



CPU

The CPU, central processing unit, or the processor chip is what will process the 1's and 0's into acceptable information requested by you, the user. Most computer specialists call this component of the system unit the "brain" of the computer. Now think of your own brain. How does it work? Your brain will process data into meaningful information after it is entered via your eyes, ears, mouth, or touch. These aspects of your body are considered input streams. What are some input streams on your computing device? The point is that the data must get into the CPU for processing. Processing involves some key activities. These activities also illustrated in your courseware make up the **machine cycle** consisting of

- fetching instruction
- decoding the instruction
- Executing the instruction
- and storing the result.

Further, the CPU activities may involve the **control unit** or the **arithmetic/logic unit (ALU)**; they also include the registers, or high-speed storage areas connected by electrical components of your motherboard called a bus. You will see other concepts identified such as a microprocessor or microcontroller chip—this is the CPU etched into your computing device. Intel Corporation or Advanced Micro Devices (AMD) manufacture microprocessors for most of our computing devices. That is why you will see on your laptop, "intel inside."

Processors Explained for Beginners [Guide](#)

With all the processing of data into information, there are several sources of storing the data and information. You courseware outlines a number of primary (temporary) and secondary (permanent) storage requirements and options to include the following:

RAM (random access memory) chips temporarily hold (a) software instructions and (b) data before and after they are processed by the CPU. Because RAM's contents are temporary (primary memory), RAM is said to be volatile—the contents are lost when the power is turned off.

Three types of RAM exist:

- DRAM—The first type (pronounced "dee-ram"), DRAM (dynamic RAM), must be constantly refreshed by the CPU or it will lose its contents. Faster variations of the basic DRAM include SDRAM (synchronous dynamic RAM), which is synchronized by the system clock; DDR-SDRAM (double-data rate synchronous dynamic RAM), and its later variations DDR2 and DDR3; and RDRAM (Rambus DRAM), which is much faster than SDRAM.
- SRAM—The second type, static RAM, or SRAM (pronounced "ess-ram"), is faster than DRAM and retains its contents without having to be refreshed by the CPU.
- MRAM—The third and newer type is MRAM (pronounced "em-ram" and short for magnetoresistive RAM), which stores data using magnetic charges rather than electric charges and is faster and stores more data than electronic RAM. MRAM retains its contents when the power is shut off.

For youtube.com video tutorials on RAM, go to:

[Link 1](#)

Cache Memory

Three kinds of cache:

- Level 1 (L1) cache: part of the microprocessor chip—Level 1 cache is built into the processor chip. Ranging from 8 to 128 kilobytes, its capacity is less than that of Level 2 cache, although it operates faster.
- Level 2 (L2) cache: not part of the microprocessor chip—Level 2 is the kind of cache usually referred to in computer ads. Level 2 cache resides outside the processor chip and consists of SRAM chips. Most new systems have at least 1–6 megabytes of cache.
- Level 3 (L3) cache: on the motherboard—Level 3 cache is a cache separate from the processor chip on the motherboard. It is found on very high-end computers. On personal computers it holds 2–8 megabytes.

Cache is not upgradable; it is determined by the type of processor chip used in the computer.

Additional Information: Cache

[Link 3](#)

Virtual Memory—In addition to including cache, most current computer operating systems allow for the use of virtual memory—that is, some free hard-disk space is used to extend the capacity of RAM. The processor searches for data or program instructions in the following order: first L1, then L2, then RAM, then hard disk (or CD). In this progression, each kind of memory or storage is slower than its predecessor.

Additional Information: [Virtual Memory](#)

How to increase virtual memory in Windows:

[Link 4](#)

ROM

Unlike RAM, to which data is constantly being added and removed, **ROM (read-only memory)** cannot be written on or erased by the computer user without special equipment. ROM chips contain fixed start-up instructions—programs that are built in at the factory—that are necessary for basic computer operations. ROM tells the computer how to load the operating system (BIOS programs). These chips are nonvolatile; their contents are not lost when power to the computer is turned off.

Read versus Write—In computer terminology, read means to transfer data from an input source into the computer’s memory or CPU. The opposite is write—to transfer data from the computer’s CPU or memory to an output device. Thus, with a ROM chip, read-only means that the CPU can retrieve programs from the ROM chip but cannot modify it or add to those programs. A variation is PROM (programmable read-only memory), which is a ROM chip that allows you, the user, to load read-only programs and data. However, this can be done only once.

Additional Information: BIOS

[Link 5](#)

[Link 6](#)

Flash Memory

A nonvolatile form of memory, **flash memory chips** can be erased and reprogrammed more than once. Flash memory, which doesn’t require a battery and which can range from 2 gigabytes to 256 gigabytes in capacity, is used to store programs not only in personal computers but also in pagers, cellphones, MP3 players, printers, and digital cameras. Flash memory is also used in newer PCs for BIOS instructions; they can be updated electronically on flash memory—the chip does not need to be replaced, as a ROM chip would.

CMOS

Pronounced “see-moss,” **CMOS (complementary metal-oxide semiconductor)** chips are powered by a battery and thus do not lose their contents when the power is turned off. CMOS chips contain flexible start-up instructions—such as time, date, and calendar—that must be kept current even when the computer is turned off. Unlike ROM chips, CMOS chips can be reprogrammed, as when you need to change the time for daylight saving time.

Additional Information: [CMOS](#)



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