

Types of Computers by Generation

- 1st Generation Computers (First Generation); They are very heat dissipating and large volume computers powered by radio lamps. It begins with the construction of ENIAC.
- 2nd Generation Computers; They are computers with smaller volumes and different computational speeds, which emerged with the invention of the Transistor in 1952.
- 3rd Generation Computers; They are computers that emerged in 1958 with the development of Integrated Circuits. Concepts such as multi-tasking and remote access were born in these computers.
- 4th Generation Computers; They are computers that started with the invention of the Complex Integrated Circuit (integrated circuit) in 1965 and are still used today.

Classification of Computers

Computer processing speed can be classified according to memory capacity, data transmission speed, and the number of users that can benefit from it at the same time.

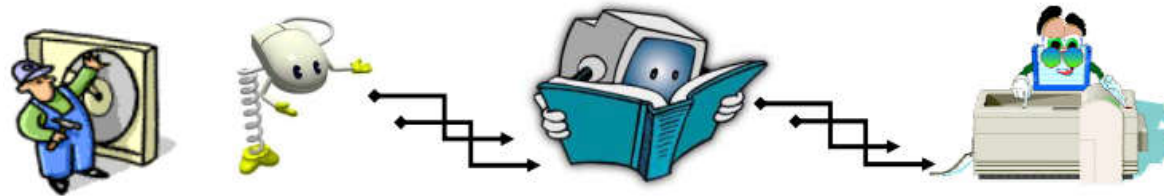
- Personal Computers (PC) (or Microcomputer):
 - ❖ These are computers that are usually used by a single person.
 - ❖ That's why these computers are called personal computers.
 - ❖ Microcomputers became widespread after the 1970s and found many uses.

Why are they called as «micro»? © They are really micro by comparing the big machines of 50's...

Classification of Computers

- **Mini Computers (Frame):** ????
 - ❖ It is a multi-user type of computer as opposed to PC.
 - ❖ Up to 100 people can use it simultaneously with a suitable keyboard and screen.
 - ❖ The computer in Bank Branches is a good example of such computers.
- **Host/Servers (MainFrame/Servers):**
 - ❖ Computers serving more than 100 users. It is used in very large workplaces.
- **Supercomputer:**
 - ❖ Although the number of users is not high, it is used in scientific studies that require very high processing speed.
 - ❖ It is used in major universities or scientific institutions such as NASA.
 - ❖ TUBITAK has started studies to establish a supercomputer in our country.

Input-Process-Output Principle

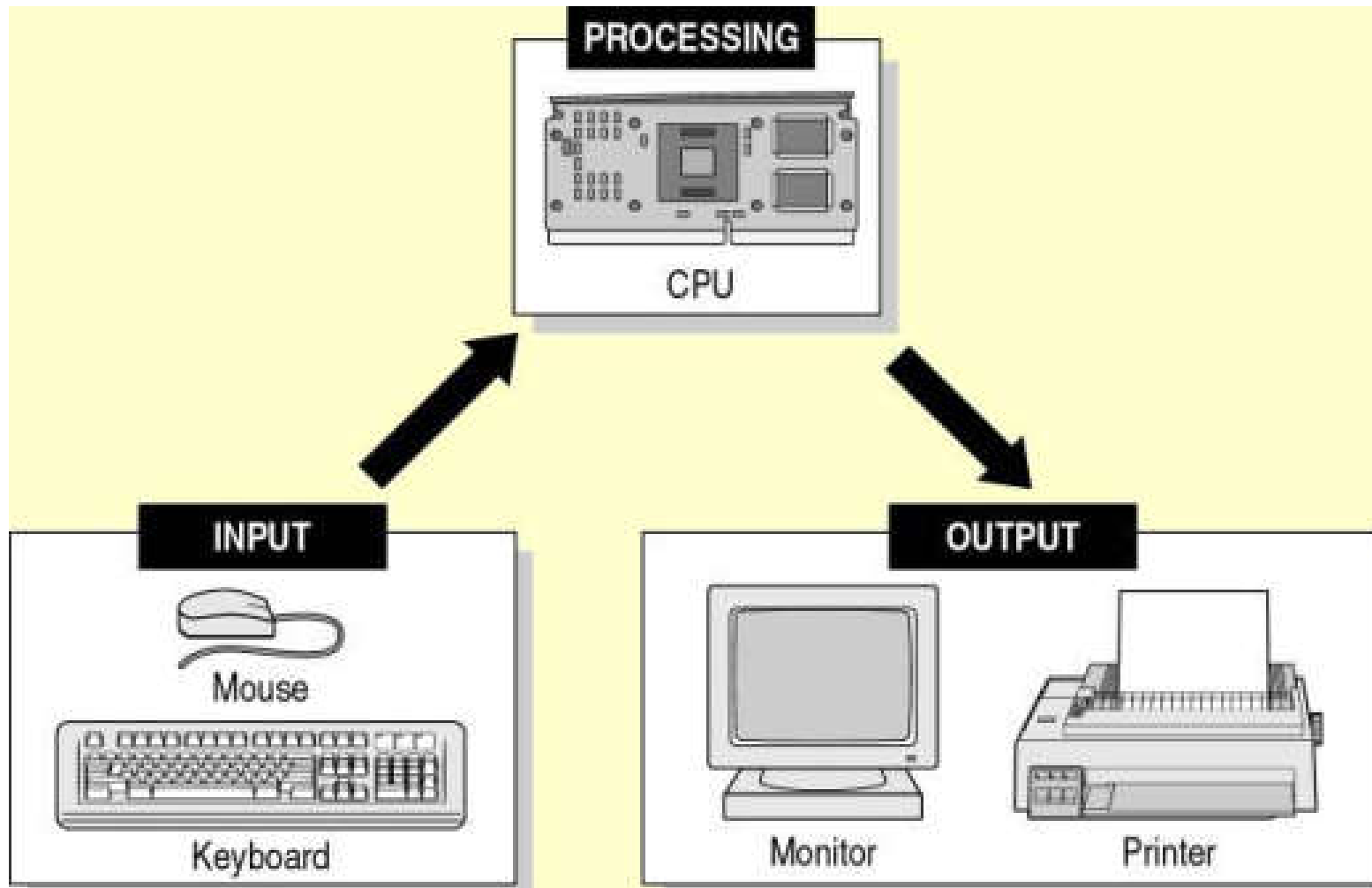


It is possible to divide every information processing system into at least three levels:

1. Accepting input or data,
2. data processing and
3. to be output as the last one.

If the system can hold data in addition to these, a fourth component called data storage is added to these. Devices installed inside or externally connected to the PC are included in one of the "Input and Output (I/O-Input/Output)", "Processing" or "Storage" functional groups.

3 stages of transactions



Computer Components

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graph TD; A[Computer Components] --> B[HARDWARE]; A --> C[SOFTWARE]; B --> D[It is the physical appearance of the computer that should be understood when it comes to hardware.]; C --> E[Software is the general name of the programs used by the computer.]
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HARDWARE

It is the physical appearance of the computer that should be understood when it comes to hardware.

SOFTWARE

Software is the general name of the programs used by the computer.

HARDWARE

- The physical parts of computers that can be touched and seen are called hardware.
- Internal Hardware: It is the hardware inside the computer case.
 - ❖ motherboard, microprocessor, memory, hard disk, ...
- External Hardware: Hardware located outside the case. There are 2 different types of external hardware:
 - ❖ Input devices: keyboard, mouse, microphone, browser, ...
 - ❖ Output devices: display, printer, speaker, plotter, ...

Computer Software (Software)

- The programs required to use the hardware are called software. They are not hand held. They are installed on the computer to perform a specific action [setup]

Software, Program, Program,(By developing software/program, coding,...)

- Word processor programs allow users to write, spread sheet programs to calculate, and presentation programs to make presentations with a computer.
- There are many different software such as programs that play MP3 audio files, show movie files.
- Thousands of different kind of softwares for different purposes.

Operating Systems

- It is the most basic software required for the computer hardware to work.
 - It provides communication between peripheral units and programs. (Copying a text file to a floppy disk, printing it out from a printer, etc. is the task of the operating system.)
 - It provides data communication between programs. (Allows the user to issue various commands and run programs)
 - It manages the system's memory, provides additional facilities such as disk buffering (disk cache) and ensures that the memory is used effectively.
 - Creates a file management system for accessing files in storage devices in a certain order.
 - Provides secure access to resources, especially in multi-user systems.

Some of OS are; DOS, Windows, Unix, Linux, Mac OS...

CASE (AT and ATX)



They are electrostatic boxes that contain the cards that make up the computer, the central processor (CPU), RAM, other expansion cards and protect them from physical damage. The paradigm is changing day by day...



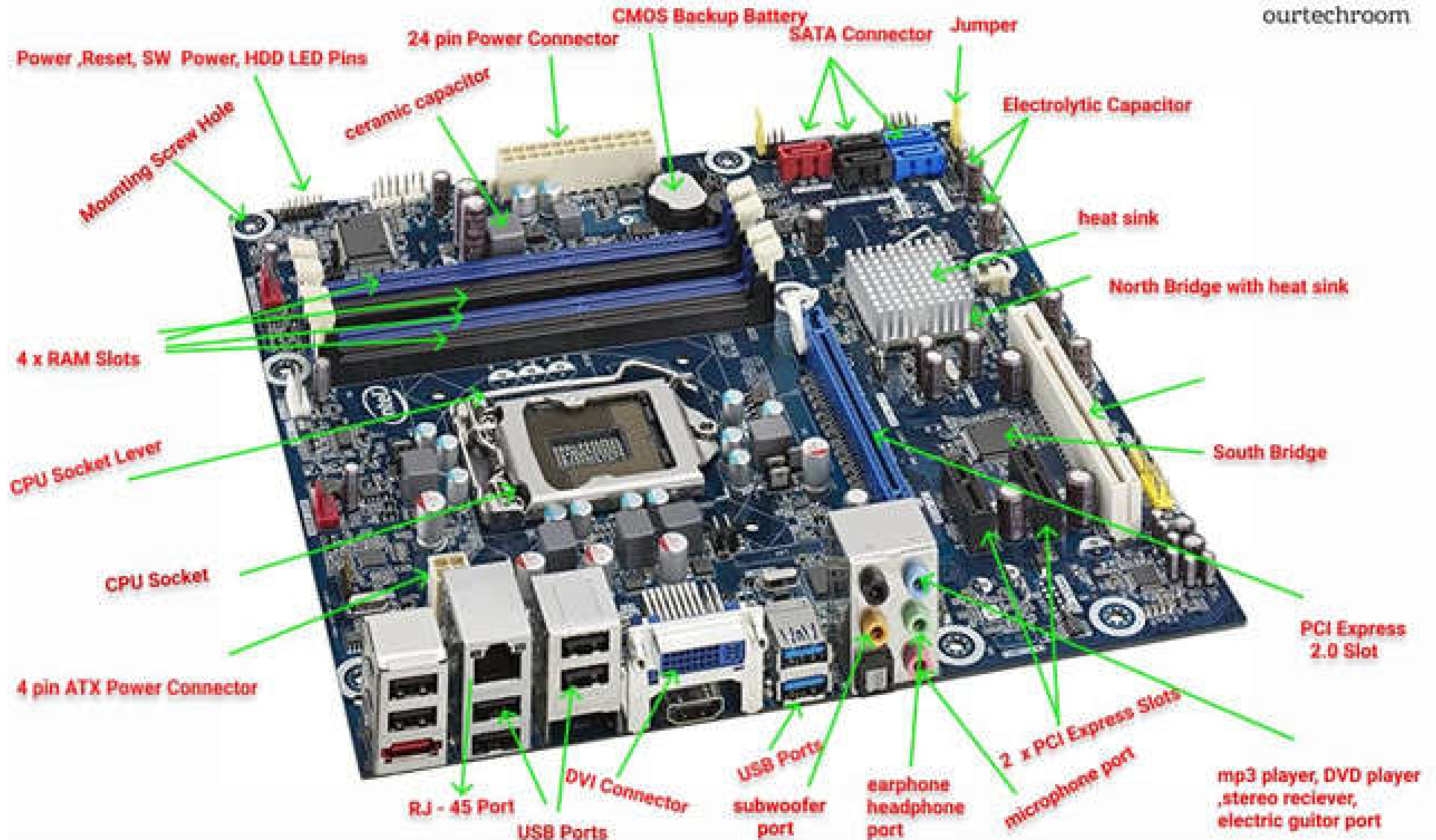
POWER SUPPLY



- Line voltage is 220 volt alternating current.
- Most digital devices in the PC are set to use 5 and 12 volts.
- This conversion process is performed by a power source.
- The power supply is a silver or black box located on the inside of the case, at the rear right.
- Your power supply partly determines how many peripherals you can put in a PC.

Motherboard

- The main board is made of fiberglass, It is usually a dark green plate with copper paths on it.
- On the main board;
 - ❖ microprocessor,
 - ❖ memory,
 - ❖ expansion slots,
 - ❖ BIOS and
 - ❖ other auxiliary circuits.
- The motherboard is called the mother of all cards;
 - ❖ Because the other components of the PC are somehow connected to the motherboard and use the motherboard as a platform to communicate with each other.
 - ❖ So the "nervous system" of the PC is located on the motherboard.



Parts of MotherBoard

CD Drive, Floppy Drive and Disk Drive are connected to the motherboard with cables. Cables types: IDE cable, SCSI cable, Floppy drive cable

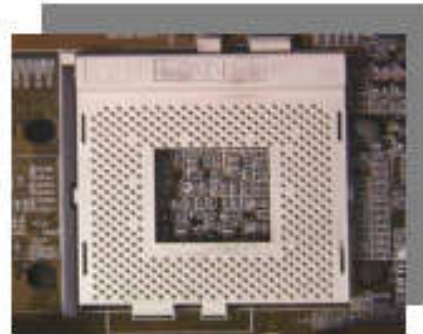
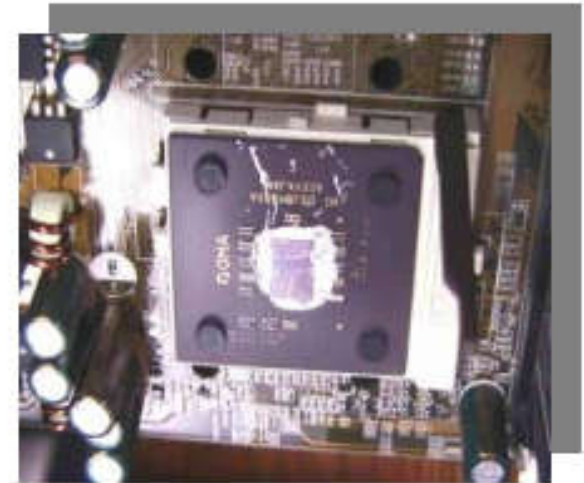
CPU (Central Processing Unit)

(Central Process Unit-CPU) The hardware that executes, controls, directs, calculates and finds the results and directs the operation of other devices in the computer is called the central processing unit (processor). The CPU is often described as the brain of the computer. Because all the operations are done by the CPU. Therefore, the processing capability and speed of a computer is directly related to the capability and speed of its processor.

The processor consists of two parts:

- **Control Unit** It is the unit that controls all the operations performed in the computer. It's responsible for the healthy and proper execution of the transactions. The Control Unit (CU) can be thought of as a manager in a company.
- **Arithmetic and Logic Unit (ALU-Arithmetical Logical Unit)** Makes arithmetic 4 operations (+, -, ×, and ÷) and logical comparisons in the computer.

CPU (Central Processing Unit)



MEMORY

They are environments where information is stored permanently or temporarily.

Main Memory RAM (Random Access Memory):

It is temporary and erasable memory. As a computer user we hear RAM refers to memory. Expressions such as "How much RAM does this computer have", "I have 2 Gigabytes of RAM", "I have increased RAM" actually refer to the main memory of the computer. There may be many processes and data waiting in the Main Memory. We can think of the main memory as a data pool. The incoming data is taken to the processor for processing, the data processed in the processor is sent back to the main memory. In other words, the main memory is a hardware where the data to be processed in the processor is temporarily stored.

The data in the main memory is destroyed when the computer is turned off.

Cache Memory

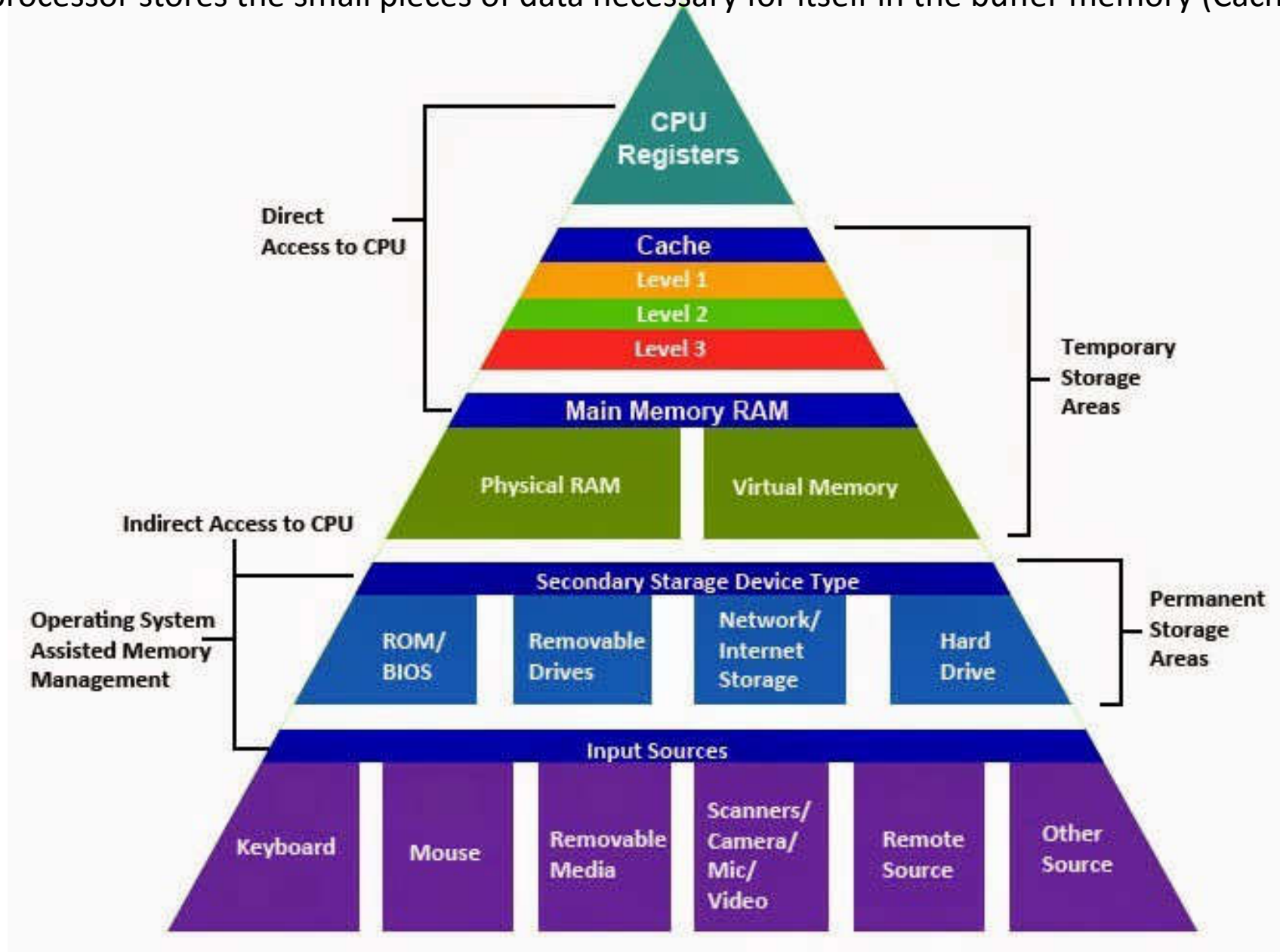
Cache Memory It is a memory that acts between the main memory and the central processing unit and is much faster than the main memory. This memory unit; It is used as a "scratch board" for frequently used computer instructions and temporarily held information during the process. Reduces the time the CPU spends retrieving data from main memory; This speeds up the computer. When the CPU needs to retrieve data from the main memory, it checks whether this data is in the internal cache. The internal cache stores a copy of the data the CPU last processed. If the searched data is not found in the internal cache, the external cache is checked. Data that cannot be found in the external cache is retrieved from the main memory. This is a slower process than caching.

The caches are divided into primary cache (Level 1, L1) and secondary cache (Level 2, L2). Apart from that, they are also classified as internal and external. Internal caches are inside the processor. External caches are external to the processor. The primary cache (L1) is the one closest to the processor. Usually the primary caches are inside the processor and the secondary cache (L2) is outside.

External memory

It is the type of memory in which programs written in RAM, storage data are stored and can be recalled. These are magnetic media (Harddisk, Compact Disk, SSD, Flash disk, Floppy, Cartridge, Tape, Hole Card etc.)

As can be seen in the picture on the side, the processor accesses the memory in different ways. Whether data comes from a fixed storage source (hard disk) or any input source (keyboard, mouse), most of it goes to RAM (Random Access Memory) memory first. After this stage, the processor stores the small pieces of data necessary for itself in the buffer memory (Cache).



Types of RAM

- Only the type of RAM suitable for the motherboard can be used
- Previously used RAM types such as Extended Data Out (EDO-RAM), Synchronous Dynamic (SD-RAM) and Rambus Dynamic (RD-RAM) were replaced by Double Data Rate SDRAM (DDR-RAM) over time. has left.
- Today, DDR2 and DDR3 type RAMs ranging from 533-2000 MHz are widely used.



SD-RAM



DDR-RAM



EDO-RAM



RD-RAM

Role of RAM Memory

Technically, memory is the process of storing electrical data in any form, but today it is used in the sense of fast and temporary storage. If your computer's processor had to constantly access your hard drive, its operating performance would suffer drastically. When data is kept in your computer's memory, your processor can access it many times faster.

All the parts in your computer (such as the processor, hard disk, and operating system) work as a team. Your processor uses memory from when you turn on the computer until you turn it off.

At this stage, we can compare the computer to an office in order to be more comfortable in the minds. The human working in the processor office; The hard disk will be the cabinets where you store your files, and the RAM memory will be your desk. It's wise to keep the files you want to use on the desktop for quick access, so you don't have to go and get them out of the closet every time. RAM Memory, that is, the table is an indispensable part of the office.

ROM/BIOS

- BIOS (Basic Input Output System) The BIOS chip (integrated) contains a program that checks the components during startup and makes them ready for operation. It is a program saved on ROM (Read Only Memory) type memory. Information in this type of memory is not deleted when you turn off the computer.
- Note: The BIOS is stored on Flash ROM on most motherboards manufactured today. The contents of this type of memory are not deleted when you turn off the computer, but can be changed by running a special program when necessary. Thus, the errors contained in the BIOS can be fixed.
- The first task of the BIOS is to warn the user if there is a problem, by checking various parts such as memory during computer startup.
- If you press a special key (usually the DEL key) while the computer is booting, the BIOS setup screen will appear. On this screen, you can change various information and settings, such as the type of hard disk drives, if necessary.

ROM (Read Only Memory)

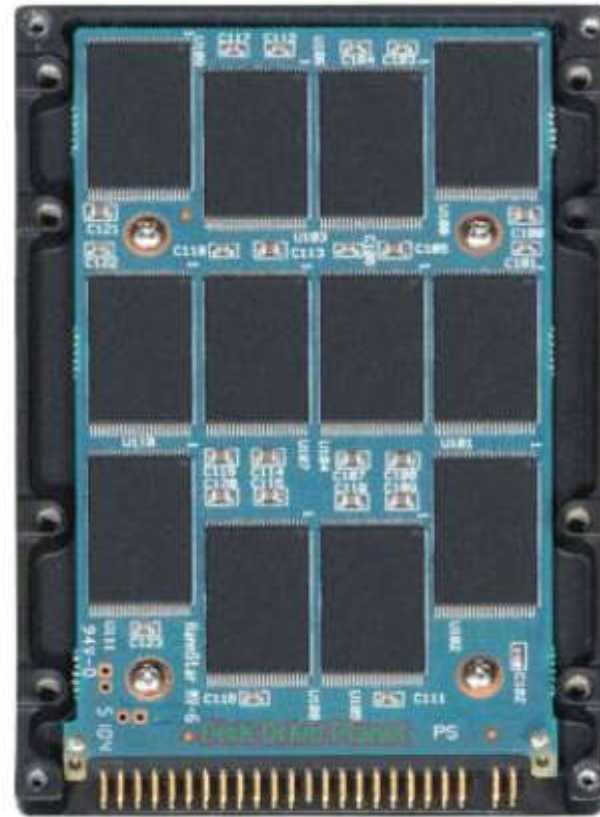
- During the production process are programmed memory types with specific information.
- ROM chips are used not only in the computer but also in many electronic devices.
- ❖ Basically, there are five ROM type:
 - ✓ ROM (Read Only Memory)
 - ✓ PROM (Programmable Read Only Memory)
 - ✓ EPROM (Electrically Programmable Read Only Memory)
 - ✓ EEPROM (Electrically Erasable Programmable Read Only Memory)
 - ✓ Flash memory
- There are basically two aspects to all although the different types of ROM.
 1. This type of information is not lost even if electric memory.
 2. The information stored in these type of memory must be replaced or special procedures are required to be replaced

HARD DRIVES

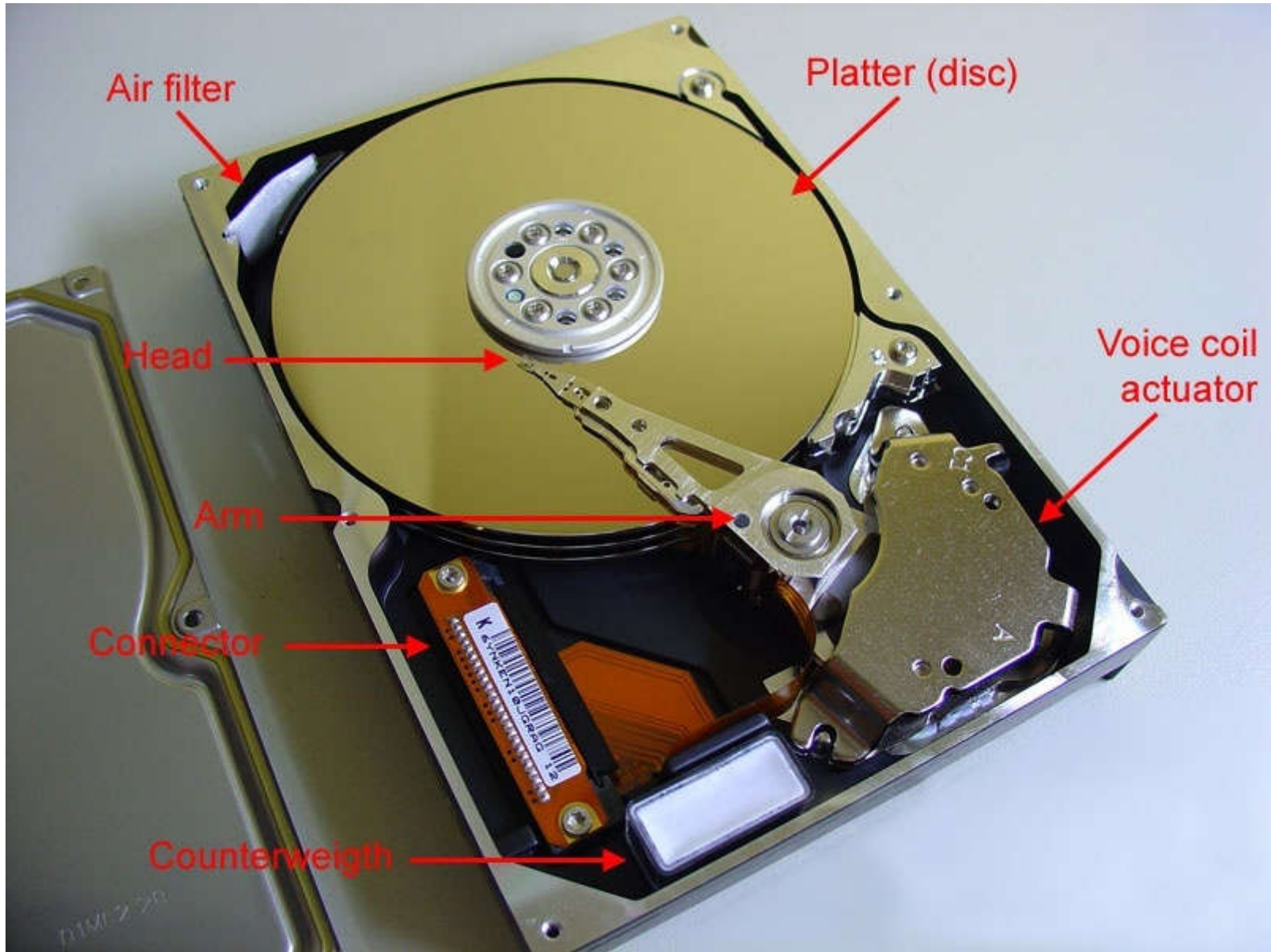
- The hard disk is a warehouse where information is stored, the desired information and files are read from the hard disk, transferred to the memory and processed.
- Hard drives are produced in different storage capacities and at different speeds. (Ex: 40 mb, 40 gb, 80 gb etc.)
- Although SSDs have much faster access than HDDs, hard drives run slower than main memory. For this reason, main memory is needed. The data stored in the computer is stored on hard disks. When this data needs to be used, the data on the hard disk is transferred to the main memory. There is a very fast communication between the main memory and the processor. If there were no main memory, processors would have to wait for data on slow hard disks, which would cause unbearable decreases in computer performance.



YE OLD MECHANICAL DRIVE



*State-of-the-Art
Solid-State Drive*



Hard Drive

- Hard disk is a magnetic recording unit
- Hard drive consists of one or more magnetically inscribed aluminum discs encased in a vacuum (deaerated and friction minimizing) metal box.
- Hard disk speed, known as RPM, means that the higher the RPM, the faster it will run. (Quick operation means faster data transfer)
- The positions of these magnets standing next to each other on the hard disk consisting of millions of small magnets form the numbers "0" and "1".
- 1 Gb disk contains 8,589,934,592 (8 billion 589 million 934 thousand 592) small magnets, and data can be read or changed by changing the direction of millions of them per second.

What Does a HDD Consist of?

- Hard disks consist of several disks that rotate around a center. These discs are made of aluminum and covered with smooth iron oxide to create a magnetic field.
- Used for reading/writing the information on the disc in HDD

Drive motor

Read / write heads

Stepper motor

The control circuit



SSD

Compared to HDD's, their technology is completely different. SSDs do not have spinning disks. SSDs contain memory modules inside, have no moving parts, so they are quiet, get very little heat, and can copy and write data at high speeds. They are impact resistant and are not affected by vibration.



Memory Units

- Bit is called the smallest memory unit.
- 1 Bit consist 0 or 1 (closed circuit = 0, open circuit = 1). Byte is used to express a character formed by a combination of 8 bits.

1024 Byte = 1 KiloByte (KB)

1024 KB = 1 MegaByte (MB)

1024 MB = 1 GigaByte (GB)

1024 GB = 1 TerraByte (TB)

Floppy Disc

- Floppy Disc reads or writes data to disk.
- It can be placed inside the computer case or it can be connected as an external unit.
- They are called by different names according to their read and write disk type.(Magnetic Floppy Disc, Optical Floppy Disc



CD-ROM



- CD drives, called CD-ROMs, began to be widely used in PCs in the early 90s, with their prices getting cheaper. The capacity of CDs was 650MB in the beginning, but later increased to 700MB.
- CD printers first developed in 1998 ,They have the ability to read information addition to write information on blank CDs. There are 2 types of blank CDs:
 1. CD-R: information can be written only once.
 2. CD-RW: Many times data can be written.
- The numbers on CD drives and writers indicate the speed of reading and writing information. 1X means 150 KB/s of information per second. (52X = 7,800KB/s)
- A 52x32x52 burner reads all discs at 52 speeds, writes to CD-RWs at 32 speeds, and writes to CD-R discs at 52 speeds.

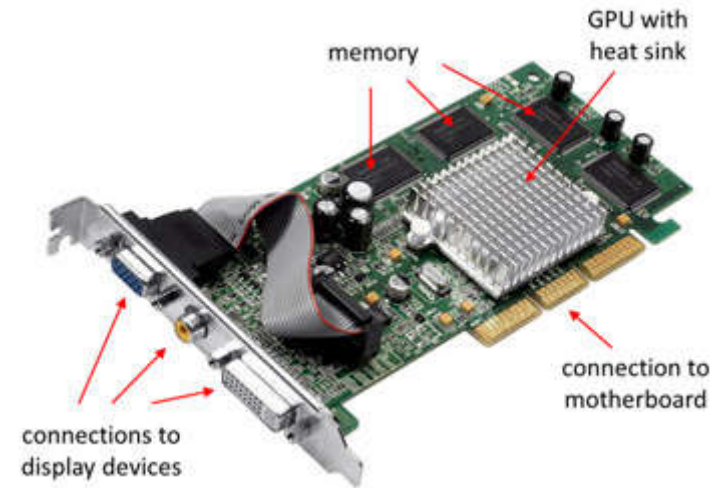
DVD Driver and Printer



- DVD discs, which emerged towards the end of the 90s, have a higher capacity than CDs. Single layer DVD discs can store 4.7GB, double layer (double layer) ones can store 8.5GB.
- DVD drives and printers became widespread in the 2000s as their prices became cheaper.
- On DVD, 1X means 1385KB per second. 16X DVD drives and burners are 3 times faster than 52X CDs at 22MB/s

Display Card

- Display is the computer's image output unit.
- Image occurs on the screen.
- Digital information generated by the computer is sent to the screen by turning the video signal.
- This unit also called graphics card can be an individual card sometimes it produced as integrated on the motherboard.



SOUND CARD

- Sound card is hardware that audio to be recorded and for computer to send audio to other devices.
- Sound cards such as graphics cards consist integrated of some motherboards.
- We can voice input Thanks to a microphone and we can audio output thanks to speaker



Network Card



- Network cards used to connect computers to each other with the cable.
- They communicate to other computers on the network card with cable converts digital data into electrical signals. It transmits these signals to the computer converts to digital data.
- It is known as WiFi 802.11g wireless connection speed 54 Mbit / s

Monitor (Screen) Output Device

- It is a device that allows us to see the video signal from a computer.
- They work on the same principle with televisions. There are two types of CRT and LCD: CRT: It is large size and heavy due to the image tube.
- LCD: It creates an image with liquid crystals. It is thin and light

Printer Output Device

- It is device that is used for text, graphics and images transfer to the paper.
- There are 3 types :
- **Dot matrix:** It get outputs with a needle in contact with the paper hit an ink ribbon.It works noisy and slow.
Inkjet:It works by spraying ink onto the paper in different colors.
Laser: Electrostatically marks the location of data to be written on paper with laser and paste called toner powder to the area.Due to take rapid output used in offices

Keyboard and Mouse Input Devices

Keyboard: It has developed an input tool on the characters, numbers, and where necessary with other key.

Mouse: Used in a graphical environment, to mark objects on the screen and input tool used to select it



Scanners and Microphone

Input Device

Scanners : It converts text, graphics and photos on paper to digital information.

Microphone: Sound is transferred to the sound card. Sound card allows the audio to be converted to digital information