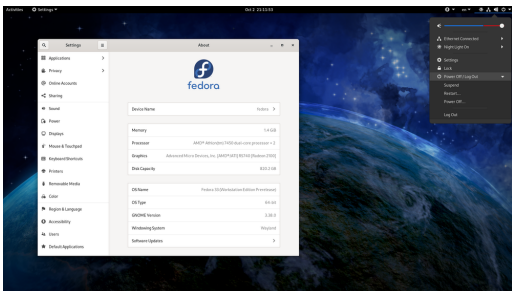
the first firmware to run; it loads the operating system into RAM

Sort by **who it serves**: the user, the machine, or one device. That is what separates application, system and utility software.

The operating system

The **operating system** runs the whole computer:

- manages files, memory, **peripherals**
- handles interrupts & **multitasking**
- provides a **user interface** and a platform
- manages security – accounts, passwords



It is the **layer between** the hardware and your programs – neither talks to the other directly.

Exercises 2.1-2.3

2.1 State whether a web browser is system or application software. [1]

2.2 State two roles of the operating system. [2]

2.3 Identify the threat in each case: an email says your account will close unless you confirm your password; a server is flooded with requests until it stops responding. [2]

Exercises 2.1-2.3

2.1 State whether a web browser is system or application software. [1]

2.1

- a web browser is used by a person to do a task
- it is **application software**

2.2 State two roles of the operating system. [2]

2.2

- any **two** of: managing files / memory / interrupts / user interface / peripherals / multitasking / security

2.3 Identify the threat in each case: an email says your account will close unless you confirm your password; a server is flooded with requests until it stops responding. [2]

2.3

- email asking for a password: **phishing**
- server flooded with requests: **DDoS**

Exercises 2.4-2.5

2.4 Give one difference between a virus and a worm. [2]

2.5 Name two ways to prevent a brute-force attack. [2]

Exercises 2.4-2.5

2.4 Give one difference between a virus and a worm. [2]

2.4

- a **virus** attaches to a file and needs the user to open or run it
 - a **worm** copies itself across a network on its own
-

2.5 Name two ways to prevent a brute-force attack. [2]

2.5

- any **two** of: strong mixed password / limit log-in attempts / two-step verification / delay after failed attempts

Exercise 3.1

3.1 Which is system software?

[1]

☐

A spreadsheet

B device driver

C word processor

D web browser

Exercise 3.1

3.1 Which is system software?

[1]

☐

A spreadsheet

B device driver

C word processor

D web browser

3.1 B

- a **device driver** is system software
- A, C and D are application software

Exercise 3.2 (a)

3.2 A printer runs out of paper while printing.

(a) State the type of interrupt this is.

[1]

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(a) State the type of interrupt this is.

[1]

(a)

- the printer is hardware that needs attention
- **hardware interrupt**

Exercise 3.2 (b)

3.2 A printer runs out of paper while printing.

(b) Describe what the processor does when an interrupt arrives.

[3]

Exercise 3.2 (b)

3.2 A printer runs out of paper while printing.

(b) Describe what the processor does when an interrupt arrives.

[3]

(b)

- the processor **stops and saves its place**
- it runs the **interrupt service routine**
- then **restores its place and carries on**

Exercise 3.3 (a)

3.3 An online shop is worried about security.

(a) Complete the table by naming the threat described and giving one way to prevent it. [6]

Description	Threat	Prevention
customers are sent an email asking them to confirm their card details		
data is read by a packet sniffer as it travels over the wireless network		
the site is flooded with requests until real customers cannot connect		

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(a)

- email asking for card details: **phishing**; prevent by not clicking unexpected links / checking the sender / anti-spam
- packet sniffer on Wi-Fi: **data interception**; prevent by **encryption** or a wireless network key
- site flooded with requests: **DDoS**; prevent by a **firewall**, proxy, or filtering

Exercise 3.3 (b)

3.3 An online shop is worried about security.

(b) Explain the difference between phishing and pharming.

[3]

Exercise 3.3 (b)

3.3 An online shop is worried about security.

(b) Explain the difference between phishing and pharming.

[3]

(b)

- **phishing**: a message; the user must click or reply
- **pharming**: no message; code on the computer or DNS redirects to a fake site
- so the user can type the **correct address** and still arrive at the fake site

Exercise 3.3 (c)

3.3 An online shop is worried about security.

(c) The shop installs a firewall. Describe two tasks a firewall performs.

[2]

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(c) The shop installs a firewall. Describe two tasks a firewall performs. [2]

(c)

- any **two** of: examines traffic in and out / checks traffic against criteria and blocks failures / keeps a log / blocks named sites or IP addresses

Exercise 3.3 (d)

3.3 An online shop is worried about security.

(d) The shop also uses two-step verification. Explain how it protects an account even if the password is stolen. [2]

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(d)

- a second code is sent to a device the real user holds
- an attacker with the password still **cannot log in without that code**

Exercise 3.3 (e)

3.3 An online shop is worried about security.

(e) An employee receives a phone call from someone claiming to be from the IT department, asking for their password. Identify this threat and state one way staff can be prepared for it.

[2]

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(e) An employee receives a phone call from someone claiming to be from the IT department, asking for their password. Identify this threat and state one way staff can be prepared for it. [2]

(e)

- **social engineering**
- staff training: never give a password over the phone; **verify who is asking**