

What is a computer?

A computer is any device that takes an input, processes it and then outputs information.



Input Devices

An input device is a piece of hardware that can be used to enter data into a computer.



Output Devices

An output device is a piece of hardware that can be used to represent information in a variety of ways.



Fetch, Decode, Execute

The main function of the CPU is to run an endless fetch-execute cycle.



The speed of the FDE cycle is measured in cycles per second (hertz). This is known as the **clock speed**.

Processors are usually measured in **giga-hertz (GHz)**.

1GHz = 1 billion instructions processed.

Key terminology

Term	Definition
Central processing unit (CPU)	The main component in a computer for processing data and instructions.
Control unit (CU)	Directs the flow of instructions and/or data and coordinates the other parts of the CPU. It generates clock ticks.
Arithmetic logic unit (ALU)	The ALU performs all the mathematical calculations / logical operations in the CPU.
Cache	Incredibly fast, but very expensive volatile memory used by the CPU.
Registers	Fast access storage locations found on the CPU where data or control information is temporarily stored.
Program counter (PC)	A counter that keeps track of the memory address of the instruction to be executed next.
Current instruction register (CIR)	A temporary holding area for the instruction that has just been fetched from memory.
Accumulator (ACC)	A register for temporary storage of arithmetic and logic data in the CPU.
Memory address register (MAR)	Stores the address in the main memory that is currently being read or written.
Memory data register (MDR)	Stores the data in the main memory that is currently being read or written.
Memory	Used for the temporary storage of currently running programs and data.
Clock speed	The number of FDE cycles that a CPU can carry out per second.
Cores	Some processors have multiple processors (cores) which can work in parallel, sequentially or can multitask.

Components

Computer components are all the different internal parts of a computer system that help it to operate. Each component has its own purpose and functions.

Central Processing Unit

The CPU is the brain of the computer. It does all the processing and calculating for the computer.



Heat sink

A heat sink is used to draw heat away from important components such as the CPU that can get quite hot. If a component gets too hot then it won't be able to perform its job as well.



Motherboard

The motherboard is what connects all the other components. It helps keep them secure and allows the components to communicate.



Power Supply

A power supply helps to convert electricity to a suitable voltage to power the computer safely.



Hard Drive

A Hard Drive is where all the computer's long term data is stored i.e. data you want to keep for in the future, such as your own documents, music, films and games.



Random Access Memory

RAM is where temporary data is stored while the computer is currently being used. Once a computer is switched off this data is lost.



Network Interface Card

A network interface card (NIC) enables a computer system to connect to a network. Some allow access wirelessly.



Programming Constructs

Sequence

Start program
Complete action 1
Complete action 2
End program

Selection

Start program
IF condition is TRUE:
 Complete action 1
ELSE:
 Complete action 2
End program

Iteration

For loop

Start program
FOR x number of times:
 Complete action 1
 Complete action 2
End program

While loop

Start program
WHILE condition is TRUE:
 Complete action 1
 Complete action 2
End program

Zero index

Lists have a place order starting at 0

Index	0	1	2
Value	3	"A"	8.7

Data Types

String - str()

"A sequence of characters inside quotation marks usually words or sentences."

Character – char()

Single character inside quotation marks: "A"

Integer – int()

Whole numbers: 7

Float – float()

Decimal numbers: 7.5

Boolean – bool()

Can only be: **TRUE** or **FALSE**

Logical Operators

Less than

5 < 10

More than

10 > 5

Equal to

5 == (2+3)

Less than OR equal to

5 <= 10

NOT equal to

5 != 10

Data Structures

Lists or arrays are like variables that store more than one value. Lists change in size and store any data types. Arrays have a fixed size, and all data must be the same type

```
myList = [5, "B", 1.6, "Hello"]
myArray = [5, 33, 100, 3]
```

List Methods

MyList.append(x)	Adds x to the end of the list
MyList.pop(index)	Removes the item at the index
len(myList)	Returns the list length
x in myList	Checks if x is in the list
.insert(x, index)	Inserts x at the index

Variables

Variables are used to **store** some data that we can use later in our code. Remember to:

- Use a descriptive name.
- No spaces in the name.
- Use one equals sign to store something in it.
- Call it by name to reuse it

```
age = 50
name = "Bob"
print(name, " is ", age, " years old")
```

Inputs and Outputs

We show information to the user with the keyword **print**.

```
print("This is a message ")
print(5 + 5)
```

We get information from the user with the keyword **input**. Here the user is asked to enter their name, whatever they type in as an input is stored in the

```
variable myName.
myName = input("What is your name?")
```