EXPERIMENT NO.1

**INTERNAL PARTS OF COMPUTER**

**Processor:**



* A processor is the logic circuitry that responds to and processes the basic instructions that drive a computer.
* The four primary functions of a processor are fetch, decode, execute and writeback.
* The term processor is used interchangeably with the term central processing unit ([CPU](http://searchcio-midmarket.techtarget.com/definition/CPU)), although strictly speaking, the CPU is not the only processor in a computer.
* The [GPU](http://searchvirtualdesktop.techtarget.com/definition/GPU-graphics-processing-unit)(graphics processing unit) is the most notable example but the hard drive and other devices within a computer also perform some processing independently. Nevertheless, the term processor is generally understood to mean the CPU.

The processor in a personal computer or embedded in small devices is often called a [microprocessor](http://whatis.techtarget.com/definition/microprocessor-logic-chip). That term simply means that the processor's elements are contained on a single integrated circuitry ([IC](http://whatis.techtarget.com/definition/integrated-circuit-IC)) [chip](http://whatis.techtarget.com/definition/microchip).

**FIRMWARE:**



Firmware is a software program or set of instructions programmed on a hardware device. It provides the necessary instructions for how the device communicates with the other computer hardware. But how can software be programmed onto hardware? Good question. Firmware is typically stored in the flash [ROM](https://techterms.com/definition/rom) of a hardware device. While ROM is "read-only memory," flash ROM can be erased and rewritten because it is actually a type of [flash memory](https://techterms.com/definition/flashmemory).

**RAM (Random Access Memory):** RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

**RAM is of two types −**

* Static RAM (SRAM)
* Dynamic RAM (DRAM)

**Static RAM (SRAM)**

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis.

**Dynamic RAM (DRAM)**

DRAM, unlike SRAM, must be continually **refreshed** in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory as it is cheap and small. All DRAMs are made up of memory cells, which are composed of one capacitor and one transistor.

**Synchronous Dynamic RAM (SDRAM)**

SDRAM is a classification of DRAM that operates in sync with the [CPU clock](https://www.lifewire.com/bios-settings-831400), which means that it waits for the clock signal before responding to data input (e.g. user interface). By contrast, DRAM is asynchronous, which means it responds immediately to data input. But the benefit of synchronous operation is that a CPU can process overlapping instructions in parallel, also known as ‘pipelining’ – the ability to receive (read) a new instruction before the previous instruction has been fully resolved (write).

Although pipelining doesn’t affect the time it takes to process instructions, it does allow more instructions to be completed simultaneously. Processing one read and one write instruction per clock cycle results in higher overall CPU transfer/performance rates. SDRAM supports pipelining due the way its memory is divided into separate banks, which is what led to its widespread preference over basic DRAM.

**SDR SDRAM** is the expanded term for SDRAM – the two types are one and the same, but most frequently referred to as just SDRAM. The ‘single data rate’ indicates how the memory processes one read and one write instruction per clock cycle. This labelling helps to clarify comparisons between SDR SDRAM and DDR SDRAM:

* DDR SDRAM is essentially the second generation development of SDR SDRAM.

**Double Data Rate Synchronous Dynamic RAM (DDR SDRAM)**

DDR SDRAM operates like SDR SDRAM, only twice as fast. DDR SDRAM is capable of processing two read and two write instructionsper clock cycle (hence the ‘double’). Although similar in function, DDR SDRAM has physical differences (184 pins and a single notch on the connector) versus SDR SDRAM (168 pins and two notches on the connector). DDR SDRAM also works at a lower standard voltage (2.5 V from 3.3 V), preventing backwards compatibility with SDR SDRAM.

* DDR2 SDRAM is the evolutionary upgrade to DDR SDRAM. While still double data rate (processing two read and two write instructions per clock cycle), DDR2 SDRAM is faster because it can run at higher clock speeds. Standard (not [overclocked](https://www.lifewire.com/what-is-overclocking-832454)) DDR memory modules top out at 200 MHz, whereas standard DDR2 memory modules top out at 533 MHz. DDR2 SDRAM runs at a lower voltage (1.8 V) with more pins (240), which prevents backwards compatibility.
* DDR3 SDRAM improves performance over DDR2 SDRAM through advanced signal processing (reliability), greater memory capacity, lower power consumption (1.5 V), and higher standard clock speeds (up to 800 Mhz). Although DDR3 SDRAM shares the same number of pins as DDR2 SDRAM (240), all other aspects prevent backwards compatibility.
* DDR4 SDRAM improves performance over DDR3 SDRAM through more advanced signal processing (reliability), even greater memory capacity, even lower power consumption (1.2 V), and higher standard clock speeds (up to 1600 Mhz). DDR4 SDRAM uses a 288-pin configuration, which also prevents backwards compatibility.

### Graphics Double Data Rate Synchronous Dynamic RAM (GDDR SDRAM)

GDDR SDRAM is a type of DDR SDRAM that is specifically designed for video graphics rendering, typically in conjunction with a dedicated [GPU (graphics processing unit) on a video card](https://www.lifewire.com/what-is-a-video-card-2618161). Modern PC games are known to push the envelope with incredibly realistic high-definition environments, often requiring hefty system specs and the [best video card hardware in order to play](https://www.lifewire.com/top-video-cards-for-computer-gaming-1983599) (especially when using [720p or 1080p high resolution displays](https://www.lifewire.com/high-definition-pc-monitor-2640281)).

* Similar to DDR SDRAM, GDDR SDRAM has its own evolutionary line (improving performance and lowering power consumption): GDDR2 SDRAM, GDDR3 SDRAM, GDDR4 SDRAM, and GDDR5 SDRAM.

Despite sharing very similar characteristics with DDR SDRAM, GDDR SDRAM is not exactly the same. There are notable differences with the way GDDR SDRAM operates, particularly regarding how bandwidth is favored over latency. GDDR SDRAM is expected to process massive amounts of data (bandwidth), but not necessarily at the fastest speeds (latency) – think of a 16-lane highway set at 55 MPH. Comparatively, DDR SDRAM is expected to have low latency to immediately respond to the CPU – think of a 2-lane highway set at 85 MPH.

**Power Supply Unit**

A power supply is a component that supplies power to at least one electric load. Typically, it converts one type of electrical power to another, but it may also convert a a different form of energy – such as solar, mechanical, or chemical - into electrical energy.

A power supply provides components with electric power. The term usually pertains to devices integrated within the component being powered. For example, computer power supplies convert AC current to DC current and are generally located at the rear of the computer case, along with at least one fan.

A power supply is also known as a power supply unit, power brick or power adapter.

**Removable Media Devices**

Removable media are data storage devices capable of computer system removal without powering off the system. Removable media devices are used for backup, storage or transportation of data.

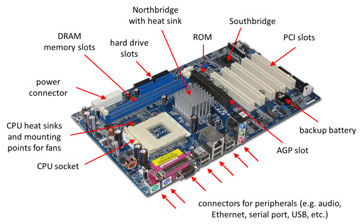
Examples of removable media include Universal Serial Bus (USB) drives, CDs, DVDs, diskettes and Blu-ray Disc. In addition to portability advantages, removable media are capable of fast data backup and recovery, which are essential corporate requirements. One disadvantage is that removable media are more expensive than data tape.

**Hard Disk Drive**

A **hard disk drive** (sometimes abbreviated as **Hard drive**, **HD**, or **HDD**) is a [non-volatile memory](https://www.computerhope.com/jargon/n/nonvolat.htm) [hardware](https://www.computerhope.com/jargon/h/hardware.htm) device that permanently stores and retrieves data on a computer. A hard drive is a [secondary storage device](https://www.computerhope.com/jargon/s/secostor.htm) that consists of one or more [platters](https://www.computerhope.com/jargon/p/platter.htm) to which data is written using a magnetic head, all inside of an air-sealed casing. [Internal](https://www.computerhope.com/jargon/i/internal.htm) hard disks reside in a [drive bay,](https://www.computerhope.com/jargon/b/bay.htm) connect to the [motherboard](https://www.computerhope.com/jargon/m/mothboar.htm) using an [ATA](https://www.computerhope.com/jargon/a/ata.htm), [SCSI](https://www.computerhope.com/jargon/s/scsi.htm), or [SATA](https://www.computerhope.com/jargon/s/sata.htm) cable, and are powered by a connection to the [PSU](https://www.computerhope.com/jargon/p/ps.htm) (power supply unit).

The desktop hard drive consists of the following components: the [head actuator](https://www.computerhope.com/jargon/a/actuator.htm), [read/write actuator arm](https://www.computerhope.com/jargon/a/aarm.htm), [read/write head](https://www.computerhope.com/jargon/h/head.htm), [spindle](https://www.computerhope.com/jargon/s/spindle.htm), and [platter](https://www.computerhope.com/jargon/p/platter.htm). On the back of a hard drive is a circuit board called the [disk controller](https://www.computerhope.com/jargon/d/diskcont.htm) or interface board and is what allows the hard drive to communicate with the computer.

**Motherboard**

A motherboard is one of the most essential parts of a computer system. It holds together many of the crucial components of a computer, including the central processing unit (CPU), memory and connectors for input and output devices. The base of a motherboard consists of a very firm sheet of non-conductive material, typically some sort of rigid plastic. Thin layers of copper or aluminum foil, referred to as *traces*, are printed onto this sheet. These traces are very narrow and form the circuits between the various components. In addition to circuits, a motherboard contains a number of sockets and slots to connect the other components.

**Parts of Motherboard:**

* A CPU socket - the actual CPU is directly soldered onto the socket. Since high speed CPUs generate a lot of heat, there are heat sinks and mounting points for fans right next to the CPU socket.
* A power connector to distribute power to the CPU and other components.
* Slots for the system's main memory, typically in the form of DRAM chips.
* A chip forms an interface between the CPU, the main memory and other components. On many types of motherboards, this is referred to as the Northbridge. This chip also contains a large heat sink.
* A second chip controls the input and output (I/O) functions. It is not connected directly to the CPU but to the Northbridge. This I/O controller is referred to as the Southbridge. The Northbridge and Southbridge combined are referred to as the *chipset*.
* Several connectors, which provide the physical interface between input and output devices and the motherboard. The Southbridge handles these connections.
* Slots for one or more hard drives to store files. The most common types of connections are Integrated Drive Electronics (IDE) and Serial Advanced Technology Attachment (SATA).
* A read-only memory (ROM) chip, which contains the firmware, or start up instructions for the computer system. This is also called the BIOS.
* A slot for a video or graphics card. There are a number of different types of slots, including the Accelerated Graphics Port (AGP) and Peripheral Component Interconnect Express (PCIE).
* Additional slots to connect hardware in the form of Peripheral Component Interconnect (PCI) slots.

**Graphics Processing Unit (GPU)**

A **graphics processing unit** (**GPU**) is a specialized [electronic circuit](https://en.wikipedia.org/wiki/Electronic_circuit) designed to rapidly manipulate and alter [memory](https://en.wikipedia.org/wiki/Memory_(computing)) to accelerate the creation of [images](https://en.wikipedia.org/wiki/Image) in a [frame buffer](https://en.wikipedia.org/wiki/Frame_buffer) intended for output to a [display device](https://en.wikipedia.org/wiki/Display_device). GPUs are used in [embedded systems](https://en.wikipedia.org/wiki/Embedded_system), [mobile phones](https://en.wikipedia.org/wiki/Mobile_phone), [personal computers](https://en.wikipedia.org/wiki/Personal_computer), [workstations](https://en.wikipedia.org/wiki/Workstation), and [game consoles](https://en.wikipedia.org/wiki/Game_console). Modern GPUs are very efficient at manipulating [computer graphics](https://en.wikipedia.org/wiki/Computer_graphics) and [image processing](https://en.wikipedia.org/wiki/Image_processing), and their highly parallel structure makes them more efficient than general-purpose [CPUs](https://en.wikipedia.org/wiki/Central_processing_unit) for [algorithms](https://en.wikipedia.org/wiki/Algorithm) where the processing of large blocks of data is done in parallel. In a personal computer, a GPU can be present on a [video card](https://en.wikipedia.org/wiki/Video_card), or it can be embedded on the [motherboard](https://en.wikipedia.org/wiki/Motherboard) or—in certain CPUs—on the CPU [die](https://en.wikipedia.org/wiki/Die_(integrated_circuit)).

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