HARDWARE-PART2

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COOLING SYSTEM IN COMPUTER

- Computer cooling systems are either active or passive cooling systems that are made to get rid of the extra heat that a computer makes. When systems release heat in the right way and at the right time, they work more efficiently and effectively. This also keeps the system running at its best, which keeps it safe from damage and keeps it working for a longer time.
- **The cooling system is used to ensure that the heat generated by computer components is removed and a cooler environment is maintained.**

TYPES OF COOLING SYSTEMS

- **Case Cooling (air cooling system)**
- **CPU Cooling (air cooling and liquid cooling.)**

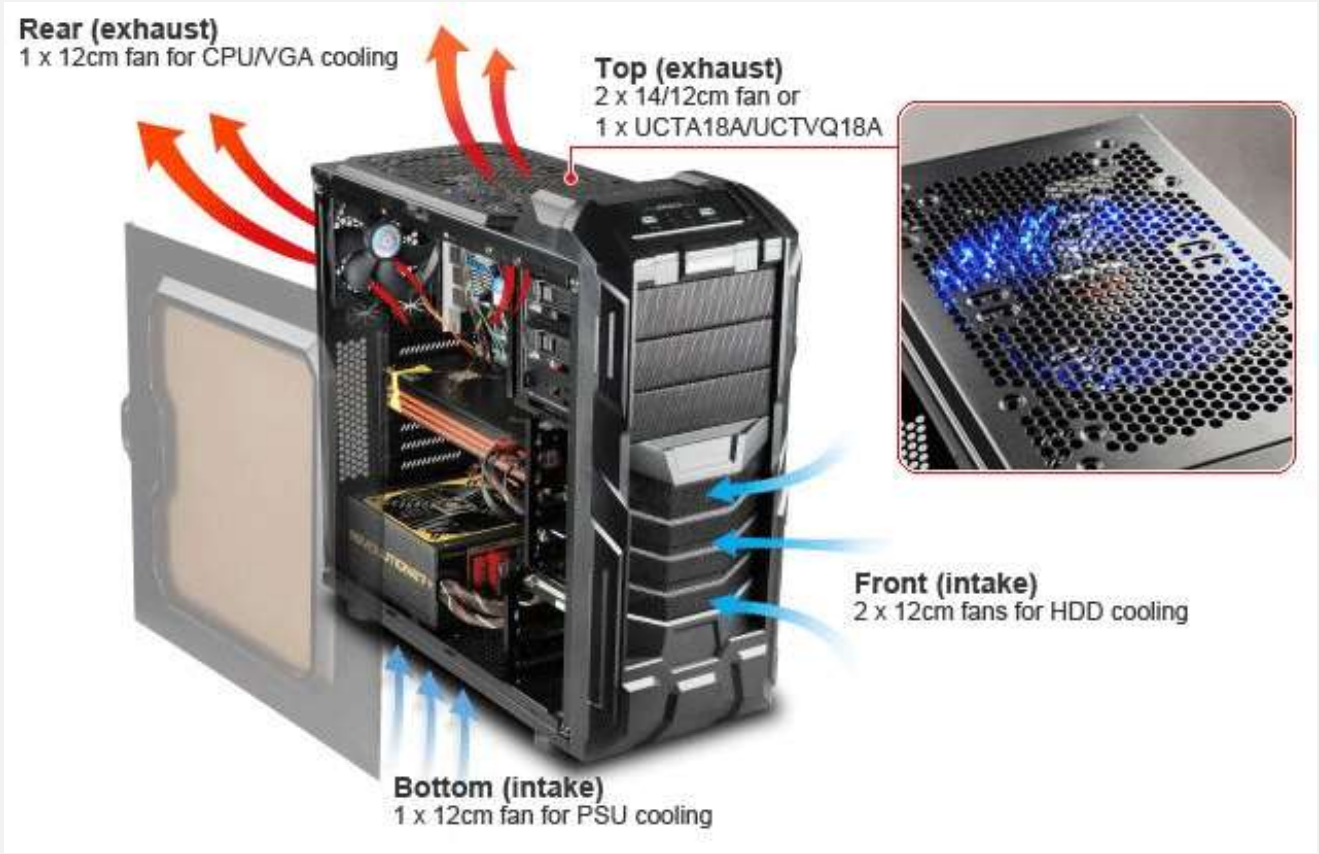
Case cooling uses **air cooling system** for the removal of heat from inside the case of the system.

Air cooling contains different kinds of air fans in order to pull the cool air in and push the hot air out .

CASE COOLING

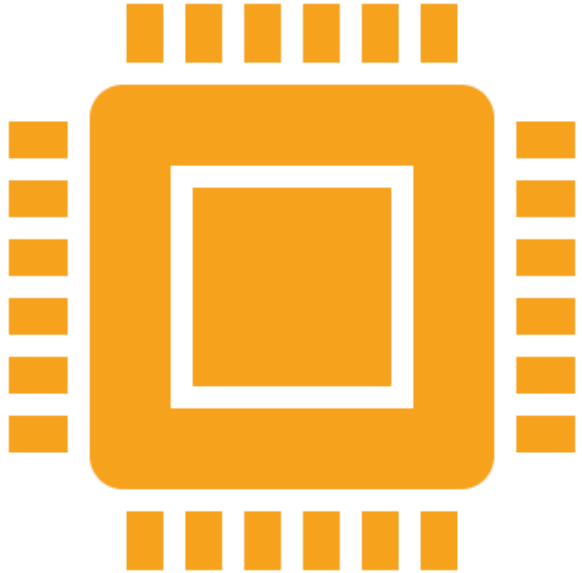
CASE COOLING SYSTEM

- **Front Intake Fan:** This fan is used to bring fresh, cool air into the computer for cooling purposes. It is attached in the front of the case.
- **Rear and Top Exhaust Fans:** These fans are used to take hot air out of the case. Rear fan is attached at the back and top fan is attached at the top of the case.
- **Power Supply Exhaust Fan:** This fan is usually found at the back of the power supply and is used to cool the power supply and take the hot air out of the case and power supply unit.



CPU COOLING

The CPU produces the heat most as compared to the other components and there should be a proper measure for cooling the CPU in order to prevent it from damage.

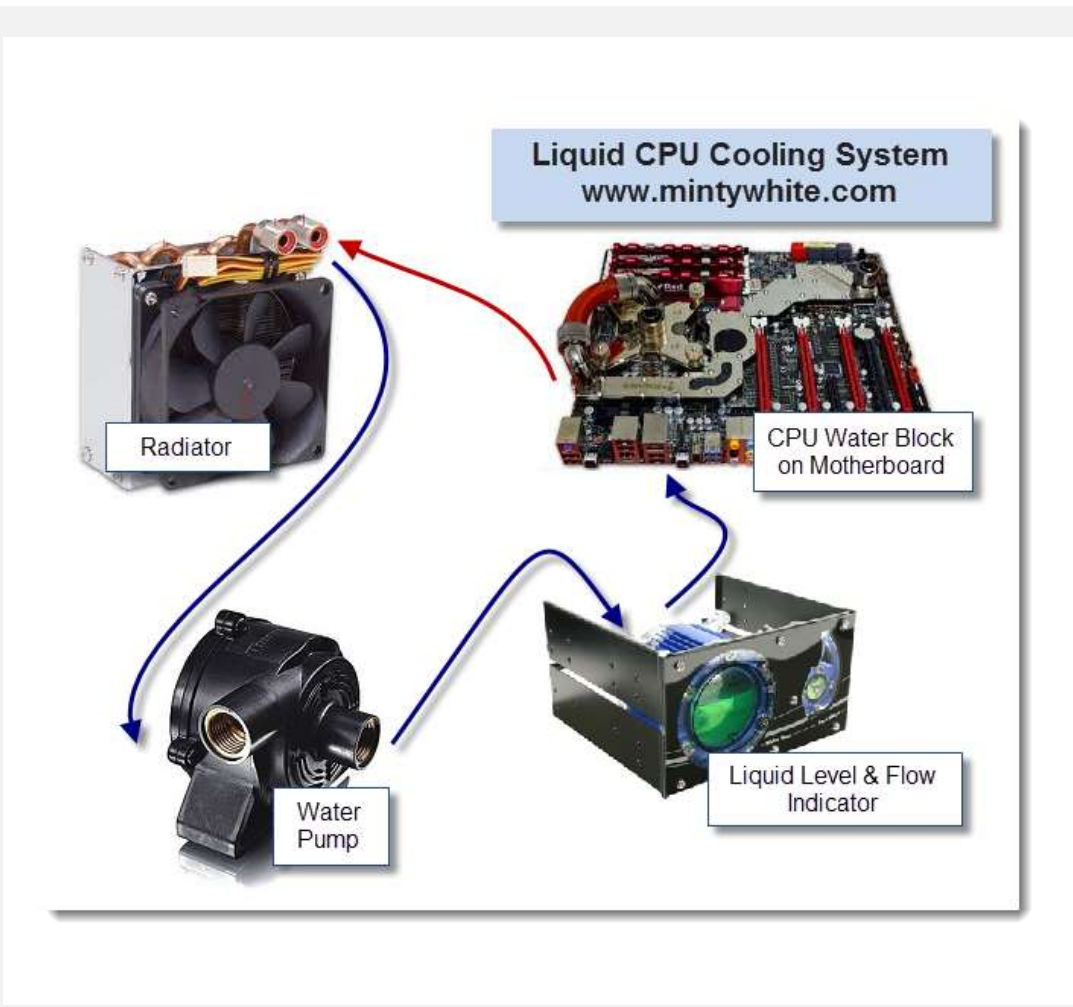


AIR COOLING

- Most computers keep the parts inside cool by letting air flow through the case.
- In the same way, to cool the CPU, a heat sink with a fan is connected to the flat side of the CPU to cover as much surface area as possible.
- The heat sink is mostly made up of rows of metal fins, and a fan is connected to the top or side of the rows.
- The fan moves the air to the heat sink, where the hot air expands and comes out. The hot air is then pushed out of the case by the case cooling system. So, the CPU's temperature doesn't get too high.

LIQUID COOLING

- Liquid cooling is another way to keep computers cool, but it is usually only used in special systems because it takes up a lot of room. A special water block is used in liquid cooling to move heat away from the processor and chipset. Through this block and a pump, water goes to a radiator, where it is cooled. A fan is connected to the radiator to help keep it cool.
- One of the best things about liquid cooling is that it doesn't make any noise and is very quiet. On the other hand, these systems are very expensive compared to air cooling systems.

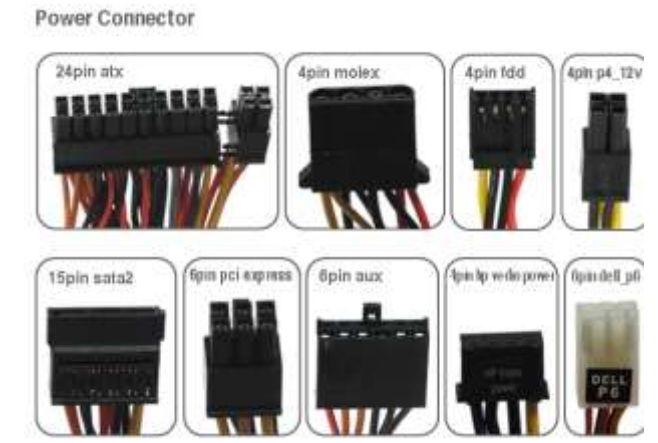


POWER SUPPLY UNIT (PSU)

- A Power Supply Unit (PSU) is a piece of IT hardware that is inside the computer.
- Power Supply Units (PSU) don't give power to computers; instead, they change the power.
- In particular, a power source changes the high voltage alternating current (AC) into high voltage direct current (DC).
- They also keep the DC output power within the small range that current computer parts need.

POWER SUPPLY CONNECTORS

- Power connections are what connect an item to its power source.
- Residential and business power connectors are the two main types.
- Either alternating current (AC) or direct current (DC) flows through power connections.
- AC ports let you plug a device straight into a power source.
- DC plugs usually come in standard sizes, and for safety reasons, they can't be switched with each other.



TYPES OF POWER CONNECTOR

- Automotive connectors
- Compact power connectors
- DC power plugs
- DC power connectors
- Hazardous area power connectors
- Heavy duty power connectors
- Industrial interlocks
- Industrial power connectors
- Industrial power connector adapters
- Modular battery contacts

INPUT VS. OUTPUT DEVICES

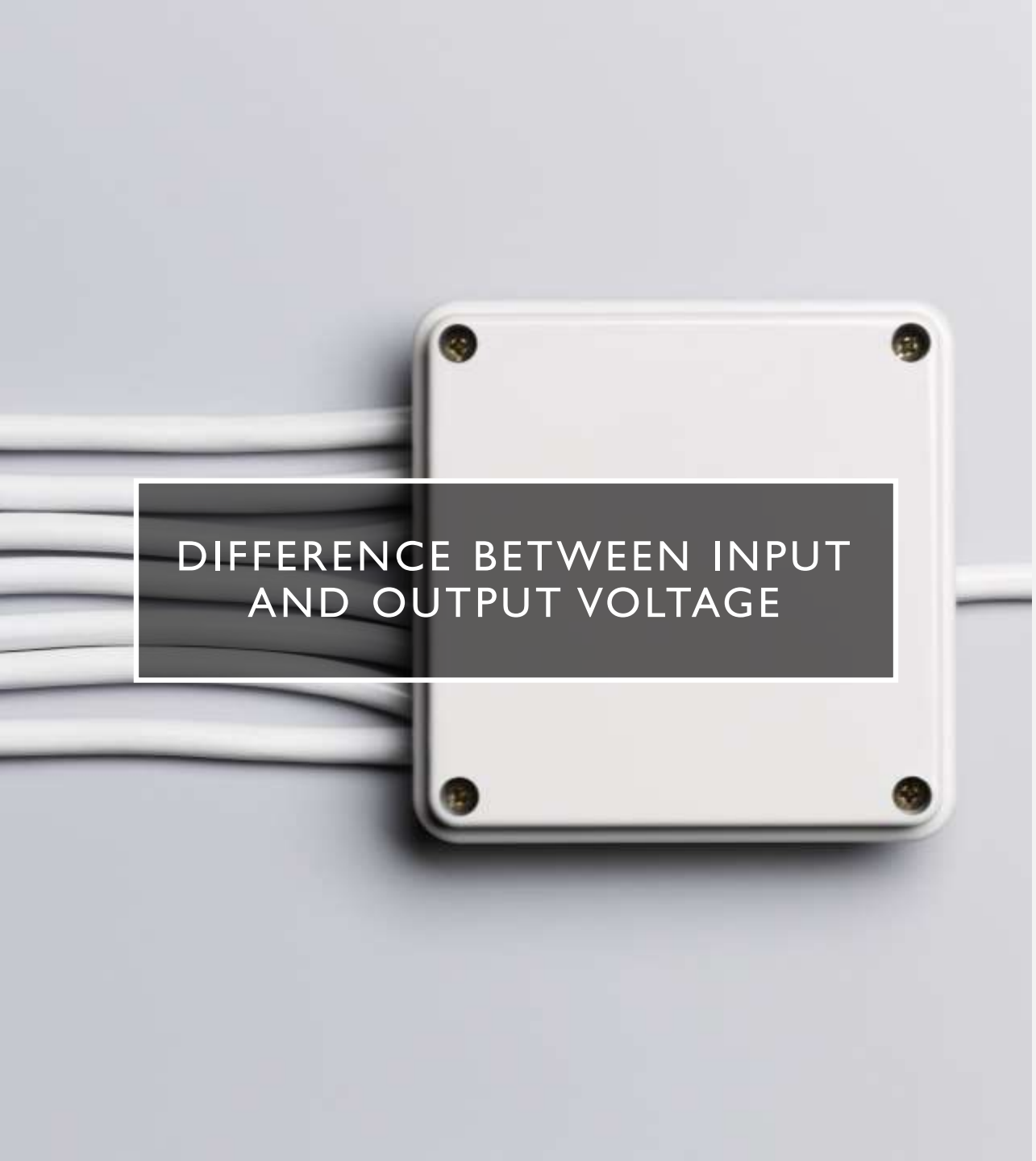
To understand the difference between input and output voltage, it is also important to recognize the difference between input and output devices.

An input device is any piece of hardware that allows data to be input into a computer, such as a keyboard, mouse or scanner.

an output device receives data from a computer and translates it into a human-readable format, such as a computer monitor or printer.

HOW IMPORTANT IT IS TO MATCH VOLTAGE?

- When choosing a charger for your device, it is very important that the output power fits what your device needs. If you use a charger with the wrong power output, your batteries and gadget will last a lot less time. For example, if your device needs a charger with a 20V output, it is important to find a spare with the same power to avoid any damage.



DIFFERENCE BETWEEN INPUT AND OUTPUT VOLTAGE

- The input voltage is the type of power source that a charger needs to work. This depends on where you live and what your electric company gives you.

- On the other hand, the output voltage is the amount of electricity that is sent to a certain object. It's important to remember that the amount of power provided is found by increasing the current by the voltage. This is shown by the equation P=IV.

- Knowing the difference between input voltage and output voltage is the key to making sure that gadgets get the right amount of power and run safely. Also, it's important to remember that different devices may need different input and output voltages, so it's important to read and follow the directions from the maker when connecting devices to electricity sources.

TIPS FOR SELECTING THE RIGHT ADAPTER

Match the voltage output of the adapter to the requirements of your device.

Check the amperage of the adapter to ensure it can supply enough current to power your device.

Select an adapter with the correct plug size to ensure it fits your device's jack.

Choose an adapter from a reputable manufacturer to ensure quality and reliability.

WATTAGE RATING (POWER CONSUMPTION OF PC)

A complete desktop uses an average of 200 Watt hours (Wh). This is the sum of the average consumption per hour of the computer itself (171 W),

the internet modem (10 W), the printer (5 W) and the loudspeakers (20 W). Assuming that a computer is on for eight hours a day, the annual consumption comes to 600 kWh.

A **laptop** uses considerably less: between 50 and 100 Wh that it is on, depending on the model.

HOW TO SAVE PCS ENERGY

- Switch off the loudspeakers if you are not using them.
- Switch off the printer when it's not needed.
- Switch off the screen if you are not working on the PC just now.
- Switch off your computer or put it in stand-by mode if you are not going to work on your PC for more than 30 minutes. A multiple socket makes it easy to switch off all your computing equipment.
- Use a laptop in preference to a desktop.
- Switch off the modem at night.

KNOWING THE POWER USAGE OF PC COMPONENTS SERVES TWO IMPORTANT PURPOSES:

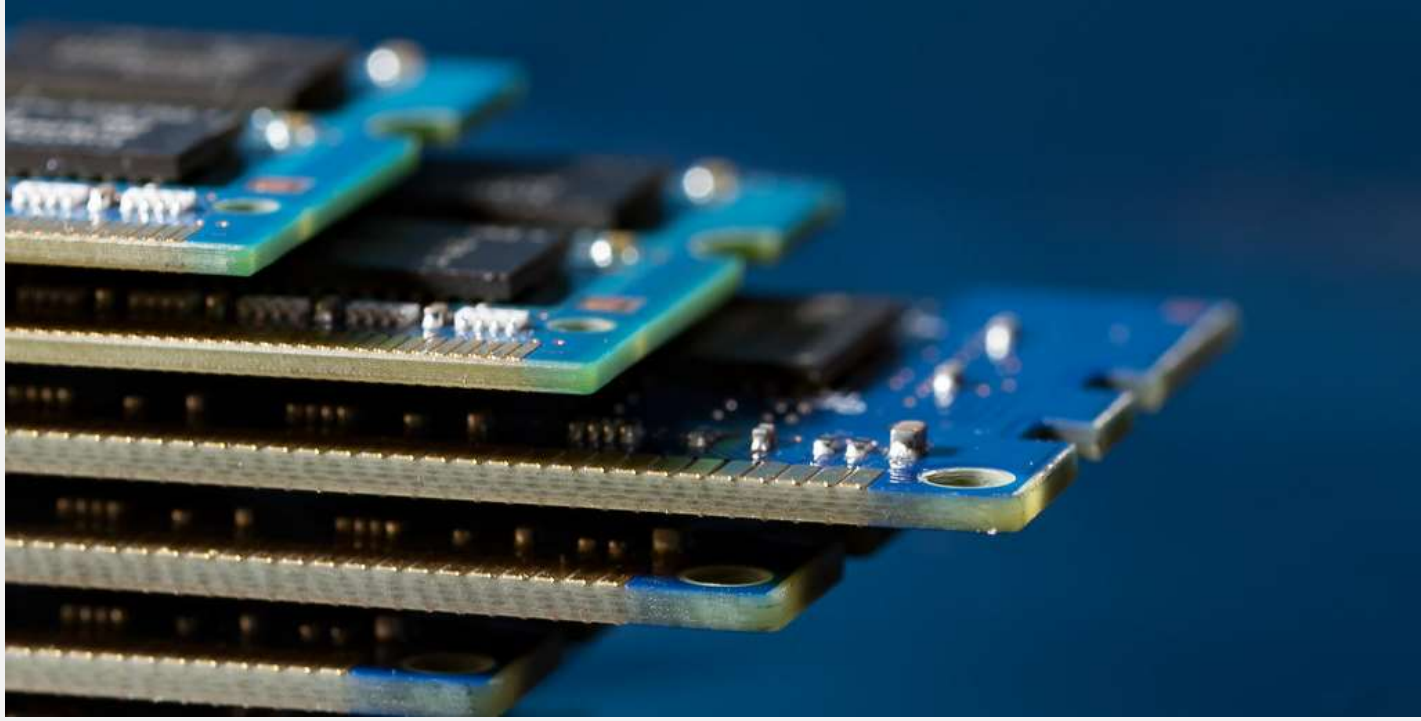
You can choose the right amount of watts for your computer's power source.

You can figure out which parts use the most power, which will help you save money on the cost of electricity.

WHAT IS COMPUTER MEMORY?

- Memory in a computer is the same as memory in a human brain. It is used to store data and directions.

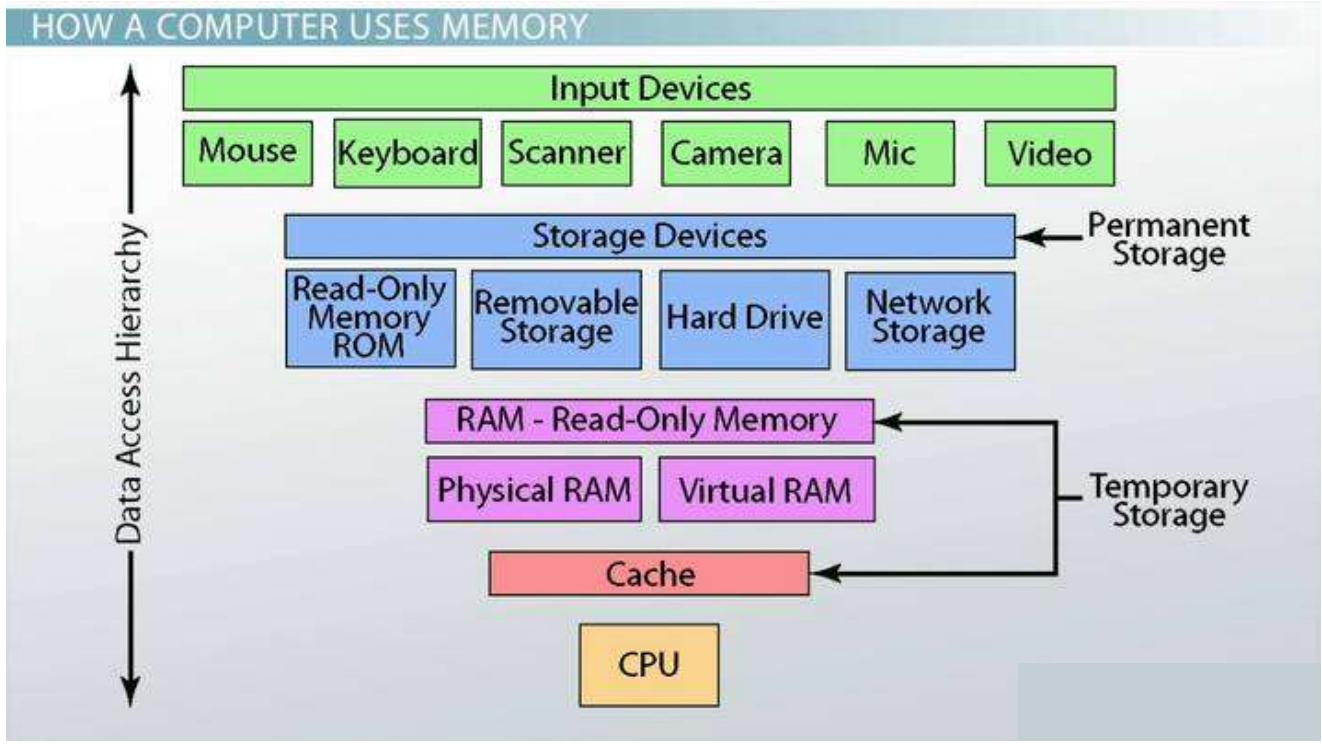
- It is a unit for storing data or a device for storing data where data to be handled and directions for processing are kept. It can store both what goes in and what comes out.



FEATURES OF COMPUTER MEMORY

- Compared to secondary memory, it is a faster type of computer memory.
- It is made of memory chips.
- It is the major memory of the machine and generally weak memory.
- Without main memory, a computer system can't work.

HOW DOES COMPUTER MEMORY WORK?

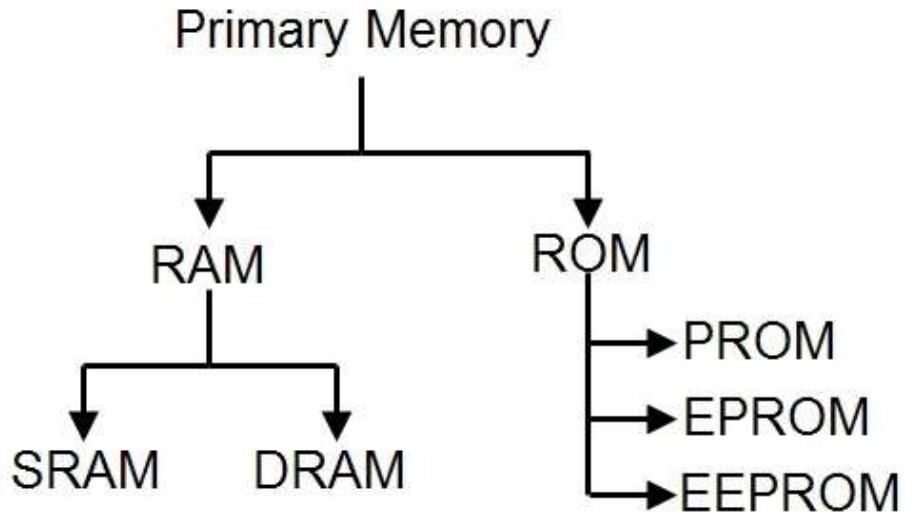


TYPES OF COMPUTER MEMORY

- Primary memory
- Secondary memory
- Cache memory

PRIMARY MEMORY

- It is also known as the main memory of the computer system.
- It is used to store data and programs or instructions during computer operations.



PRIMARY MEMORY TYPES

RAM (Random Access Memory)

ROM (Read Only Memory)

RAM (RANDOM ACCESS MEMORY)

It is a volatile memory.

Volatile memory stores information based on the power supply.

If the power supply fails/ interrupted/stopped, all the data and information on this memory will be lost.

RAM is used for booting up or start the computer.

ROM (READ ONLY MEMORY)

It is a non-volatile memory.

Non-volatile memory stores information even when there is a power supply failed/ interrupted/stopped.

ROM is used to store information that is used to operate the system. As its name refers to read-only memory.

we can only read the programs and data that is stored on it.

SECONDARY MEMORY

- It is also known as auxiliary memory and backup memory.
- It is a non-volatile memory and used to store a large amount of data or information.
- The data or information stored in secondary memory is permanent, and it is slower than primary memory.
- A CPU cannot access secondary memory directly.
- The data/information from the auxiliary memory is first transferred to the main memory, and then the CPU can access it.

CHARACTERISTICS OF SECONDARY MEMORY

- It is a slow memory but reusable.
- It is a reliable and non-volatile memory.
- It is cheaper than primary memory.
- The storage capacity of secondary memory is large.
- A computer system can run without secondary memory.
- In secondary memory, data is stored permanently even when the power is off.

TYPES OF SECONDARY MEMORY

MAGNETIC TAPES

MAGNETIC DISKS

OPTICAL DISKS

CACHE MEMORY

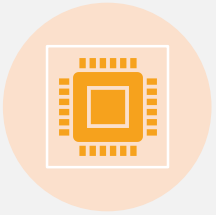
It is a type of high-speed semiconductor memory that can help the CPU run faster.

Between the CPU and the main memory, it serves as a buffer.

It is used to store the data and programs that the CPU uses the most frequently.

ADVANTAGES OF CACHE MEMORY

It is faster than the main memory.

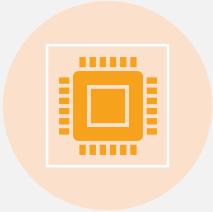


When compared to the main memory, it takes less time to access it.

It keeps the programs that can be run in a short amount of time.

It stores data in temporary use.

DISADVANTAGES OF CACHE MEMORY



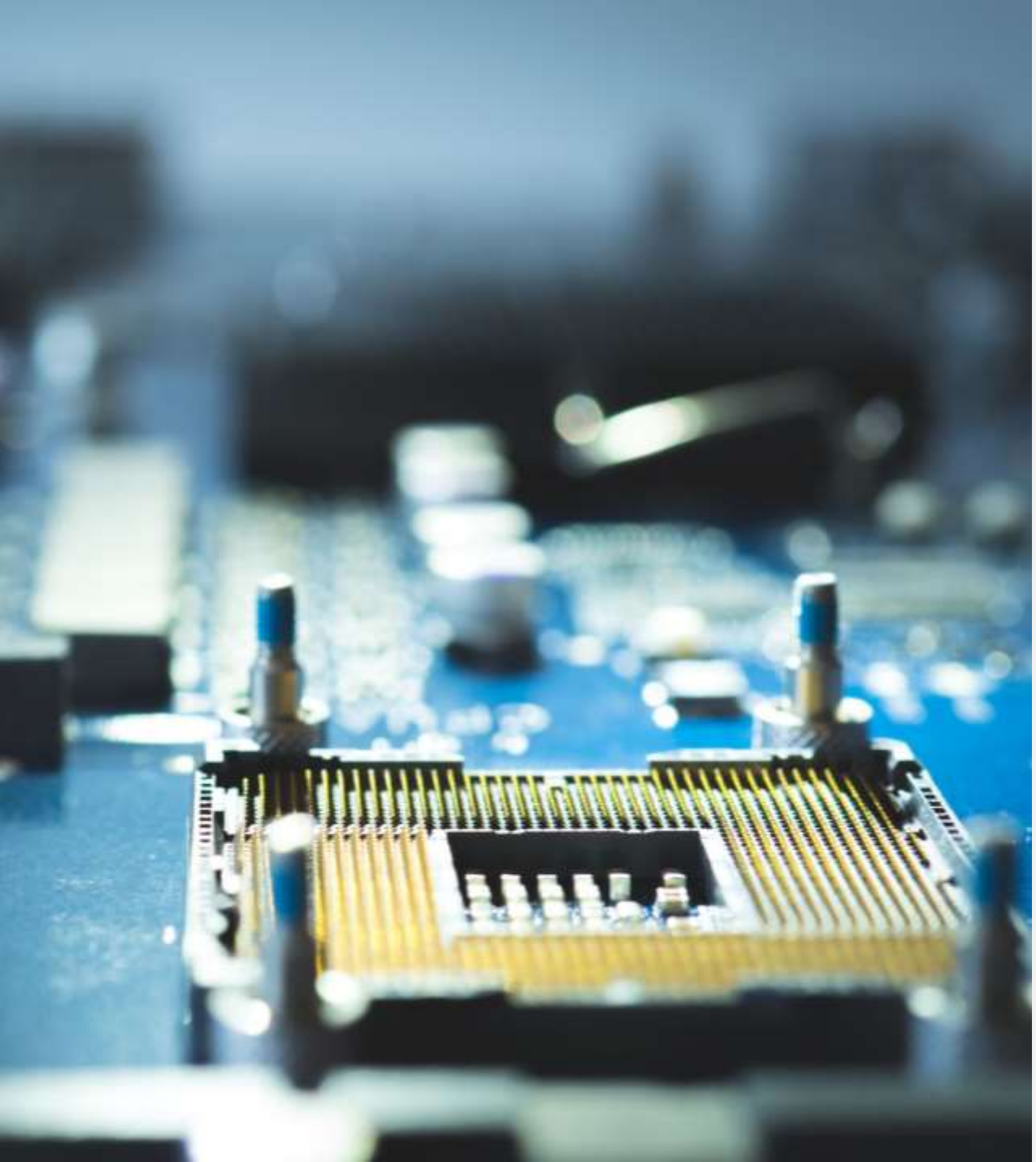
Because of the semiconductors used, it is very expensive.

The size of the cache (amount of data it can store) is usually small.

FAQS ON COMPUTER MEMORY

- **What is Volatile and Non-Volatile memory?**

Volatile memory is used to store information based on power supply. If the power supply is off, all the data and information on this memory will be lost. For example, RAM (Random Access Memory). Whereas non-volatile memory is used to store information even when the power supply is off. For example, ROM (Read Only Memory).



FAQS ON COMPUTER MEMORY

- **How many 128 * 8 memory chips are required for a memory capacity of 4096*16?**

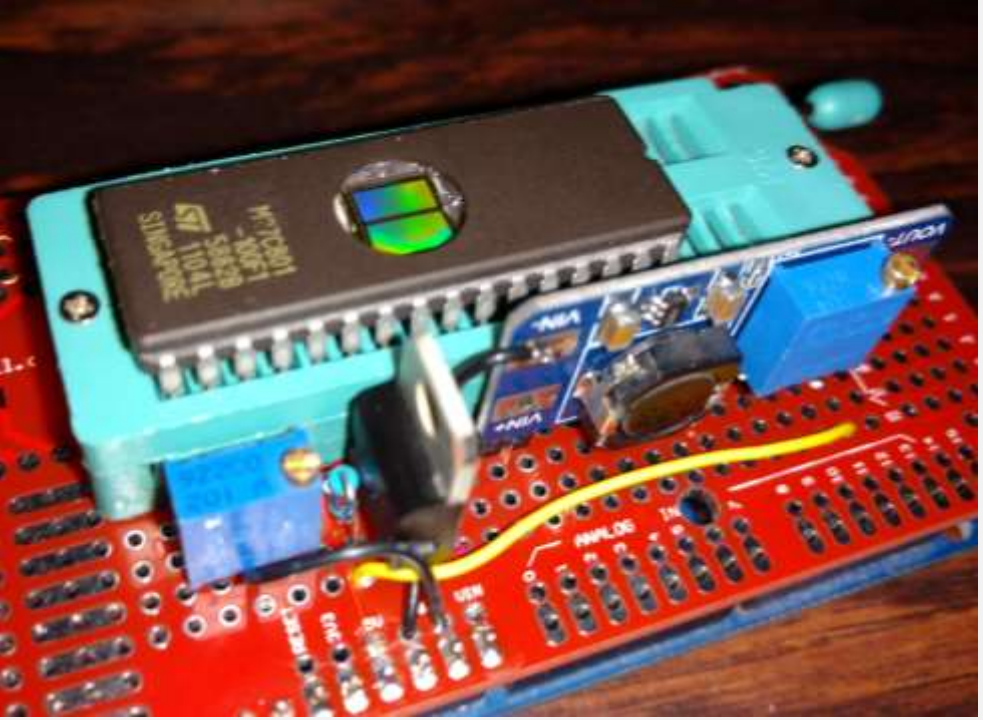
Number of chips required = Required RAM size/ Available chip capacity

= (4096 * 16)/(128 * 8) = 64

FAQS ON COMPUTER MEMORY

- **Explain any four differences between RAM and ROM?**

RAM	ROM
It stands for Random access memory.	It stands for read only memory.
It is the fastest memory.	It is slower memory as compare to RAM.
It is volatile memory.	It is non-volatile memory.
In this memory, data will erase when the power is off	In this memory, data will not erase even if the power is off



FAQS ON COMPUTER MEMORY

- **How to erase data in EPROM?**

In EPROM, using ultraviolet rays we can easily erase data.

MEMORY ADDRESSING

The memory of a computer system consists of tiny electronic switches, with each switch in one of two states: open or closed. It is, however, more convenient to think of these states as 0 and 1.

each switch can represent a bit. The memory unit consists of millions of such bits.

To make memory more manageable, eight bits are grouped into a byte.

Memory can then be viewed as consisting of an ordered sequence of bytes. This is referred to as the memory address of the byte.

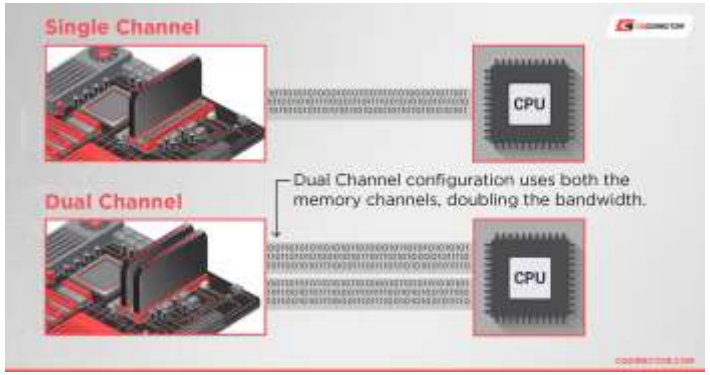
Such memory is called byte addressable memory because each byte has a unique address.

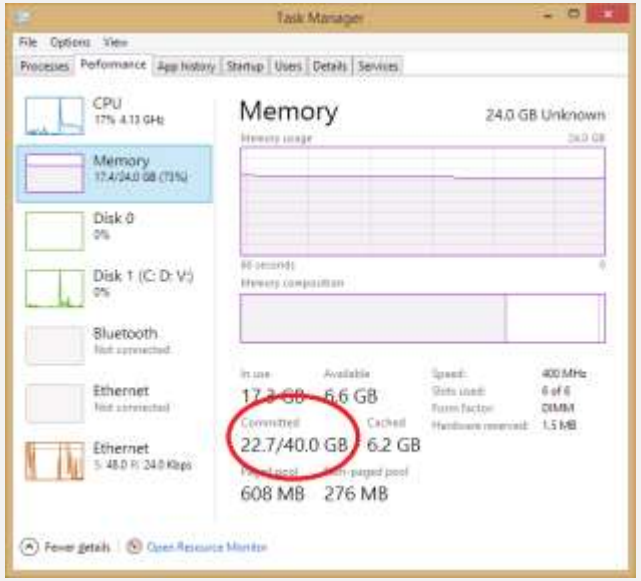
MEMORY ADDRESSING

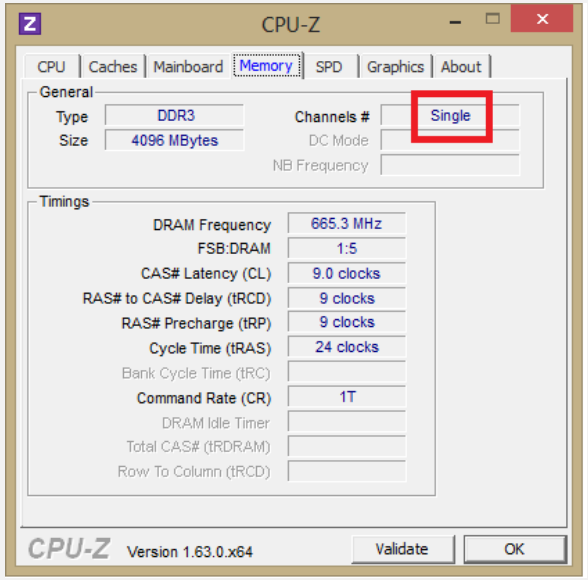
- To access the memory, to store or retrieve a single word of information, it is necessary to have a unique address. The word address is the number that identifies the location of a word in a memory.

MULTI-CHANNEL MEMORY

- This type of memory plays a role in increasing the speed of data transfer. by creating more communication channels between the memory and the memory controllers.
- When looking for high-performance PCs, one factor that you want to check is whether they have single-channel or multi-channel memory. With single-channel memory, it means that your machine only has one stick of RAM. On the other hand, multi-channel memory implies two or more sticks of RAM.







MULTI-CHANNEL MEMORY

running one stick of RAM in your computer will have the machine running on a single-channel configuration. Running two sticks puts it in a dual-channel configuration mode.

HOW DOES MULTI-CHANNEL WORK?

The RAM on the dual-memory module communicates with the entire computer platform through the memory controller located on the central processing unit.

The communication happens through what is known as the bus. Some memory channels come with multiple communication channels with the memory module. Multiple channels make data exchange faster, as it can be transmitted on more than one channel.

Single Channel	Dual Channel	Quad Channel
•Cheaper to buy one RAM stick	•10% better gaming performance	•Four times the bandwidth
•Works with any CPU and motherboard	•Significantly better for multi-core CPU performance	•Great for servers or HPC systems
	•Not too expensive	
	•Supported by most CPUs and motherboards	

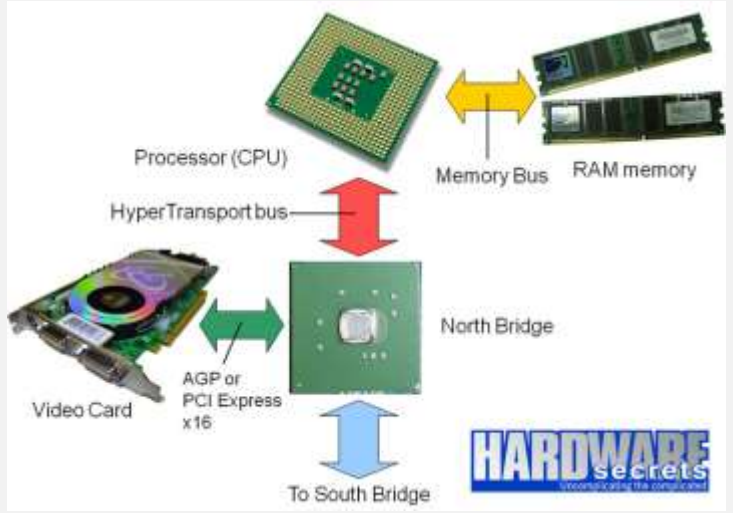
MEMORY ADVANTAGES

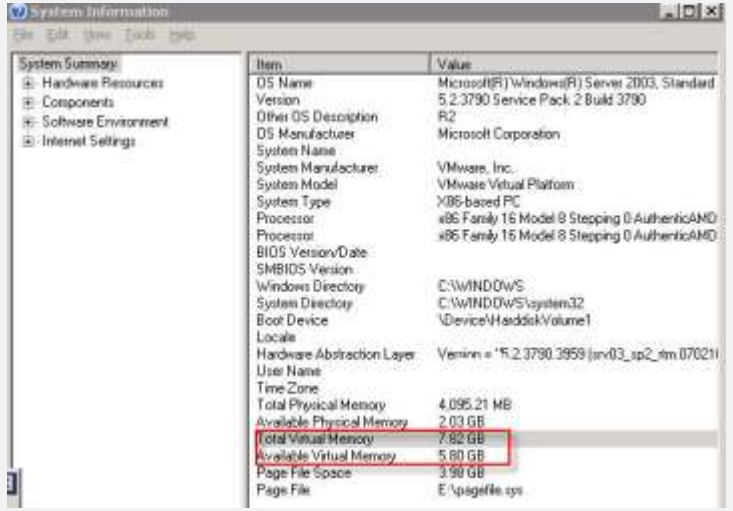
WHAT IS ECC MEMORY?

- ECC is a type of computer memory that detects and corrects the most common kinds of memory data corruption.
- it's mission-critical to eliminate data corruption, which is the purpose of ECC (error-correcting code) memory.
- ECC RAM can immediately detect and fix memory errors before they cause data corruption or event systems crashes.

VIRTUAL MEMORY

- Virtual memory is a method that computers use to manage storage space to keep systems running quickly and efficiently. Using the technique, operating systems can transfer data between different types of storage, such as random access memory (RAM), also known as main memory, and hard drive or solid-state disk storage.
- A machine can't work without virtual memory. It is a method in an operating system (OS) for making your system run faster and more efficiently, giving you places to store the data you make, and keeping your data safe.





VIRTUAL MEMORY SYSTEM ADVANTAGES

Allowing

- Allowing users to operate multiple applications at the same time or applications that are larger than the main memory

Freeing

- Freeing applications from having to compete for shared memory space and allowing multiple applications to run at the same time

Allowing

- Allowing core processes to share memory between libraries, which consists of written code that provides the foundation for a program's operations

VIRTUAL MEMORY SYSTEM ADVANTAGES

Improving security by isolating and segmenting where the computer stores information

Improving efficiency and speed by allowing more processes to sit in virtual memory

Lowering the cost of computer systems as you find the right amount of main memory and virtual memory

VIRTUAL MEMORY SYSTEM ADVANTAGES

Increasing the amount of memory available by working outside the limits of a computer's physical main memory space

Optimizing central processing unit (CPU) usage

HOW DOES VIRTUAL MEMORY WORK?

Virtual memory uses both the computer's software and hardware to work.

It transfers processes between the computer's RAM and hard disk by copying any files from the computer's RAM that aren't currently in use and moving them to the hard disk.

By moving unused files to the hard disk, a computer frees up space in its RAM to perform current tasks, such as opening a new application.

TYPES OF VIRTUAL MEMORY

- Paging
- Segmenting

LIMITATIONS OF VIRTUAL MEMORY

Virtual memory runs slower than physical memory, so most computers prioritize using physical memory when possible.

Moving data between a computer's virtual and physical memory requires more from the computer's hardware.

The amount of storage that virtual memory can provide depends on the amount of secondary storage a computer has.

If a computer only has a small amount of RAM, virtual memory can cause thrashing, resulting in significant performance delays.

It can take longer for applications to load or for a computer to switch between applications when using virtual memory.

VIRTUAL VS PHYSICAL MEMORY

Computers that rely on physical memory tend to be faster than computers using virtual memory.

Increasing a computer's physical memory capacity is more expensive than implementing a virtual memory system.

PART 2 END