



Computer Science

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Lessons in Computer Science

Submitted to the Public Health Department -The University of Basrah

Outline

➤ Memory

- RAM
- ROM
- Cache memory
- Virtual memory
- Secondary Memory



Memory

Memory is storage part in computer, it refers to the devices or components used to store data and instructions for processing by the CPU.

It is store the data, information, programs either temporarily or permanent basis.

Memory used as important role in saving and retrieving data.



RAM

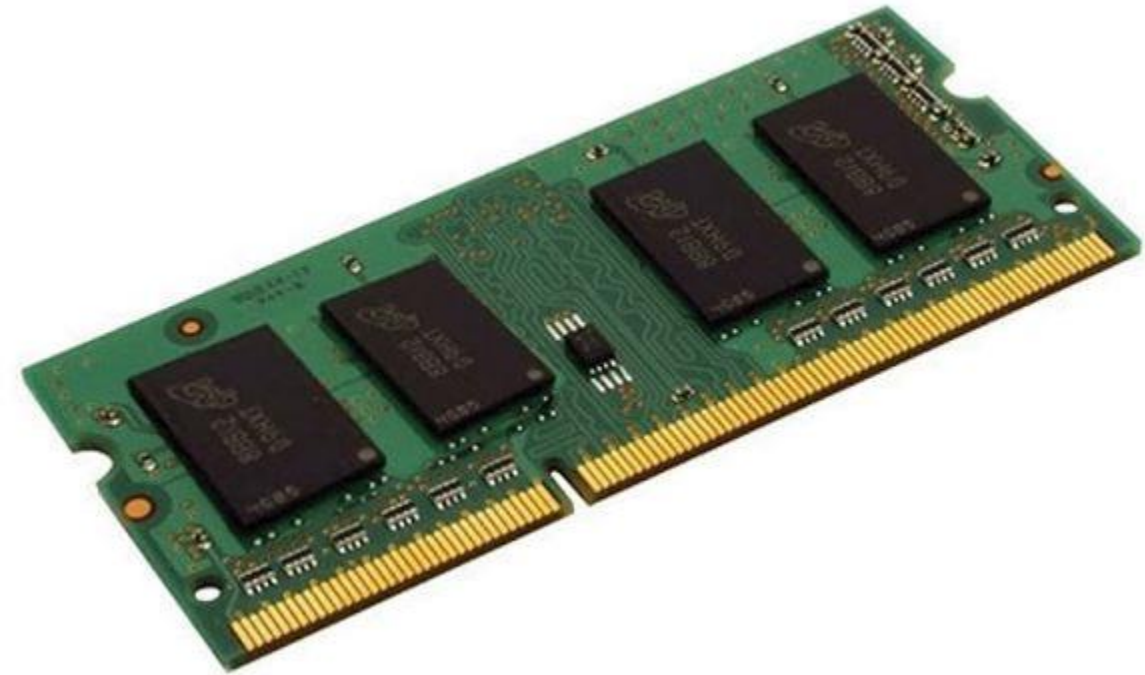
RAM is short-term memory, also called main memory and primary memory.. It is the abbreviation of random access memory.

RAM is a type of memory that is directly accessible to the CPU (Central Processing Unit) of a computer. It is used to store data and instructions that the CPU needs to access quickly in the course of executing a program.



RAM

RAM is volatile, which means it is erased when the power is turned off. It is also temporary, meaning it only stores data and instructions while the computer is powered on. When the computer is turned off, the data and instructions stored in it are lost.



RAM

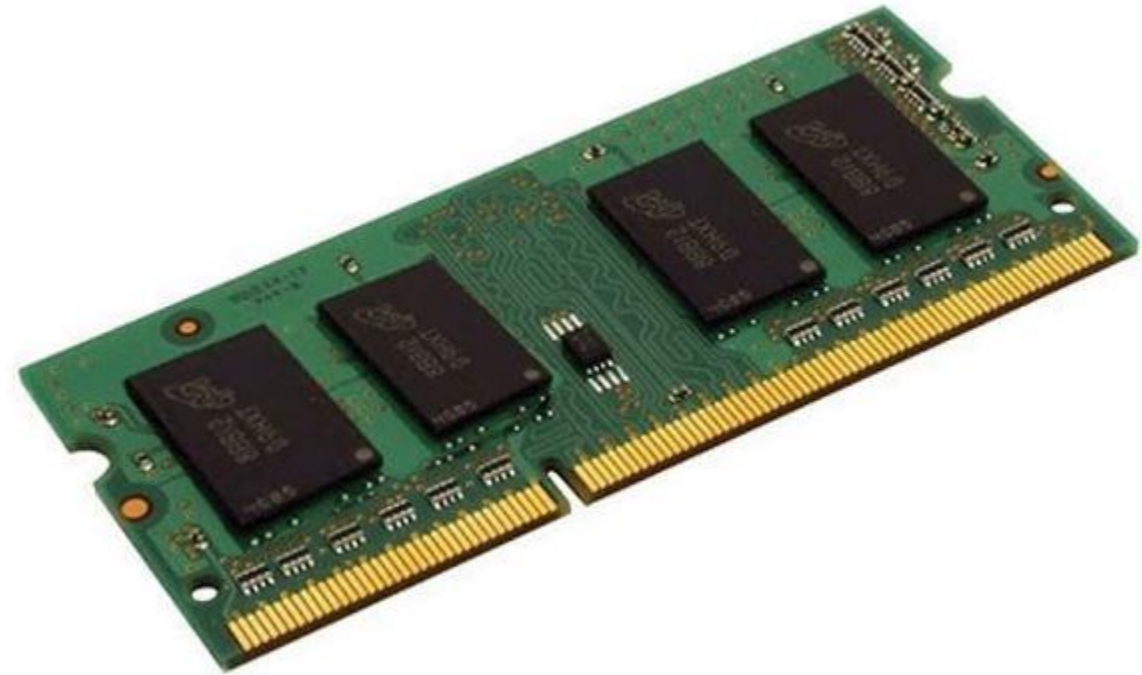
Data, information, and instructions from applications and the operating system are stored temporarily in RAM, which is usually several chips on a circuit board called a memory module that is plugged into the motherboard.



RAM

The amount of RAM in your computer has a significant effect on performance.

If you have plenty of RAM, the operating system can manage memory easily and provide RAM as the CPU and applications request it.



RAM

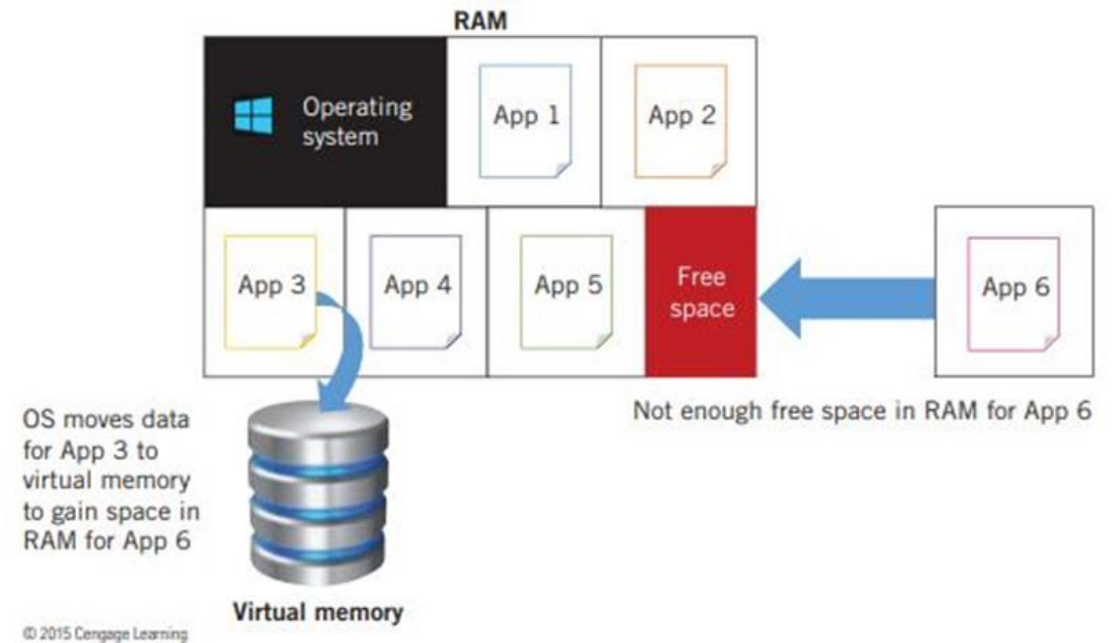
The size of a computer's RAM (Random Access Memory) depends on the model of the computer and the operating system being used.

In general, the size of RAM in personal computers ranges from 4 gigabytes to 64 gigabytes, but there may be computers with larger or smaller amounts of RAM.

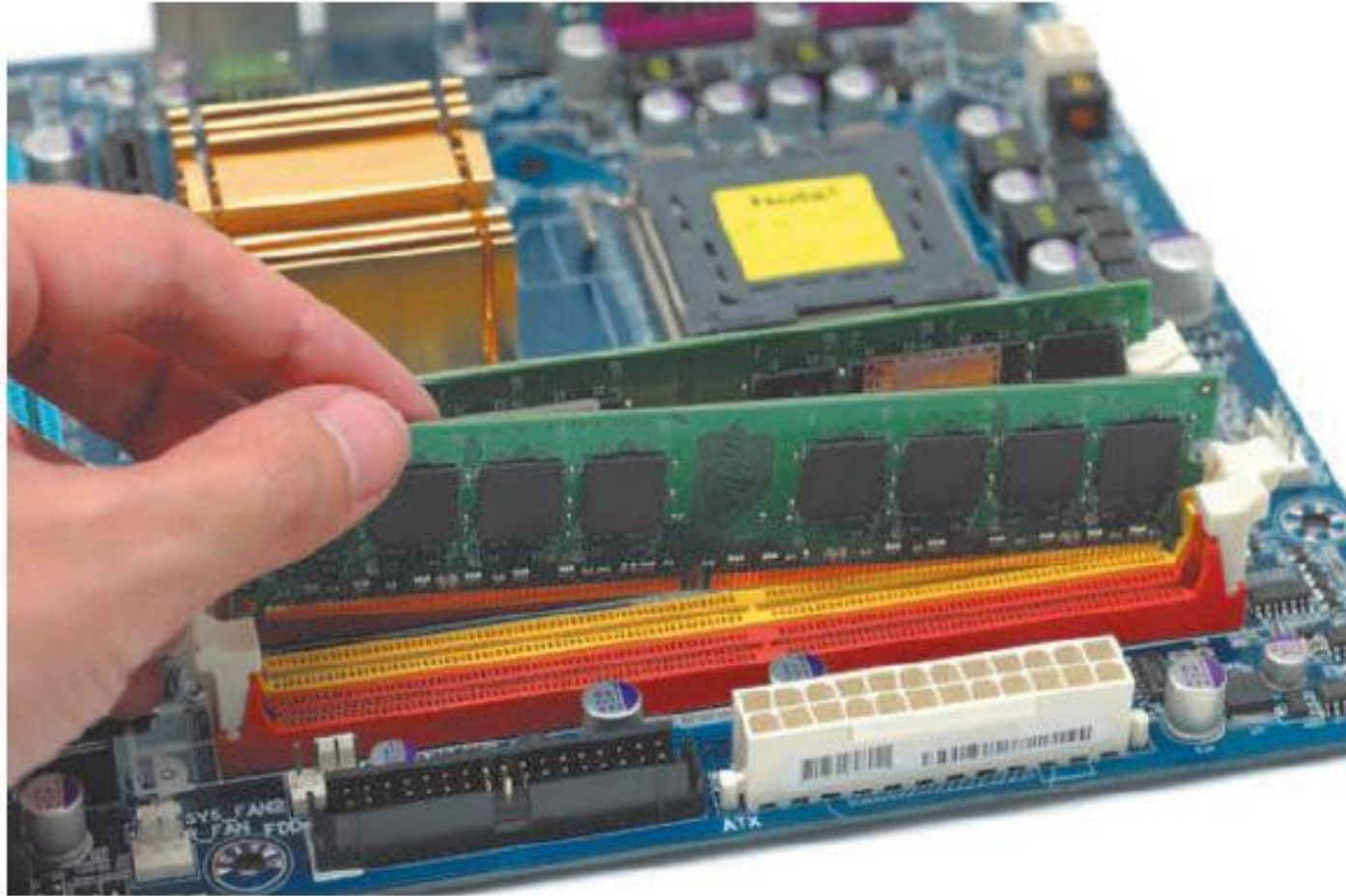


RAM

When you start an application, the operating system allocates RAM to that application. When you close an application, the operating system reclaims the RAM to assign it to another program. If you run more than one application at the same time, the computer can run out of RAM. In that case, the operating system might close an application or shut down the computer unexpectedly (this is called a crash). To prevent crashes and gain memory, operating systems take advantage of virtual memory, which is part of a computer's hard disk that can work as additional RAM.



RAM

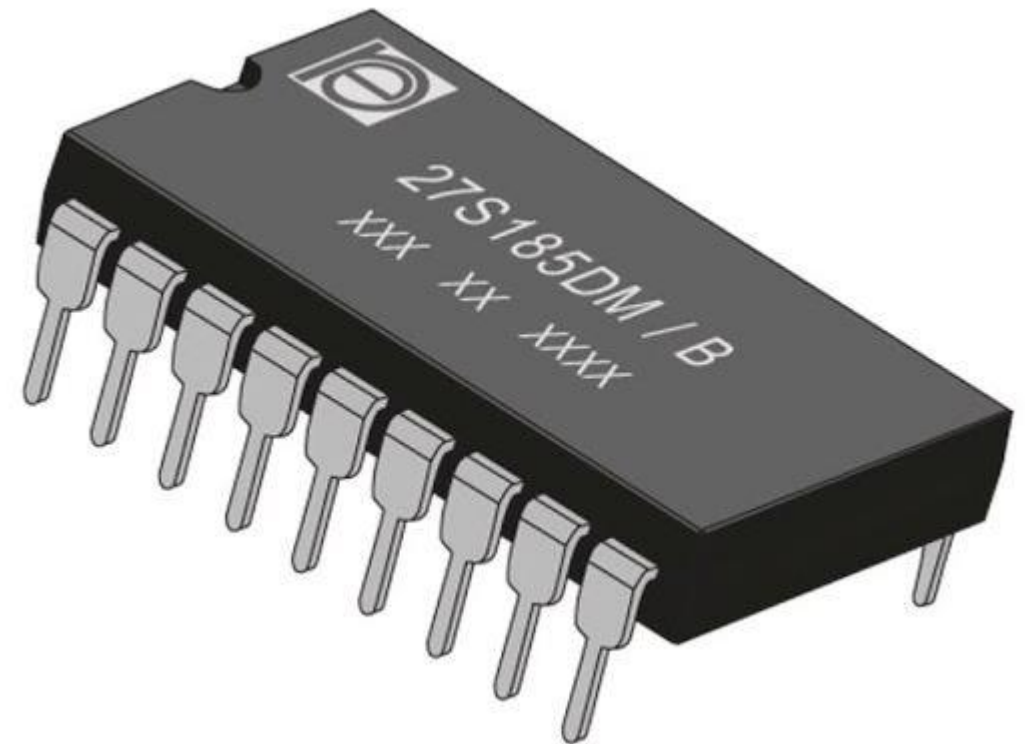


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ROM

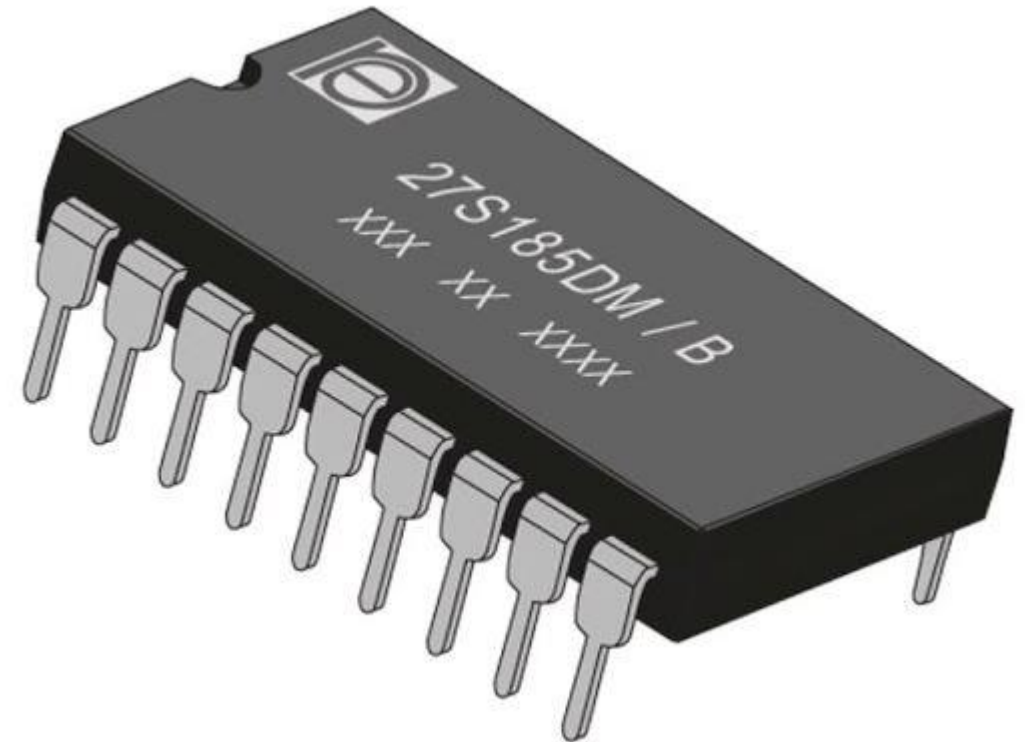
ROM (Read-Only Memory) is a type of permanent memory used in computers to store data that cannot be modified or deleted.

ROM is a single-use memory and cannot be written to after it has been programmed, making it suitable for storing the permanent data that the operating system needs to function.



ROM

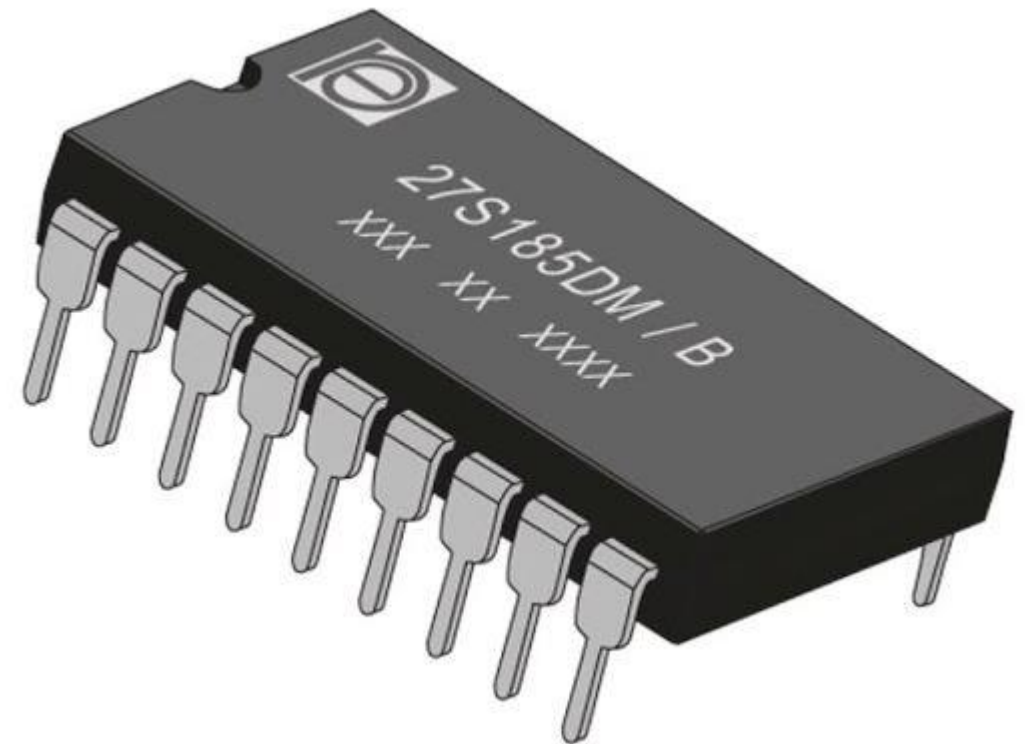
ROM is used to store the instructions that are needed to start up the computer, also known as the "bootstrap" or "boot" instructions. When you turn on a computer, the CPU retrieves these instructions from ROM and uses them to start the computer's operating system and other essential software..



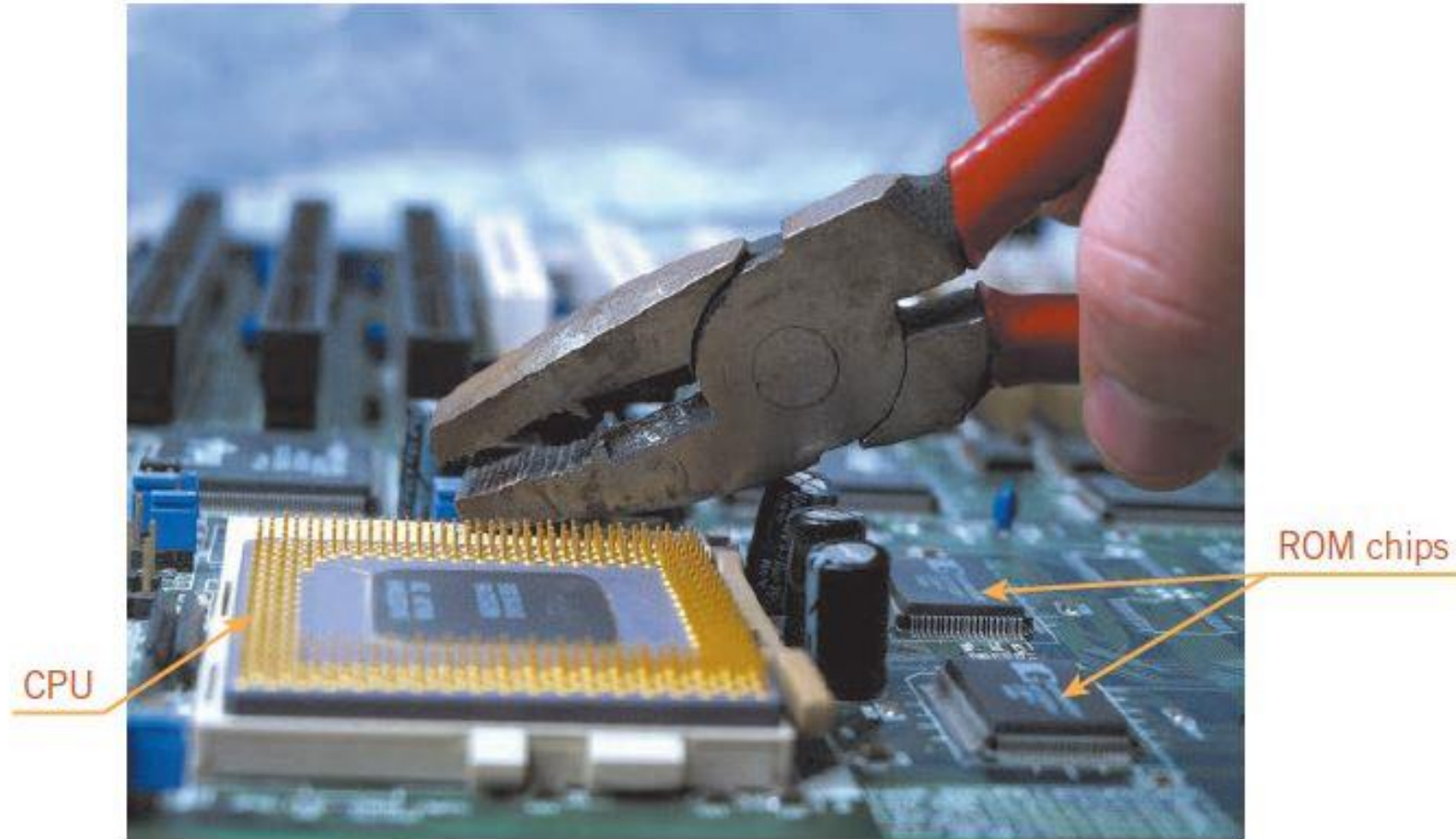
ROM

It's important to note that ROM is not the same as the permanent storage device where the operating system is saved.

The operating system is typically saved on a hard drive or flash drive and is loaded from there into RAM for continuous use.



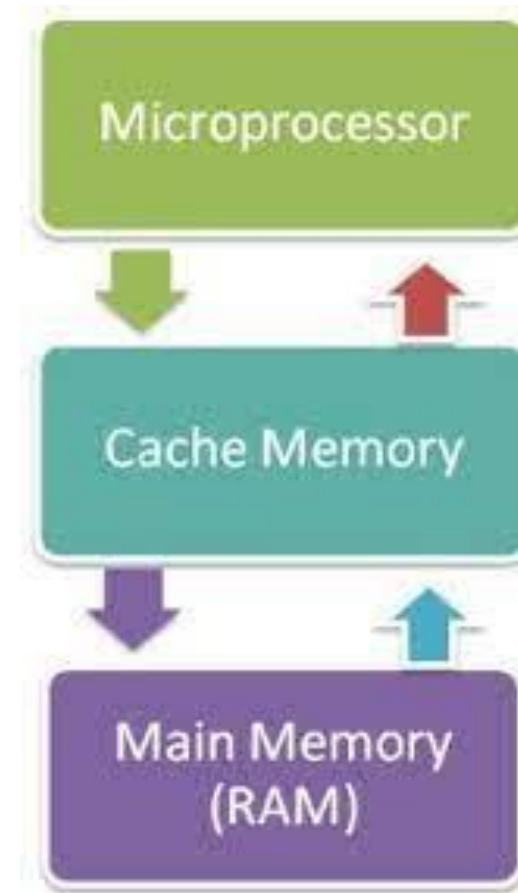
ROM



Cache memory

Cache memory, also known as cache, is a type of high-speed memory that is used to store frequently accessed data in a computer.

It is located between the CPU (Central Processing Unit) and the main memory of the computer, and is used to improve the speed at which the CPU can access data.



Cache memory

Because it takes longer to transfer data stored in RAM to the CPU than it takes the CPU to actually process the data, the CPU bypasses this bottleneck by storing a small amount of memory on the CPU itself, where it is almost instantly available.



Cache memory

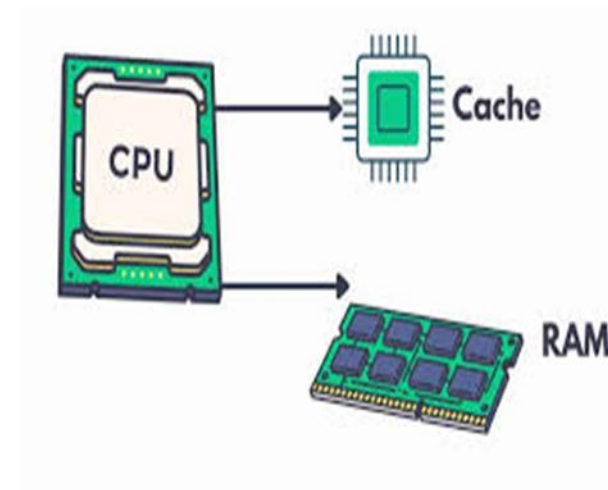
This memory is temporary storage area, is more readily available to the processor than the computer's main memory source.

It is also called CPU memory because it is typically integrated directly into the CPU chip or placed on a separate chip with a bus interconnect with the CPU



Cache memory

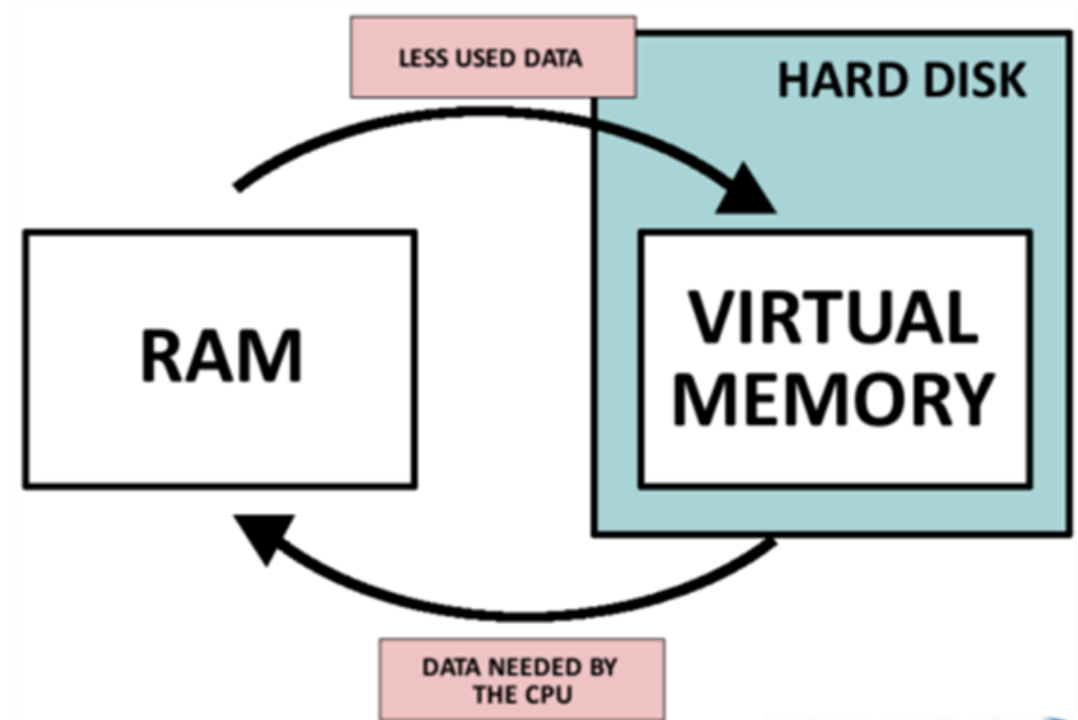
Cache memory works by storing copies of frequently used data from the main memory in a faster, more easily accessible location. When the CPU needs to access this data, it first checks the cache memory to see if the data is already stored there. If it is, the CPU can retrieve the data from the cache memory quickly, which speeds up the overall performance of the computer. If the data is not stored in the cache memory, the CPU must access the main memory to retrieve it, which is a slower process.



Virtual memory

Virtual memory is a feature of an operating system (OS) that enables a computer to be able to compensate for shortages of physical memory by temporarily transferring pages of data from random access memory (RAM) to disk storage.

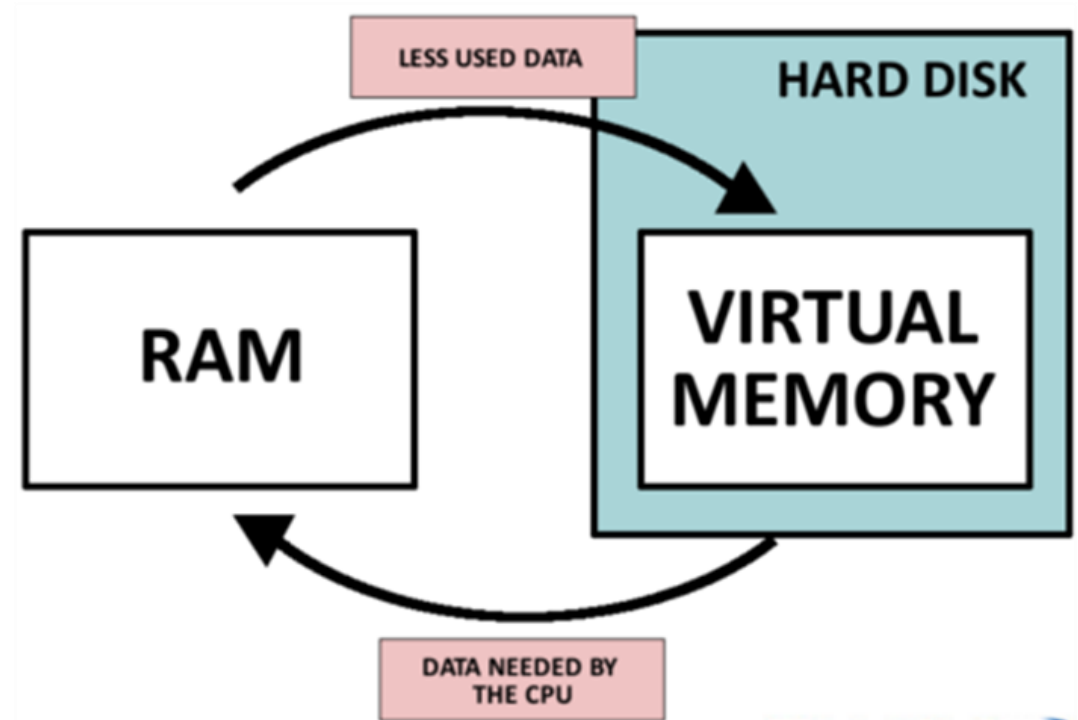
This enables a computer to run larger applications or multiple applications at the same time, even if it does not have enough physical memory to support all of the applications simultaneously.

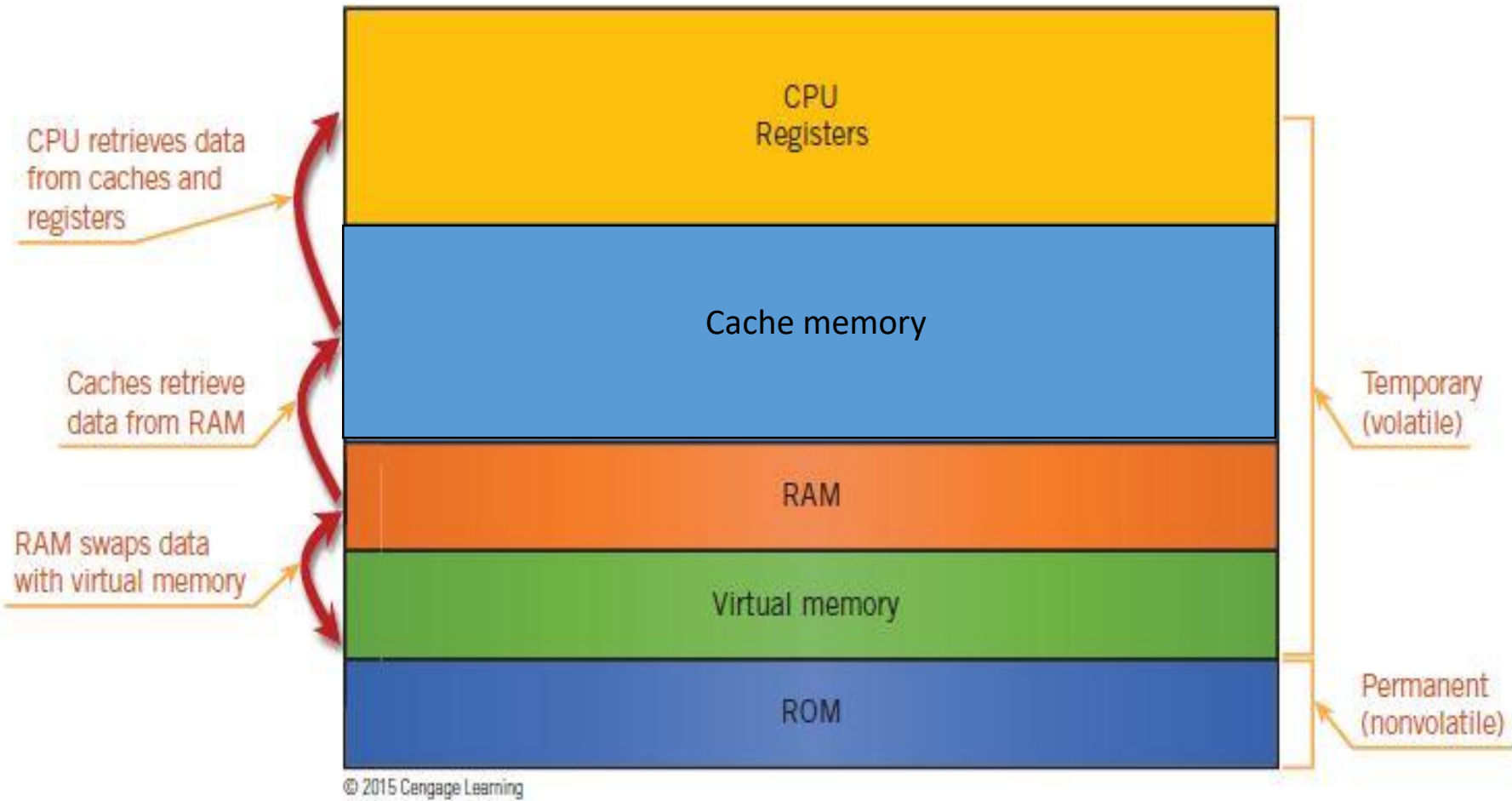


Virtual memory

When a computer is running low on physical memory, the operating system will move some of the inactive data from RAM to a special file called a paging file or swap file that is stored on the hard drive.

This frees up space in RAM to allow the computer to continue running smoothly. When the data is needed again, it is retrieved from the paging file and transferred back into RAM.





Secondary Memory

Secondary memory, also known as external memory or auxiliary storage, refers to storage devices that are external to a computer's central processing unit (CPU) and main memory. These devices are used to store data and programs that are not currently in use by the CPU, but may be needed by the computer in the future.



Types of Secondary Memory

Hard disk drive (HDD): This is a mechanical storage device that stores data on rapidly spinning disks. HDDs are relatively inexpensive and have a large capacity, but they are slower than other types of secondary memory and are vulnerable to physical damage.



Secondary Memory

Solid-state drive (SSD): This is an electronic storage device that stores data on memory chips. SSDs are faster than HDDs and are more durable, but they are generally more expensive and have a lower capacity.



Secondary Memory

Optical storage: This type of secondary memory stores data on a CD, DVD, or Blu-ray disc, which can be read by a laser. Optical storage is relatively inexpensive, but it has a limited capacity and is relatively slow compared to other types of secondary memory.



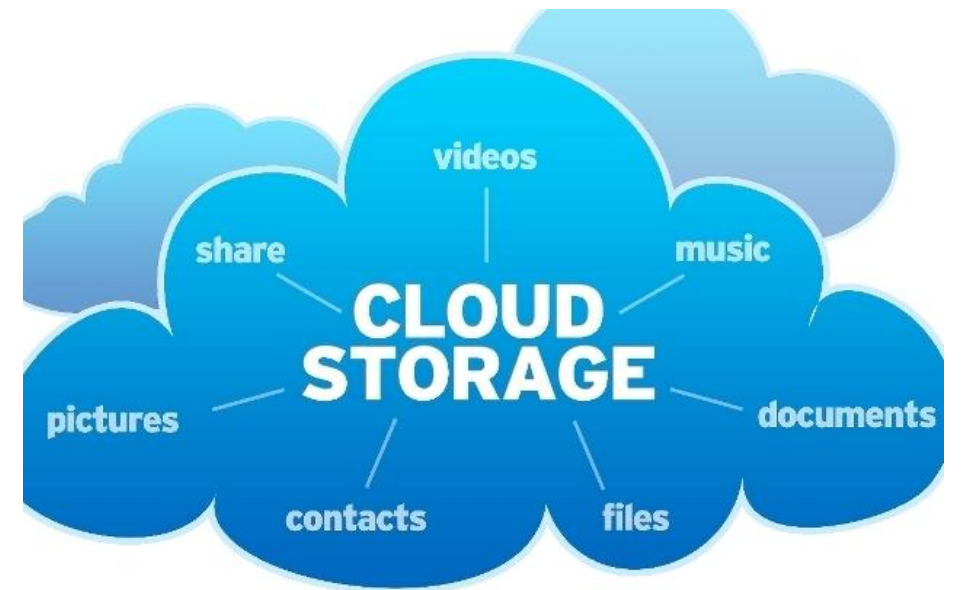
Secondary Memory

Magnetic tape. This is a thin strip of plastic coated with magnetic material, used for storing data. Magnetic tape is relatively inexpensive and has a high capacity, but it is slow and prone to physical damage.



Secondary Memory

Cloud storage: This is a type of secondary memory that is not physically connected to the computer, but rather is stored on remote servers and accessed over the internet. Cloud storage is convenient and can have a large capacity, but it requires an internet connection to access the data and is subject to the security and reliability of the provider.



Thank you

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