Parts of the processor:

1. **Arithmetic Logic Unit (ALU)**: It is the part of computer processor (CPU) used to perform arithmetic operations (such as: addition, subtraction, multiplication and division) and logic operations such as comparison.
2. **Control Unit (CU)**: It directs operations within a computer's processor. It receives instructions from a program, then passes them to the arithmetic logic unit (ALU), and sends these result of processing to the corresponding program as output.
3. **Register**: It is temporary storage areas of the computer processor. It holds data that is being worked on by the processor. The size of the register is measured in bits. The available size in the market is 32-bits or 64-bits.

How a processor works?

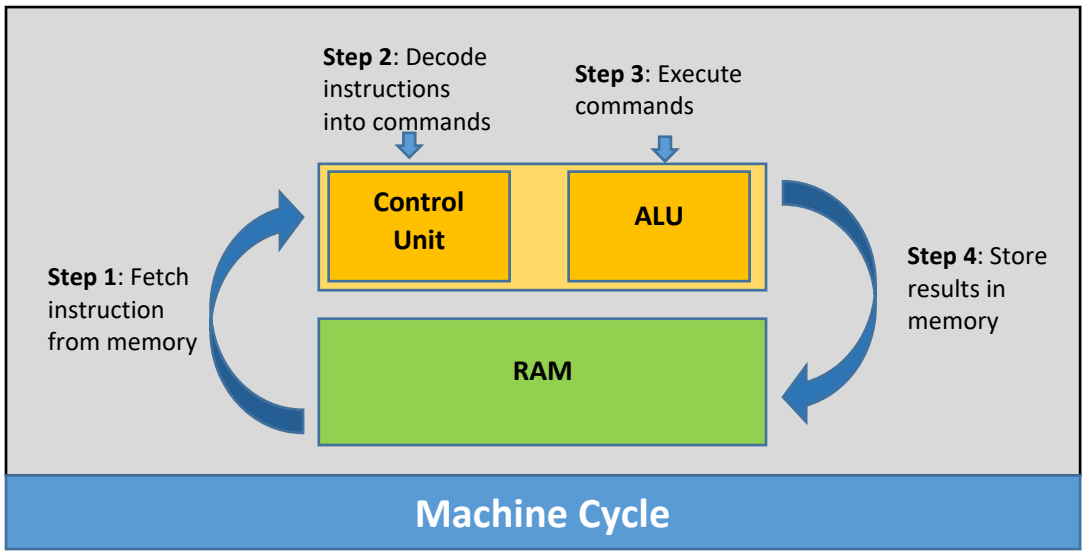
For every single instruction to be executed, the CPU repeats the machine cycle which consists of four operations: fetching, decoding, exulting, and storing.

Fetching: is the process of getting the instruction or data from the memory.

Decoding: is the process of translating the instruction into signals that computer can execute.

Executing: is the process of carrying out the command.

Storing: means writing the result to the memory.



1.3.3 Memory

It is also called the primary memory. It consists of electronic chips that holds: a) the operating system and other system software, b) the application programs, and c) the data being processed and resulting information.

1.3.3.1 RAM (Random Access Memory)

The **RAM** is the main memory where the operating system is loaded and also where your applications are copied to, when you load an application. The capacity of RAM plays an important role on the performance of the computer, the more capacity the RAM has, the more programs you can open at the same time. If your system is running slowly due to a lack of RAM, it is better to add more RAM modules to increase its capacity.

The content of the RAM is directly accessed by the CPU. The storage of data (or information) and instructions on RAM is temporary. So we can say that RAM is volatile memory. When the power is switched off the RAM becomes empty.

1.3.3.2 ROM (Read-Only Memory): is a special chip held on your computer's system (motherboard) which can be read only (not changed). It contains software that is required to make your computer work with your operating system. The content in the ROM is permanent, so ROM is a non-volatile memory.

1.3.4 Input Devices

Input devices: any peripheral (piece of computer hardware equipment) used to provide data and send instructions to the computer.

1. **Keyboard:** a device to input text and characters by pressing buttons (referred to as keys), similar to a typewriter. The most common English-language key layout is the QWERTY layout. It has around 104 keys, include alphabetic characters, punctuation symbols, numbers and a variety of function keys

2. Pointing Devices

- **Optical Mouse**: uses lasers, or more commonly LEDs, to track the surface under the mouse to determine motion of the mouse, to be translated into mouse movements on the screen.

- **Trackball**: a pointing device consisting of an exposed extended ball housed in a socket that detects rotation about two axes.

- **Touchscreen** : It is a computer screen that can be used by touching it with a finger or a stylus pen, instead of using a mouse and keyboard. Touchscreens are used in personal digital assistants (PDAs), tablet computers, smartphones and other devices

3. **Game controller** – an input device used with video games or entertainment system to provide input to a video game. Game controllers could include gamepads, joysticks, steering wheels, paddle, and the keyboard and mouse.

Gamepad

Joystick

Steering wheel and paddle

4. **Image Scanner** - a device that provides input by analyzing images, printed text, handwriting, or an object. Scanners capture images from the paper document and convert them into a digital format.

5. **Webcam**: a low resolution video camera used to provide visual input that can be easily transferred over the internet.

Digital Camera: It is used to capture pictures or video which is then stored into its memory card. Stored digital images or video can be transfer to a computer by connecting the camera or the memory card to it.

6. **Fingerprint scanner** - is a type of technology that identifies and authenticates the fingerprints of an individual in order to grant or deny access to a computer system or a physical facility.

7. **Microphone**: A sound sensor that provides input by converting sound into electrical signals.

8. **Bar code reader** - a hardware input device capable of reading a barcode using a laser. An example of a barcode reader is a supermarket barcode scanner that reads and logs the price of a product.

9. **Magnetic Ink Character Recognition (MICR)** - a character-distinguishing technology that makes use of special magnetized ink. It is largely used in banks and other organizations where security is a high priority.

10. **Optical Character Reader (OCR) -** is used for taking an image of letters or typed text and converting it into data the computer understands.

11. **QR (Quick Response) Code -** is a two-dimensional barcode with a larger storage capacity than the standard UPC (i.e. barcode). A QR code reader app can be installed on a smartphone, allowing the user to scan a QR code and view the data stored in it. QR codes often contain information about a product or a direct forward to a website.

1.3.5 Output Devices

Output Device: is any piece of computer hardware used to communicate the results of data processing to the user.

1. **Monitor or Visual Display Unit (VDU):** it is used for outputting information in an understandable format for humans. Older computer monitors made use of cathode ray tubes (**CRT**), which made them large, heavy and inefficient. Nowadays, flat-screen **LCD** (Liquid Crystal Display) or **LED** (Light Emitting Diode) monitors are lighter and more energy efficient.

2. **Printers**: an output device that are used to print information on paper (referred as hard-copy) There are many different types of printers such as Dot-Matrix printer, Ink-Jet printer and Laser printer. In large organizations laser printers are most commonly used due to the fact that they can print very fast and give a very high quality output.

Dot-Matrix Printer

Ink-Jet Printer

Laser Printer

3. **Plotters**: it is an output device similar to a printer, but normally allows you to print larger images.

4. **3D Printer**: is a device that creates a physical object from a digital model by layering materials. 3D printers use materials, such as metal alloys, polymers, plastics, or even food ingredients.

5. **Speakers**: an output hardware device that connects to a computer to generate sound.

6. **A projector or image projector**: It is an optical device which projects an image (or videos) onto a surface, commonly a projection screen. The newest types of projectors are handheld projectors that use lasers or LEDs to project images.

1.3.6 Storage Devices

Storage devices are called secondary memory. They are non-volatile and persistent in nature and is not directly accessed by a computer/processor. It allows a user to store data/information for a long-term period of time.

1. **Hard Disk Drive -** Hard disks are the main, large data storage area within your computer. Hard disks are used to store your operating system, your application programs and your data. The data is written on the platters by moving a magnetic head over the platters as they spin The storage capacity of the hard disk ranges from gigabytes (GBs) to terabytes (TBs).

2. **Solid State Drive:** SSDs use nonvolatile flash memory chips to store data. This means that they are faster than magnetic HDDs. Their storage capacity also ranges from GBs to TBs. SSDs have no moving parts and therefore make no noise, are more energy efficient, and produce less heat than HDDs.

3. **Tape drive -** a device that reads and writes data on a magnetic tape, used for long term storage and backups. It could store up to 100 TB of data.

4. **Compact Disc (CD) -** the most common type of removable media, suitable for music and data. It has a memory size of 700 MB.

5. **Digital Versatile Disc (DVD) -** a popular type of removable media that is has same dimensions as a CD but stores more information. It is the most common way of transferring digital video, and is popular for data storage. A single layer DVD can store up to (4.7 GB), but a dual layer DVD can store up to (8.5 GB).

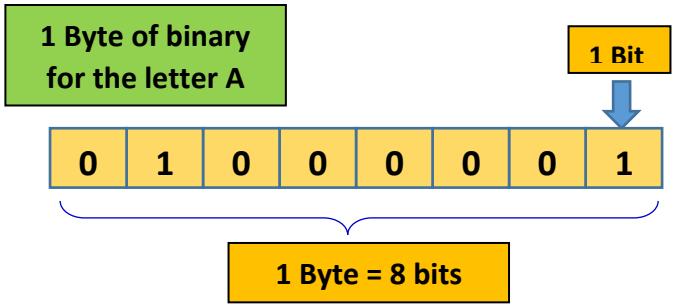
6. **Blu-ray Disc (BD) Drive:** is a digital optical disc data storage media that has Single Layered and Dual layered disc with a memory size of 25 GB and 50 GB respectively. It is capable of storing hours of video in High-Definition and Ultra High-Definition resolution.

7. **Universal Serial Bus (USB) Flash Drive** – is a flash memory data storage device integrated with a USB connector, typically small, lightweight, removable, and rewritable. Capacities vary, from hundreds of megabytes to tens of gigabytes.

8. **External Hard Disk -** External hard disk drives typically connect via USB; which has slower data transfer rates when compared to internally mount hard disk. The available capacities for external hard disk drives ranged from 500 GB to 10 TB.

1.3.7 Units used to measure the memory capacity:

The smallest unit of data in a computer is a bit. A bit can hold a single binary value, either 0 or 1. Eight bits equal to one byte, which is an 8-digit number.



The following table lists the various units of memory.

1 Bit	0 (or) 1
1 Byte	8 Bits
1 Kilobyte (KB)	1,024 Bytes
1 Megabyte (MB)	1,024 KB
1 Gigabyte (GB)	1,024 MB
1 Terabyte (TB)	1,024 GB