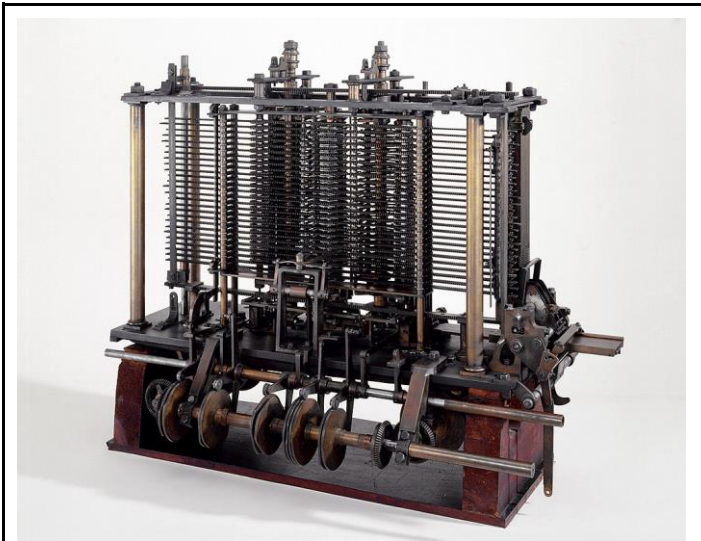

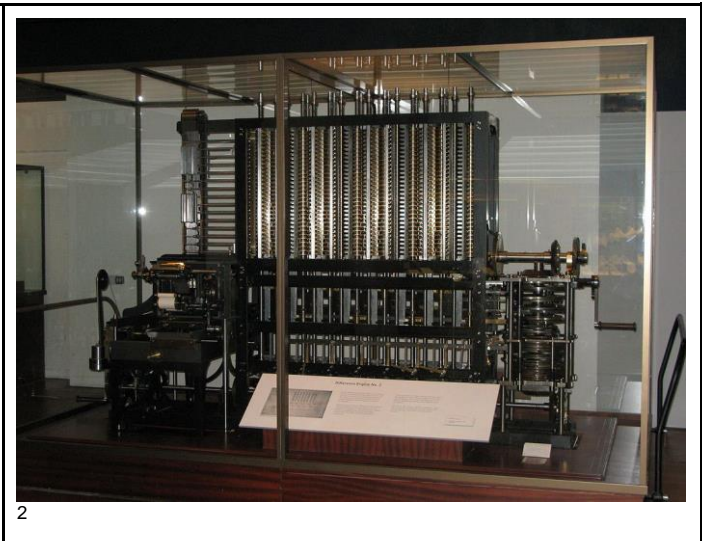


Computer Systems - Knowledge Organiser

Key Terms & Definitions

1	Computer	An electromechanical device which receives input, processes it and produces and output
2	Device	A piece of electrical or mechanical equipment made for a particular purpose
3	Program	A sequence of instructions written in a programming language that a computer can execute or interpret
4	Software	A set of programs used to operate computers and perform specific tasks
5	Hardware	The physical components of a computer
6	Data	Individual facts or statistics
7	Processor	The part of the computer that interprets and carries out instructions
8	Main memory	The part of the computer that stores data that is currently being used by the processor
9	Secondary storage	The part of the computer that stores data long term that is not currently being used by the processor
10	I/O (Input / Output)	Refers to input, any method of getting information into the computer, and output, any method of getting data out of the computer.
11	Computer architecture	The way in which the parts (components) of a computer system are organised

Types of Computer

<div data-bbox="73 199 772 742"></div> <div data-bbox="73 742 772 986"><p>1</p><p>Babbage's difference engine was the first design for a general purpose computer, one that can automate any process specified by a program.</p></div>	<div data-bbox="772 199 1467 742"></div> <div data-bbox="772 742 1467 986"><p>Before mechanical and electronic computers, a computer was a person who was employed to do tasks (such as performing complex calculations) that we now use modern computers to do.</p></div>	<div data-bbox="1467 199 2166 742"></div> <div data-bbox="1467 742 2166 986"><p>2</p><p>Babbage also designed the difference engine. The major difference between this and the analytical engine was that the difference engine was not designed to be general purpose. It was specifically designed to do certain calculations and can therefore be considered a special purpose computer.</p></div>
General purpose computers		Special purpose computers

Hardware and Software

Hardware



Mouse - External hardware



Motherboard - Internal Hardware

Hardware can be **internal** (inside the PC/laptop/mobile phone case) or **external** (outside the case).

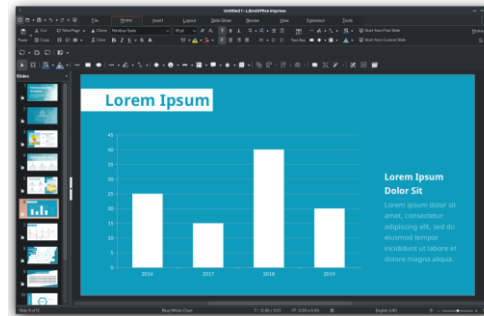
External hardware examples:

- Mouse
- Keyboard
- Monitor
- Headphones
- Speakers
- Webcam

Internal hardware examples:

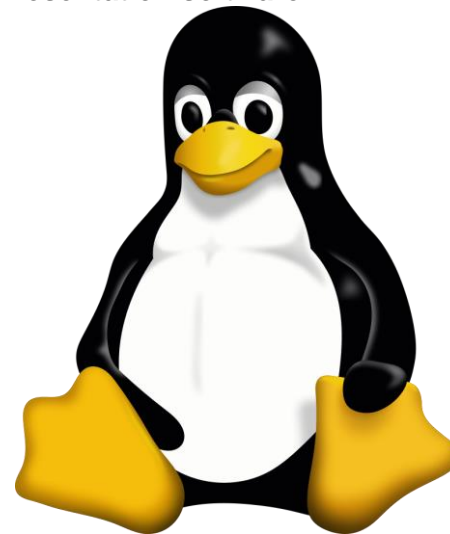
- CPU (Central processing unit) / Processor
- Motherboard
- GPU (Graphics processing unit)
- Hard drive
- RAM (Random access memory)
- Power supply (can be external in some devices)

Software



3

Presentation software



4

Tux, the mascot of the Linux operating system

Software can be placed into two categories: **system software** and **application software** based on the task(s) it performs.

Application software is designed to perform tasks that the user wants to complete. Examples include:

- Word processors
- Spreadsheet software
- Presentation software
- Web browsers
- Games

System software is designed to control the hardware of the computer. It provides an interface between the hardware and the application software.

The computer's operating system is an example of system software. It performs tasks such as memory management and processor scheduling which are necessary for the application software to run. Examples of operating systems include:

- Windows
- macOS
- iOS
- Android
- Linux

Hardware

Required hardware



A computer with required internal hardware

Modern computers come in a range of shapes and sizes for different purposes but all have the following hardware in some form:

- Processor
- Main memory
- Storage
- Communication system(s)
- I/O (Input / Output)

(Secondary) Storage



An SSD

Common examples of secondary storage devices include:

- Hard disk drives (HDDs)
- Solid state drives (SSDs)
- USB flash drives
- SD cards
- Optical disks

Architecture



John von Neumann

Since all modern computers have similar basic hardware, we can say that they're similar in architecture.

Modern computers generally follow an architecture known as von Neumann architecture which was described by John von Neumann in 1945.

Main memory (RAM)



A 4GB stick of RAM

When a program is to be executed, it is loaded from secondary storage into main memory along with any data required. Instructions and data are then fetched from memory by the processor as required during the execution of the program.

Any new data created as a result of running the program must be saved from main memory to secondary storage otherwise it will be lost when the computer is switched off.

Processor (CPU)



Two CPUs side by side

When executing (running) a program, the CPU fetches instructions and data from main memory as required. It then decodes each instruction to understand what it is asking the CPU to do. It then performs the task that the instruction is asking it to do.

Examples of operations the CPU may be instructed to do:

- I/O operations
- Arithmetic or logical operations on data
- Control the flow of a program (which instruction is to be executed and when)

Communication components



A wireless NIC (network interface card)

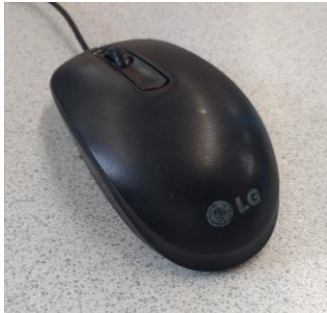
Used for transferring programs and data between computer systems.

You will have used at least one wireless communication component such as WiFi, Bluetooth or mobile data (3G, 4G, 5G).

Communication components can allow:

- Input to be obtained remotely
- Data to be stored on remote systems
- Programs to be executed remotely

Input devices



Mouse - an input device

Captures data from an external source. This could be someone typing on a keyboard, clicking with a mouse or even using a games controller.

Examples of input devices include:

- Keyboard
- Mouse
- Games controller
- Camera
- Microphone
- Touchscreen

Output devices



Speaker - an output device

Communicates data stored on the computer to the user in some way. This could be a monitor displaying an image, a speaker playing a song or even a games controller with haptic feedback.

Examples of output devices include:

- Speaker
- Headphone
- Monitor
- Touchscreen
- Games controller with haptic feedback