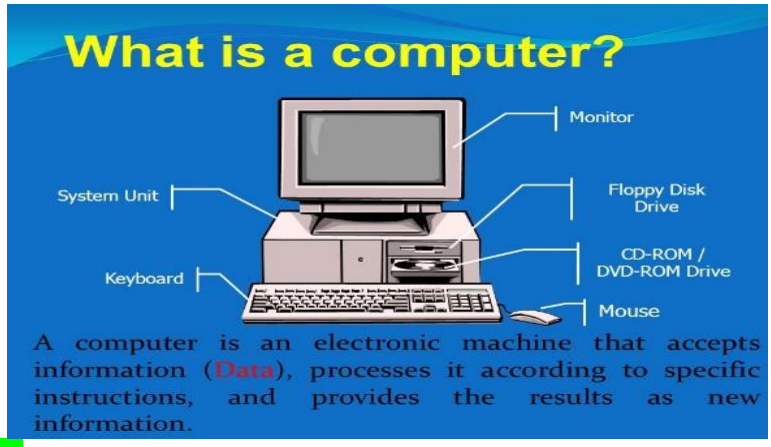
COMPUTER HARDWARE INFORMATION

Introduction Of Hardware:

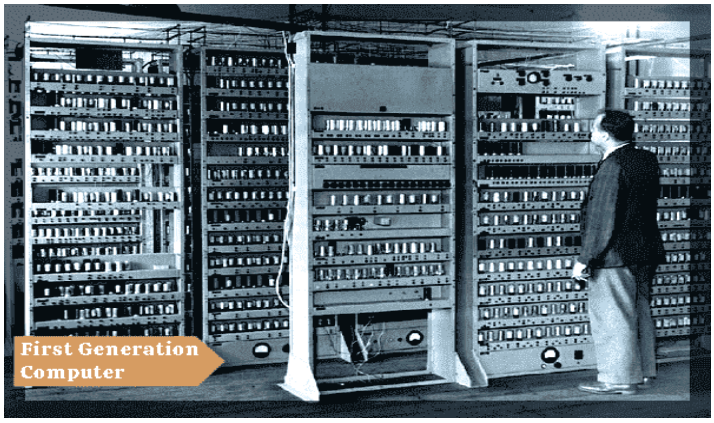


Computer Defined:

The basic term, computer is an electronic device that process data, converting into information that is useful for people. Any computer Regardless of its type- controlled by programmed instructions, which gives the machine a propose and tell what to do.

Computer Generations:

- **First Generation:**



The period of first generation was from 1946-1959. The computers of first generation used vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit). These tubes, like electric bulbs, produced a lot of heat and the installations used to fuse frequently. Therefore, they were very expensive and only large organizations were able to afford it.In this generation, mainly batch processing operating system was used. Punch cards, paper tape, and magnetic tape was used as input and output devices. The computers in this generation used machine code as the programming language.

The main features of the first generation are –

- Vacuum tube technology
- Unreliable
- Supported machine language only
- Very costly
- Generated a lot of heat
- Slow input and output devices
- Huge size
- Need of AC
- Non-portable
- Consumed a lot of electricity

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Some computers of this generation were −

- ENIAC
- EDVAC
- UNIVAC
- IBM-701
- IBM-650

Second Generation:

The period of second generation was from 1959-1965. In this generation, transistors were used that were cheaper, consumed less power, more compact in size, more reliable and faster than the first-generation machines made of vacuum tubes. In this generation, magnetic cores were used as the primary memory and magnetic tape and magnetic disks as secondary storage devices.In this generation, assembly language and high-level programming languages like FORTRAN, COBOL were used. The computers used batch processing and multiprogramming operating system.

The main features of second generation are −

- Use of transistors
- Reliable in comparison to first generation computers
- Smaller size as compared to first generation computers
- Generated less heat as compared to first generation computers
- Consumed less electricity as compared to first generation computers
- Faster than first generation computers
- Still very costly
- AC required
- Supported machine and assembly languages

Some computers of this generation were −

- IBM 1620
- IBM 7094
- CDC 1604
- CDC 3600
- UNIVAC 1108

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Third Generation:

The period of third generation was from 1965-1971. The computers of third generation used Integrated Circuits (ICs) in place of transistors. A single IC has many transistors, resistors, and capacitors along with the associated circuitry.The IC was invented by Jack Kilby. This development made computers smaller in size, reliable, and efficient. In this generation remote processing, time-sharing, multiprogramming operating system were used. High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation.

The main features of third generation are −

- IC used
- More reliable in comparison to previous two generations
- Smaller size
- Generated less heat
- Faster
- Lesser maintenance
- Costly
- AC required
- Consumed lesser electricity
- Supported high-level language

Some computers of this generation were −

- IBM-360 series
- Honeywell-6000 series
- PDP (Personal Data Processor)
- IBM-370/168
- TDC-316

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Fourth Generation:

The period of fourth generation was from 1971-1980. Computers of fourth generation used Very Large Scale Integrated (VLSI) circuits. VLSI circuits having about 5000 transistors and other circuit elements with their associated circuits on a single chip made it possible to have microcomputers of fourth generation. Fourth generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to Personal Computer (PC) revolution. In this generation, time-sharing, real-time networks, distributed operating system were used. All the high-level languages like C, C++, DBASE etc., were used in this generation.

The main features of fourth generation are −

- VLSI technology used
- Very cheap
- Portable and reliable
- Use of PCs
- Very small size
- Pipeline processing
- No AC required
- Concept of internet was introduced
- Great developments in the fields of networks
- Computers became easily available

Some computers of this generation were −

- DEC 10
- STAR 1000
- PDP 11
- CRAY-1(Super Computer)
- CRAY-X-MP (Super Computer)

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Fifth Generation:

The period of fifth generation is 1980-till date. In the fifth generation, VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components.This generation is based on parallel processing hardware and AI (Artificial Intelligence) software. AI is an emerging branch in computer science, which interprets the means and method of making computers think like human beings. All the high-level languages like C and C++, Java, .Net etc., are used in this generation.

AI includes −

- Robotics
- Neural Networks
- Game Playing
- Development of expert systems to make decisions in real-life situations
- Natural language understanding and generation

The main features of fifth generation are −

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user-friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates

Some computer types of this generation are −

- Desktop
- Laptop
- NoteBook
- UltraBook
- ChromeBook

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Type of computer:

There are 4 types of computers-

1. Micro computer
2. Mini computer
3. Mainframe computer
4. Super computer

Here is all 4 types computers Definitions:

1. **Microcomputer:**

Desktop computers, laptop personal digital assistant (PDA), tablet and smartphones are all types of are microcomputers. The microcomputers are widely used and the fastest growing computers. These computers are the cheapest among the others 3 types of computers. The microcomputers are designed for general usage like entertainment, education and work proposes. Well known manufacturing of microcomputers are Apple, Samsung, Sony, and Toshiba and many more others companies. Desktop computers, Gaming consoles, sound and navigation system of a car, Netbooks, Notebooks, PDA's, Tablet PC's, smartphones, Calculators are all type of are microcomputers.

2. **Minicomputer:**

Minicomputer are used by small business and firms. Minicomputers are also called as "Midrange computer". These are small machine and can be accommodated on a disk with not as processing and data storage capabilities as super-computers and mainframe. These computers are not design for single user. Individual department of a large company or organization use Mini-computers for specific propose. For example, a production department can use minicomputers for monitoring certain production process.

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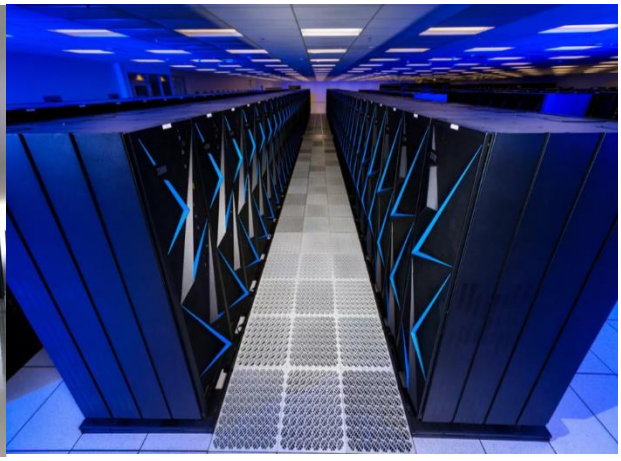
3. Mainframe Commuter:

Mainframe commuter are not as powerful as supercomputer, but certainly they are quite expensive nonetheless, and many large firms and government organization uses mainframes to run their business operations. The mainframe computers can accommodate in large air-conditioned rooms because of its size, supercomputers are the fastest computers with large data storage capacity mainframes can also process and store large amount of data. Banks, Educational, Institutions and insurance companies use mainframes computers to store data about their customers, students and insurance policy holders.

4. Super-computer:



Supercomputers are the most powerful computers made, and physically they are some of the largest.

These systems can process huge amount of data, and the fastest supercomputers can perform more than one trillion calculations per second. They are using for **Space Exploration, Earthquake Studies, Weather Forecasting and Nuclear Weapons Testing**

COMPUTER HARDWARE INFORMATION

Different between Micro and Mini computers:

Microcomputer	Minicomputer
The microcomputer was introduced in nearly 1970.	The minicomputer was introduced in 1960.
often uses at home, offices, and educational institutes like schools and colleges.	it is often used in huge business institutes and departments.
consists of one processor.	generally consists of multiprocessors.
memory present in MB.	memory present in GB.
it is a small-sized computer.	it is a large-sized computer.
price starts from 500$ to 5500$	price varies between 18000$ to 500000$.
Inexpensive and easy to use.	It can handle a huge amount of data.
Much slower than the larger computers.	can support a number of terminals.
Common examples of microcomputers are IBM=PC and Apple Macintosh.	examples of minicomputers are IBM=VAX-8800, MV-1500.

Different between Super and Mainframe computers:

Supercomputers	Mainframe Computers
Supercomputers are optimized for complicated computations that take place largely in memory.	Mainframe computers are designed to handle tremendous amounts of input, output and storage.
Supercomputers are mostly purpose-built for one or a few specific institutional tasks.	Mainframe computers are built to handle a large variety of tasks.
Supercomputers mainly focus on problems which are limited by calculation speed.	Mainframe computers focus on problems which are limited by input/output and reliability.
The processing speed of supercomputers can go beyond 200 MIPS.	The processing speed of mainframe computers can range from as low as 3-4 MIPS to as high as 100 MIPS
Supercomputers are mainly used for scientific research in addition to aircraft industry and VR.	Mainframes are mostly used in banks and other financial institutions, insurance industry, etc.

COMPUTER HARDWARE INFORMATION

Parts of the computer system:

A completed computer system consists of mainly three parts:

1. Hardware (The computer)
2. Software (Programs)
3. Data (Information)

Defined Hardware: The mechanical devices that make up the computer are called hardware. A computer hardware consists of interconnected electronic devices that you can use to control the computer's operation, input, and output.
For examples:

- Monitor.
- Motherboard.
- CPU (Microprocessor.
- Main memory (RAM)
- Expansion cards.
- Power supply unit.
- Optical disc drive.
- Hard disk drive (HDD
- Keyboard
- Mouse
- Speaker and many more...

Defined Software: Software is a set of instructions that makes the computer perform tasks. In other words, we can say that, software tells the computer what to do. Here the program refers to any piece of software:

1. **System software:** That software which are used to provide interface between users and hardware is known as system software ex. **Operating systems.**
2. **Application Software:** that Software which are used to perform particular task is known as Application Software ex. **Adobe flash player**, **Microsoft Word, excel**
3. **Utility software:** That software is used as a helping tool for our convenience is known as utility software ex. **Antivirus**, **File Management System**, **Disk clean-up tool**

Other's Software:

- Freeware software
- Shareware software
- Open-source Software
- Proprietary software

COMPUTER HARDWARE INFORMATION

Component defined:

Component are those Hardware items which are hard, visible and Touchable. The hard component of a computer system is placed under a cabinet. The component which are usually popular is like -Hard disk drive, microprocessor and RAM etc.

Components Example:

- Microprocessor
- Hard disk drive
- Random Access Memory
- Power supply
- Motherboard
- DVD writer
- Graphics Card

Types of Peripherals devices:

1. **Input Devices:** Those Devices which are used to give input in computer system are known as input devices. For example: Keyboard, Mouse, Trackball, Graphics tablet, Game Controllers, Touch screen, Webcam, Microphone etc.
2. **Output Devices:** Those Devices which are used to take output as result of our input in our computer system are known as Output devices, for example: Monitor, Printer, Audio Speaker, Headphone, Projector, GPS, Sound card, Video card etc.

Microprocessor defined: Microprocessor is a computer processor where the data processing logic and control is included on a single integrated circuit, or a small number of integrated circuits. The microprocessor contains the arithmetic, logic, and control circuitry required to perform the functions of a computer's central processing unit.

- It is known as the brain of computer It is first Priority to run machine.
- It is a chip-based structure made up of millions of transistors and logic gates.
- It receives the incoming instruction as input from memory of RAM procced it and gives result as output.
- It is responsible for the speed and capacity to execute task in computer systems.
- These Microprocessor are categorized are into 2 different architecture 32bit and 64bit.

CPU (Central processing unit): CPU also called a central processor, main processor or just processor, is the electronic circuitry that executes instructions comprising a computer program. The CPU performs basic arithmetic, logic, controlling, and input/output (I/O) operations specified by the instructions in the program.

CPU Categorized into 2 different segments:

1. **Arithmetic Logical Unit (ALU):** It performs all the Arithmetic, mathematical, algebraical and logical tasks like Addition, Divide, Multiplication, Subtraction and Modulus. It also preforms logic tasks OR, AND & NOT
2. **Control Unit (CU):** It is responsible for controlling the flow of data between microprocessor and the external components of the computer using the CPU buses.

COMPUTER HARDWARE INFORMATION

Buses in Microprocessor: CPU consists 3 buses mention below. Basically, buses are used as medium or carrier of information or data between the microprocessor and the memory and components of the system. It carries the instruction from memory to CPU and back CUP to memory after Processing...

3 Types buses here:

1. **Data bus**: It sends and Receives data to memory
2. **Address bus**: It sends address of input to the memory or RAM
3. **Control bus:** It makes the communication between CPU and Components

Specifications of CPU: Major Specifications of Microprocessor as below…

- **Clock speed:** Clock speed is a unit to measures the number of instructions executes by the working microprocessor within a second is called Clock speed. It is measured in GHz.
- **Cache memory:** It is static natured and quick responsive memory, by structural it is made up of 6 transistor and 1capasitor in each cell block cache memory are categorized into 3types L1, L2 and L3.
- **Operating Voltage:** It means how much power or voltage a microprocessor needs to performs tasks.
- **FSB (Front-side bus):** It stands for front-side bus. It is a data bus which carries the data from RAM to processor and then back to processor RAM as a procced instruction.

Major Brands of CPU (INTEL, AMD, NVIDIA)

INTEL	AMD	NVIDIA
Intel corporation is an American multinational corporation and technology company and the biggest manufacture of microprocessor in the earth	AMD (Advanced micro devices) Is and American multinational semiconductor company which also makes GPU (Graphics processing unit) And microprocessor brand all over world	NVIDIA is an American technology company it designs graphics processing units for the gaming and microprocessor units for all over

Packaging: The process of installing the microprocessor in motherboard is known as packaging. In motherboard there are different types of packaging for different types of microprocessors…

Packaging is based upon which microprocessors you want to install into your system. The processor is installed and fix with the socket in motherboard…

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CPU Installation-Sockets for CPU:

- According to structure are a collection or an array of pins which holds microprocessor.
- Sockets are used to adjust the position of microprocessor in the motherboard these are Categorized according to the brands and version of microprocessors…
- For latest Intel 10th Generation core i9 processor supports GA 2066 socket.

INTEL	NO. OF PINS	PROCESSOR
LGA	1151 TO 1155	I3, I5 & I7
PGA	478	PENTIUM I
PPGA	775	PENTIUM II
FC PGA	479	PENTIUM III
AMD	NO. OF PINS	PROCESSOR
C SERIES	SOCKET C32	OPTERON
AM SERIES	AM 1 TO 4	RYZEN 3,5,7, PHENOM, ATHLON & SEMPRON
A SERIES	SOCKET A462	DURON & ATHLON
FM SERIES	FM 1 TO 2	TRINITY & LLANO

Specification of AMD:

Over clocking	Graphics	EVP (Enhanced Virus protection	Gaming and Graphics tasks	Cost
Over clocking is the process in which we consume more performance than the processor has. You can simply over clocking the performance Of AMD processor up to 4.2 GHs in the latest technology	AMD provide their processor an onboard GPU which provides superior graphics without GPU unit. We can also play mid-range games and perform high end work like video rendering	AMD provides EVP intheir processors which makes an anti-malware protection from the viruses and protect microprocessor	AMD is better for gaming and media production works because it has full control of threats at a time. Which makes high end performance.	AMD is much cheaper than intel and also provides a good performance. If you have lower budget go with AMD.

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Specification of INTEL:

Over clocking	Hyperthreading	EDB (Execute disable bit)	Cores and threats	EIST (Enhanced intel speed step technology)
Over checking is the process in which we consume more performance than the processor has, you can simply over clock the performance of intel processor up to 4.4GHz in the latest technology	It is a technology developed by intel in which a single physical processor can works as two microprocessors as similar	Intel provide EDB in their processor which makes a protection from the virus and protect microprocessor as similar	Intel gives 32 threats of 14nm technology and 12 cores in their latest processor which gives a better experience to the user in multitasking. This is much more in comparing of AMD,	EIST is a thermal based technology which enhanced the microprocessor performance as per the requirement which the uses need while work. It can fluctuate performance according to needs just like low performance while office works and high performance for gaming and high-end purpose it prevents heat and remove load from processor while we don't need it.

Mobile Processors: Mobile processors are similar as laptop desktop processors but are smaller in size power and capacity. They are specially design for portable devices such as mobile, tablet and calculators etc. they don't have specs like overclocking and turbo boost, they designed for simple list messaging, watching video or playing games etc.

Here are the most common processors for mobile phones are:

- Apple A series
- Samsung Exynos
- Media Tek Hello
- Qualcomm Snapdragon
- Huawei Kirin

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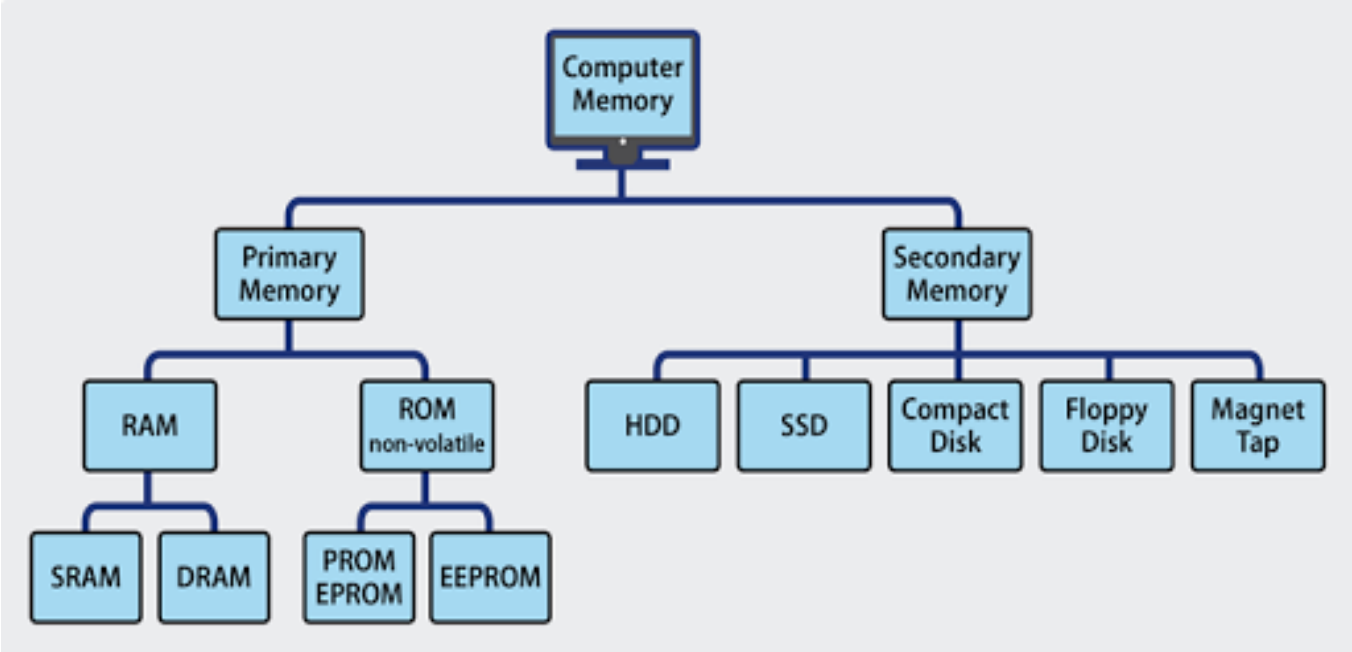
Memory types:



RAM (Random Access Memory): was invented by Roert Heath Dennard at IBM Thomas j Watson Research Center in 1968.

RAM definition: RAM stands for Random Access Memory. It gets the word “Random” because information can be accessed in non-sequential order. Though the data itself is stored Together, it could be anywhere in the “container” or amount of RAM available. RAM is measured in “bits”, and, 8bits equals 1 byte, A kilobyte equals 1024 bits, and a megabyte equals 1024 kilobytes.

RAM Divided into types: 1. SRAM (Static Ram) 2. DRAM (Dynamic Ram)

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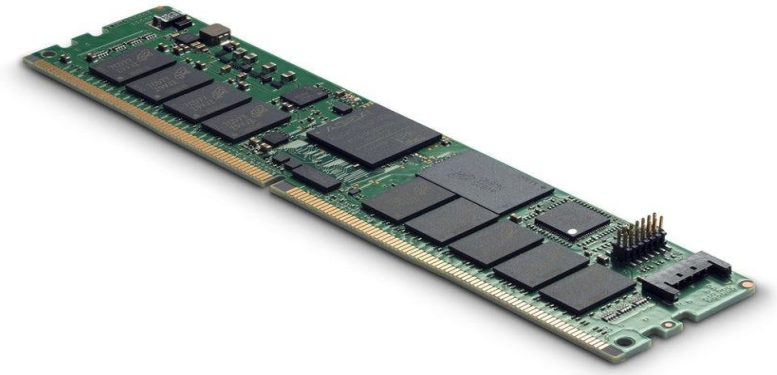
1. **SRAM:**

Static Ram is a type of RAM that Holds its data without external refresh, for as long as power is supplied to the circuit. This is contrasted to dynamic RAM(DRAM), which must be refreshed many times per second in order to hold its data contents. SRAMs are used for specific application within the PC, where their strengths out wight their weakness compared to DRAM.

1. **DRAM:**



Dynamic RAM is the standard computer memory of the vast majority of modern desktop computers. It is a volatile memory that needs to be refreshed with voltage regularly, otherwise it loses the information stored on it. Dynamic RAM is also referred to as DRAM. Volatile mean that it loses the information stored on it as soon as power is withdrawn.

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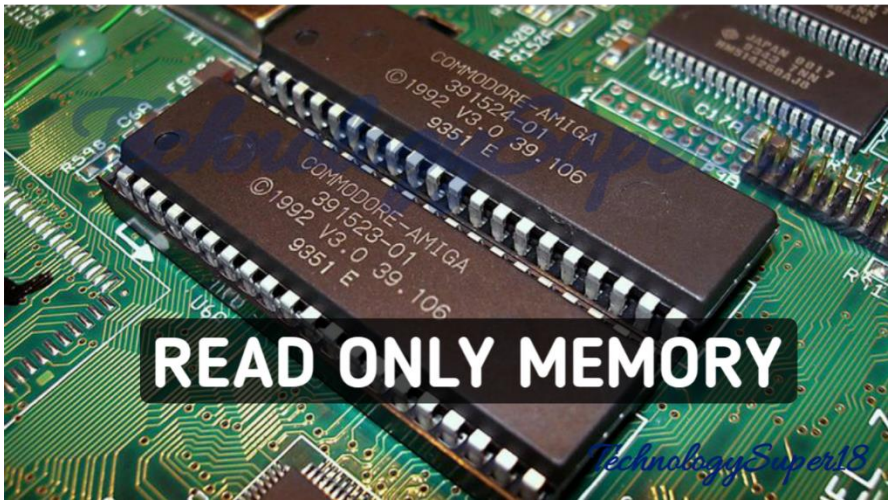
Difference's SRAM between DRAM:

SRAM	DRAM
Stores data till the power is supplied	Stores data only for few milliseconds even when power is supplied
Uses an arry of 6 transistors for each memory cell	Uses a single transistor and capaitor for each memory cell
Does not refreshes the memory Cell	Needs to refresh the memory cell after each reading of the capacitor
Data access is faster	Data acces is slower
Consume more power	Consume less power
Low density/less memory per chip	High density/more memory per chip
Cost per bit is high	Cost per bit is low

ROM (Read Only Memory) Definition:



ROM is a type of storage medium that permanently stores data on personal computers and others electronics devices. It contains the programming needed to start a PC, which is essential for boot-up, it performs major input/output tasks and holds programs or software instruction because ROM is Read only memory, it cannot be changed, is permanent and non-volatile, meaning it also holds its memory even when power is removed by contrast, random access memory is volatile. It is lost when power is removed.

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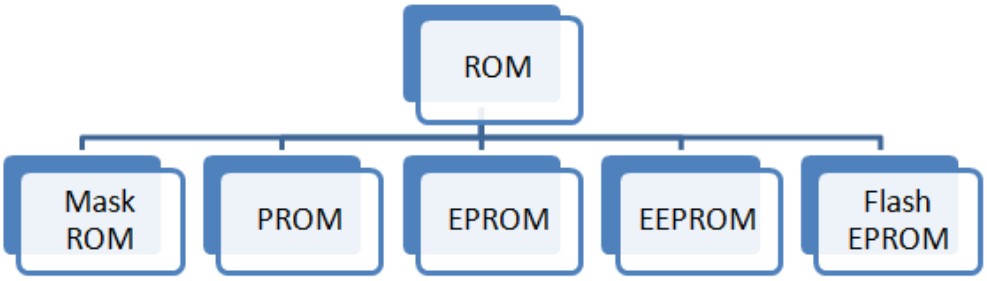
Types of ROM:



- **Mask ROM:** MROM is the short form of Mask Read Only Memory. It is inexpensive and is the very first ROM which is hard wired device that contains a pre-programmed set of data or instructions.

PROM: PROM is read-only memory chip that data can be written only once by a user. The difference between it and the read only memory is that PROM is manufactured as a blank memory, while the ROM is programmed during the manufacturing process. The user buys a PROM, the user will need a special device called a PROM programmer or PROM burner to write the desired data onto the blank PROM chip. The process of programming a PROM is sometimes called burning the PROM. The memory can be programmed just once after manufacturing by "blowing" the fuses, which is an irreversible process.

- **EPROM:** Erasable programmable read-only memory (EPROM), Can be written to or programmed and can also erased.

- **EEPROM:** Electrically Erasable Programmable Read-only Memory (EEPROM), Written or Programmed easily erased with the help of electrical devices and data can be easily modified.

- **FLASH MEMORY:** Non-volatile memory, can be erase electronically and rewritten, similar to EEPROM and most computer use flash memory to hold their startup instructions because it allows computer easily to update its concern.

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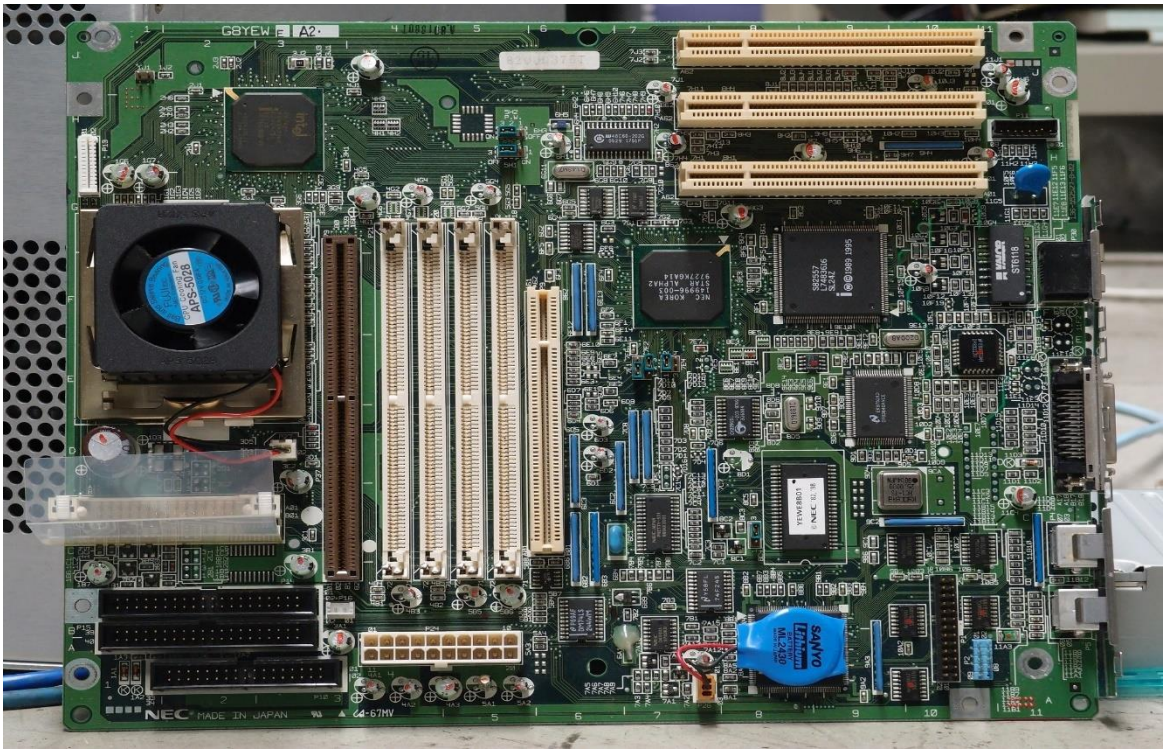
Motherboard:



Motherboard is known as the interconnection of components in a computer. the main printed circuit board (PCB) in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system. It is circuit board which have ports and sockets with transistors coating to connect components togethers, it is responsible for contact of flow data and instruction with the help of BUSES and Motherboard categorized into 2 different segments:

1. Integrated Motherboard
2. Non- Integrated Motherboard

Motherboard Brands:

Desktop Motherboard	Laptop Motherboard	Server Motherboard
It is used in Desktop systems.it comes with Upgradation capability, we can upgrade it easily	It is used in laptop all components are place in limited space, rare motherboard allows upgradation	It used in server, Bigger in size having many ports and designed for high end works

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Cmos Battey:

Nonvolatile BIOS memory refers to a small memory on pc motherboards that is used to store BIOS settings. It was traditionally called CMOS RAM because it used a volatile, low-power complementary metal-oxide-semiconductor (CMOS) SRAM (such as Motorola MC146818 or similar) powered by a small battery when system power was off.

Graphics card:

A Graphics card is a piece of computer hardware that produces the image you see on monitor, The graphics card is responsible for rendering an image to your monitor, It does this by converting data into a signal your monitor can understand.

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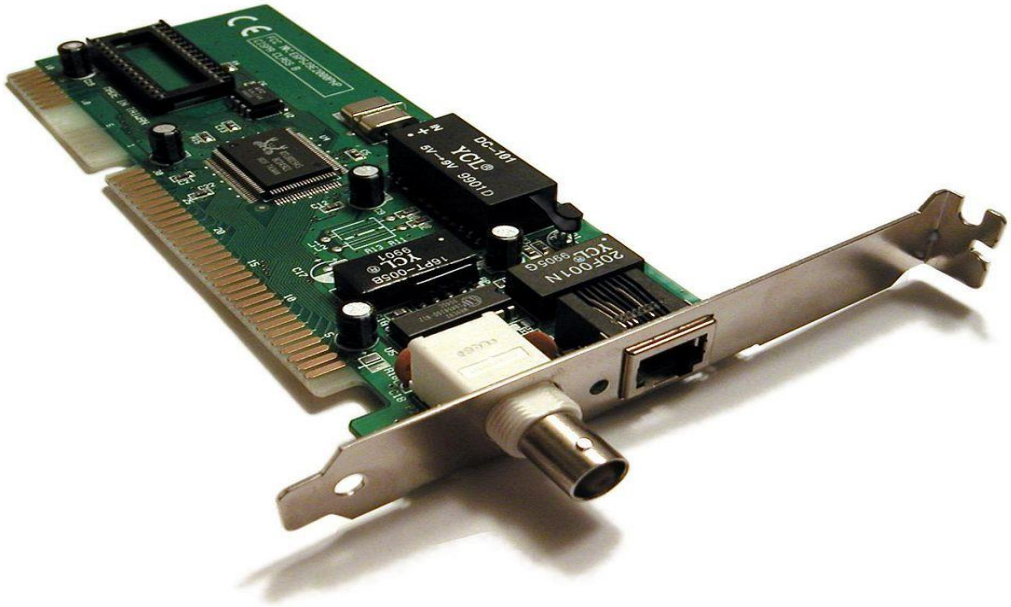
Nic card (Network interface card):



A network interface card (NIC) is a hardware component without which a computer cannot be connected over a network. It is a circuit board installed in a computer that provides a dedicated network connection to the computer. It is also called network interface controller, network adapter or LAN adapter.

Audio card:

A sound card is an expansion card or IC (integrated circuit) for producing sound on a computer that can be head through speakers or headphones. Although the computer does not need a sound device to function, they are included on every machine in one form or another, either in an expansion slot or built into the motherboard.

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HDD (Hard disk drive):

HDD is a data storage device used for storing and retrieving digital information using rapidly

rotating disks (platters) coated with magnetic material. An HDD retains its data even when powered off. Data is read is read in a random-access manner, meaning individual blocks of data can be stored or retrieved in any order rather than sequentially. Example of Primary Memory and HDD is 2 types here is name:

1. Sata (Serial advanced technology attachment): 7pins for data 15pins power 4pins molex speed up to 600mbps
- Sata1-150mbps
- Sata2-300mbps
- Sata3-600mbps
2. Ide (Entergrated drive Electronics): 40pins for data 4pins for power 4pins Molex speed upto 133Mbps
- Atapi-I-100mbps
- Atapi-II-133mbps

File systems in HDD:

1. **FAT** (File allocation table)
- It's not a security
- Partition size max 32gb
- Does not support data compression
- Does not support disk quata
2. **NTFS** (New technology file system)
- It's a security
- Partition size is 1TB (tera bytes)
- It supports data compression
- It supports disk quata

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HDD Components:

1. **Disk platter**:

- The paltter is made by magnet material, in the flat disk part of the drive.
- The data stored in the platter.
- Each set of magnetic particles is collection a unit called a bit.

2. **Stepper motor**:

- Use stepper motors for controlling read/write head position
- Stepper motors usually use +12V power, but some new low-power drives use +5V power source.

3. **Spindle motor:**

- It controls the platter
- This motor rotates at a speed of 3600 to 10,000 R.P.M
- All the platter moves in the same direction

4. **Read and write head:**

- The heads read and write the information to the drive platter
- The head writes magnetic information the platter

SSD (Solid-state drive):

- SSD is a data storage device that uses solid state memory to store persistent data. It is flash based storage device and it is use same input/output interface developed for hard disk drive.
- SSDs do not have any moving mechanical components, which distinguishes them from traditional magnet disk such as HDD.
- SSD use microchips that retain data in non-volatile memory ships.
- SSD use non-volatile NAND flash memory, which enables it to data when the power Is removed.

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History of Storage Media:

- Punch card in 1940s
- Magnetic tapes/drives 1940s
- Hard drives introduce by IBM (International business Machines Corporation) in 1956.improved in 1960s
- In 1995, M-system introduced flash-based solid-state drives. They had the advantage of not requiring batteries to maintain the data in memory (required by the prior volatile memory systems), but were not as fast as the DRAM-based.

Different between HDD & SDD:

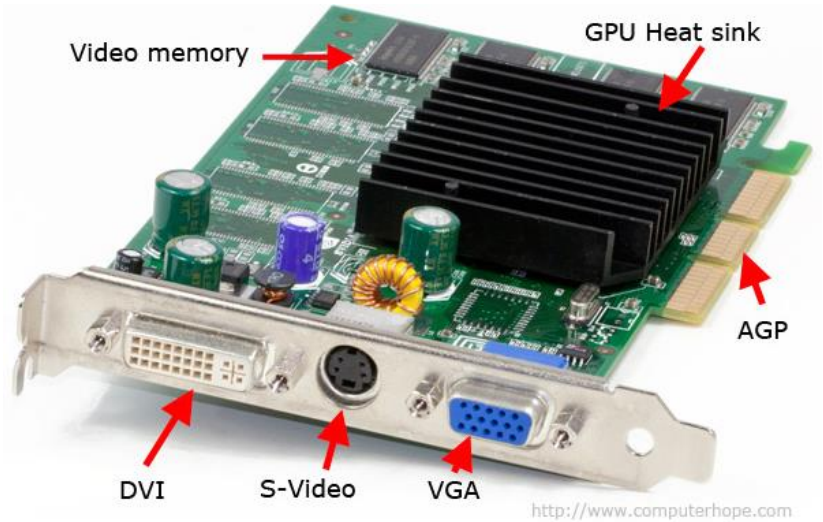
Attribute	SSD (Solid State Drive)	HDD (Hard Disk Drive)
Power Draw / Battery Life	☺ Less power draw, averages 2 – 3 watts, resulting in 30+ minute battery boost	More power draw, averages 6 – 7 watts and therefore uses more battery
Cost	Expensive, roughly $0.20 per gigabyte (based on buying a 1TB drive)	☺ Only around $0.03 per gigabyte, very cheap (buying a 4TB model)
Capacity	Typically not larger than 1TB for notebook size drives; 4TB max for desktops	☺ Typically around 500GB and 2TB maximum for notebook size drives; 10TB max for desktops
Operating System Boot Time	☺ Around 10-13 seconds average bootup time	Around 30-40 seconds average bootup time
Noise	☺ There are no moving parts and as such no sound	Audible clicks and spinning can be heard
Vibration	☺ No vibration as there are no moving parts	The spinning of the platters can sometimes result in vibration
Heat Produced	☺ Lower power draw and no moving parts so little heat is produced	HDD doesn't produce much heat, but it will have a measurable amount more heat than an SSD due to moving parts and higher power draw
Failure Rate	☺ Mean time between failure rate of 2.0 million hours	Mean time between failure rate of 1.5 million hours
File Copy / Write Speed	☺ Generally above 200 MB/s and up to 550 MB/s for cutting edge drives	The range can be anywhere from 50 – 120MB / s
Encryption	Full Disk Encryption (FDE) Supported on some models	☺ Full Disk Encryption (FDE) Supported on some models
File Opening Speed	☺ Up to 30% faster than HDD	Slower than SSD
Magnetism Affected?	☺ An SSD is safe from any effects of magnetism	Magnets can erase data

COMPUTER HARDWARE INFORMATION

SMPS (switch mode power supply):

A SMPS is a device used to input power to all component of motherboard it contains difference color wires having different voltage for different components in CPU cabinet SMPS offers advantages in terms of size, wight, cost, efficacy and overall performance. These have become an accepted part of electronics gadget. Basically, it is a device in which energy conversion and regulation is provide by power semiconductors that are continuously switching “ON” and “OFF” with high frequency.

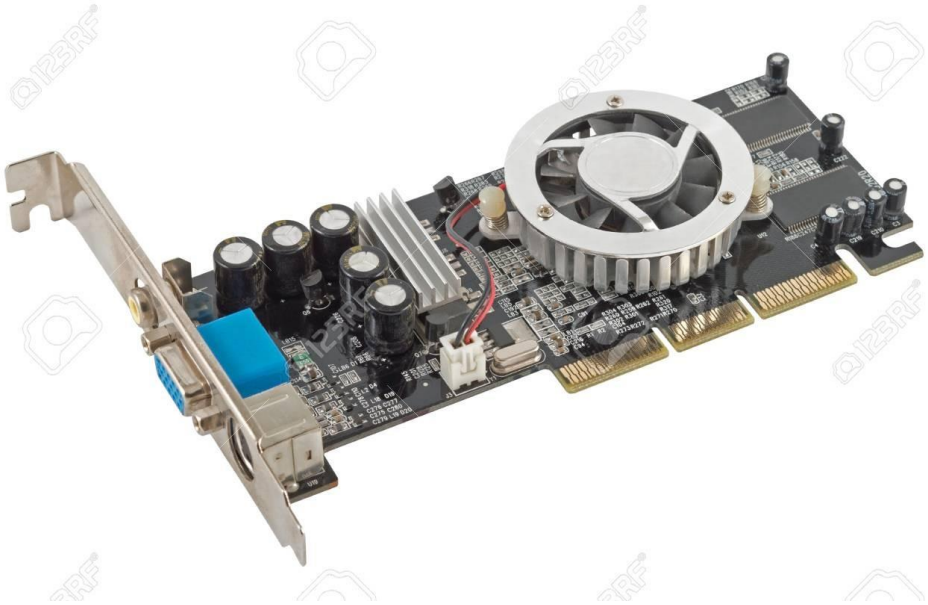
Video Card:



A video card “also called a video adapter, display card, graphics card, graphics board, display adapter or graphics adapter and sometimes proceeded by the word discrete or dedicated to emphasize the distinction between this implementation and integrated graphics” is an expansion card which generates a feed of output images to a display (such as computer monitor)

COMPUTER HARDWARE INFORMATION

Function of a VGA (Visual Graphic array) Card:



Video card is to provide an interface between the hardware and the software. Basically, this means that it plunges in to the monitor and shown what the computer is doing.

Heat Sink:

A heat sink I mounted on most modern graphic cards. A heat sink spreads out the heat produced by the graphics processing unit evenly throughout the heat sink and unit itself. The heat sink commonly has a fan mounted as well to cool the heat sink and the graphics processing units. Not all cards have heat sink, for example, some cards are liquid cooled, and instead have a water block, additionally, cards from the 1990s and did not produce much heat, and not required more.

COMPUTER HARDWARE INFORMATION

Graphics card:

Graphics card or video card is display adaptor or hardware component whose function is to generate output images to display. It is also called dedicated expansion card. **It is of 2 types:**

1. Internal
2. External

USB (Universal serial bus):

- A USB drive is data storage device that include flesh memory with an integrated Universal serial bus interface
- This device is smaller, faster, thousands of times more capacity, and more durable and reliable then compact disk (CD) because this device are not movable parts
- Comes with more different sizes and each different got speeds

2 types of UBS ports:

1. Internal
2. External

Pen drive:

A USB flash drive is a data storage device that includes flash memory with an integrated universal serial bus (USB) interface. USB flash drives are typically removable and rewritable And physically much smaller than an optical disk.

Function of pen drive: Pen drive ac as permanent storage device that interface with the computer through a USB or firewire port, those pen drives store information for any of the same use an internal hard drive. The pen drives use flash memory modules that hold data in a NAND memory configuration, which have increased sequential read and write speeds but reduce random access times.

COMPUTER HARDWARE INFORMATION

Features of pen drive:

1. These products made of plastic and steel
2. The capacity of pen drive is 2gb to 1tb

Memory Card:

A memory card or memory cartridge is an electronic data storage device used for storing digital information, typically using flash memory. You can store music, pictures, videos and important documents files etc. it uses in different devices like Cell phones, camera and iPod many mores.

Input device (Mouse, keyboard): Those devices which are used to give input in computer system are known as input devices.

Mouse: A mouse is a input device used to input in computer system using a pointer Arrow and here is 5 basic types mouse are:

1. Mechanical mouse: Inside this mouse metal or rubber ball in its underside.
2. Trackball Mouse: The trackball is an upside-down mouse that rotates in place within a socket.
3. Optical mouse: A mouse that uses light to detect movement
4. Wireless mouse: wireless working as similar mouse but only in this mouse don't have any wire connection.
5. G-stick Mouse: gStick is a pen-shaped computer mouse

Keyboard: A keyboard is a input device used to input in computer system using some key strokes. And 5 basic types of keyboards:

1. Mechanical keyboard: have switches under each key
2. Gaming keyboard: small, auxiliary keyboard designed only for gaming
3. Standard keyboard:(also called modern keyboard) set number of total keys
4. Wireless keyboard: This keyboard doesn't have wire like others keyboard
5. Multimedia keyboard: one with media keys — additional buttons, typically along the top, for controlling audio playback, for starting common applications (e.g., e-mail client and Web browser) and other auxiliary functionality.

COMPUTER HARDWARE INFORMATION

UPS (Uninterruptable power supply):

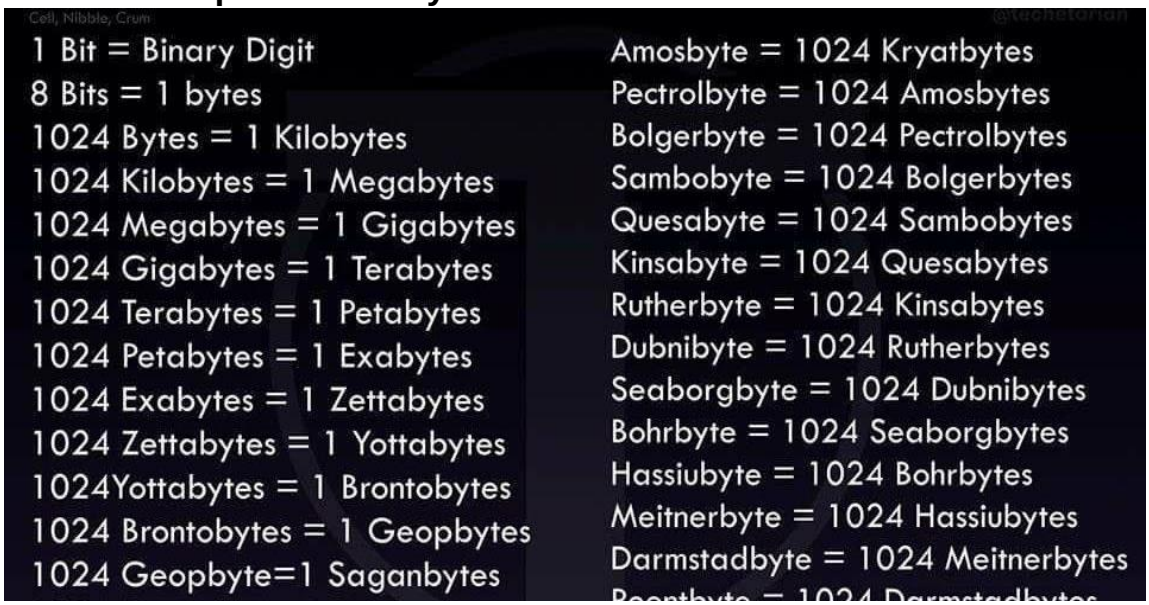
A UPS is an input device used as power backup when mains off.
An uninterruptable power supply (UPS) is a device that allow a compute to keep running at atleast a short time. When primary power source is lost. It also provides protection from power fluctuation thus we can say that UPS is a device that helps to provide consists power to computer system.

Storage Units: The Unit which is used to measure the data size, transfer speed and data transmission is known as storage unit bit, byte, kb, mb, gb,tb etx.

Bit definition (0/1):

- Comter circuit need power of electricity
- Electricity power mode is ON and OFF
- The ON and OFF is bit in electricity
- Becouse the computer is storing the data in form off electricity
- In electricity also called bit
- Only two values in bit 0 and 1 mean ON or Off

Units of computer memory Measurement:



COMPUTER HARDWARE INFORMATION

Nic or Network Card:

It stands for Network interface controller. Nic used to connet Ethernet cable (RJ-45), (SC, ST connector) with the PC. It is a card which have Mac Address written on it.

Components of NIC:

- Metal expansion card
- Boot ROM chip
- 32-bit controller
- Activity LED
- Rj-45 Lan port

Repeaters:

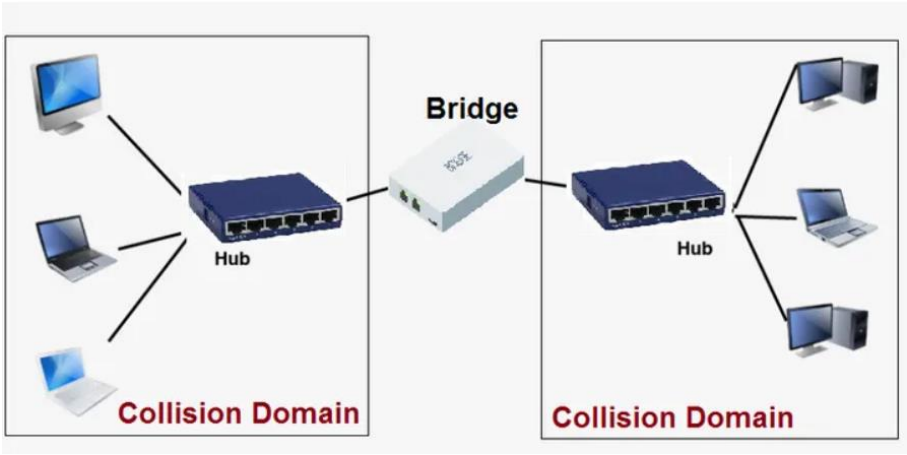
Repeater used to regenerate or replace a signal. It removes the unwanted noise in an incoming signal, it works on layer 1 of OSI (Open system Interconnection) Model.
It is used in some scaled area and it refine the signals and manage the proper speed of the network.

HUB:

It is a networking device which simply receive data from one port and transfer on all other ports. HUBs are commonly used to connect segments of Lan
It used in where you have to crate multiple ethernet with the help of a networking device. It comes with different port segments like 6,12,24 etc.

COMPUTER HARDWARE INFORMATION

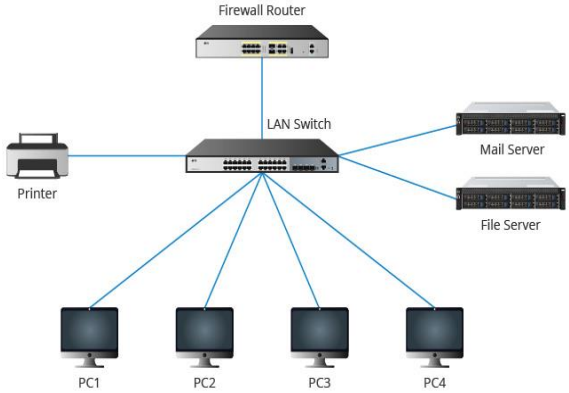
Bridge:



Bridge device inspect incoming network traffic and determine whether to forward or dicard it according to its intended destination it operates on data link layer
A bridge is a type of computer network device that provides interconnection with other bridge networks that use the same protocol. **Bridge not change the physical MAC(media access control) address.**

Switch:

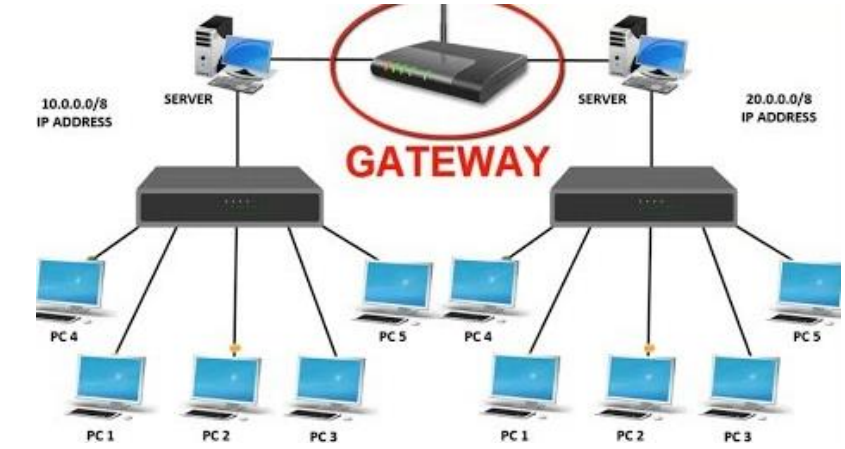
A switch can receive input or signal from any of one port and transmit it on all the ports. Ethernet LAN (Local area network) is used to connect to a switch that correct system. It works on data link OSI (Open system interconnection) Model.
It is a small device that transfers data packets between multiple network devices such as computers, routes, servers or other switches.



COMPUTER HARDWARE INFORMATION

Gateway:

Gateway connects two networks together with the help of gateway devices like firewalls and router. It is a node between the public network and private network which makes some security with the help of identification.
A gateway is a networking device that connects two networks using different protocols together. It also acts as a “gate” between two networks.



Router:

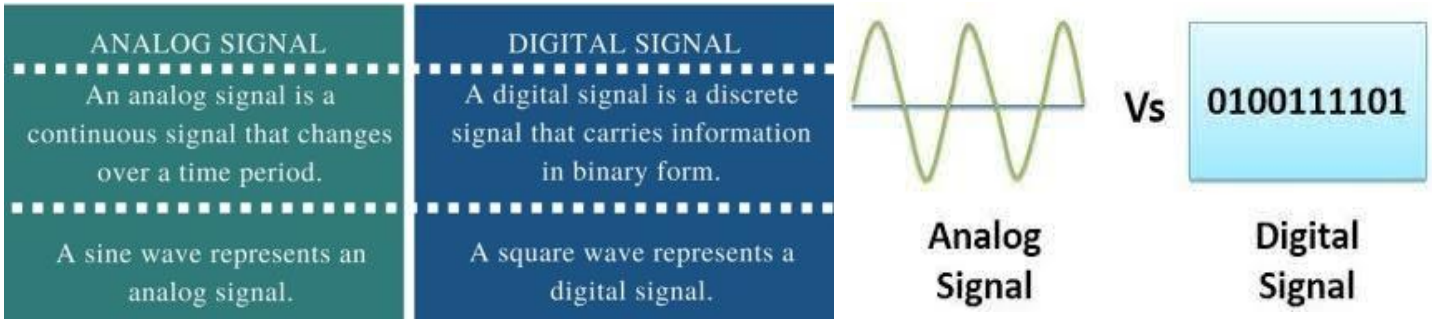
Router is a networking device which is used to provide interaction between two different networks. Router are also used for provide the routes to the data
And devices that are connected in network. Router are used to establish internetwork communication.
A Router inspects a given data packet’s destination internet Protocol (IP), and provide connection to the nodes with the main network. It gives you wired and wireless both connectivity’s.

COMPUTER HARDWARE INFORMATION

Modem:

Modem is modulator-demodulator, Modem is a hardware device that connects a computer or router to a board band network. It concerts or “” an **analog** signal from a telephone or cable wire to **digital** data (1s and 0s) that a computer can recognize.

Analog and Digital Signals:



The main difference between the two devices is that a modem lets you connect to the internet, While a router distributes that connection to different devices. A modem is your gateway to the web, while a router is a central hub for your devices.

HDMI (Hight-definition multimedia interface)

HDMI is a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device. HDMI is a digital replacement for analog video standards.

COMPUTER HARDWARE INFORMATION

Connectors:

A connector is generally a specific interface which is used to connect a device physically with a computer system with stability, it is used to install the cable or interface of external media or devices to a computer system.

Types of connectors:

- **BNC (Bayonet Neill councilman) connector:**
- **DB connectors (DB9, DB15, DB25, DB37 and DB50)**
- **RJ connectors (RJ-11, RJ12, RJ45)**
- **Fiber-optic connectors (ST/SC)**
- **SCSI connectors (SCSI-1, SCSI-2, SCSI-3, SCSI-5)**

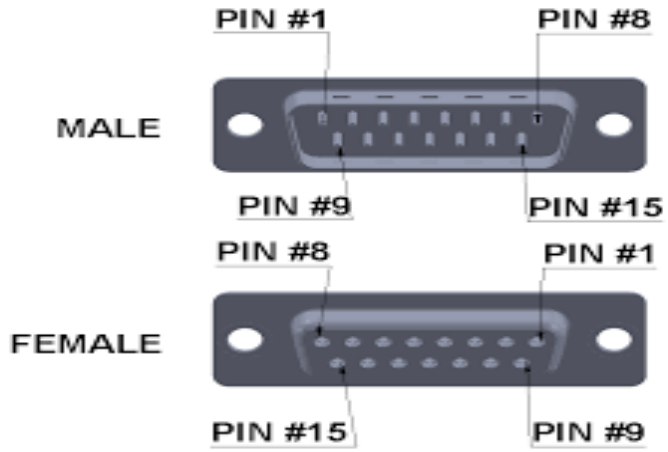
BNC connector:

Bayonet Neill-Concelman (BNC) connector is a series of connectors used for connecting thinnet coaxial cabling to various networking components. BNC connectors use twist-and-lock mechanism that provides a secure connection between network cabling and components. BNC connectors are typically used on 10Base2 Ethernet networks. The different type of BNC connectors includes that following:

BNC cable connector
BNC T-connector
BNC barrel Connector
BNC terminator

COMPUTER HARDWARE INFORMATION

DB (DATA BUS) connector:



DB connector is any connector used for connecting data terminal equipment **(DTE).** The letters “DB” stands for “DATA bus” and are followed by a number that indicates the number of lines or pins in the connector.
Common members of the DB family include the following:
DB-9, a 9-pin serial connector
DB-15, 15-pin connectors
DB-25, a 25-pin connector
DB-37, a 37-pin connector
DB-60, a 60-pin connector

RJ (Registered Jack) connector:

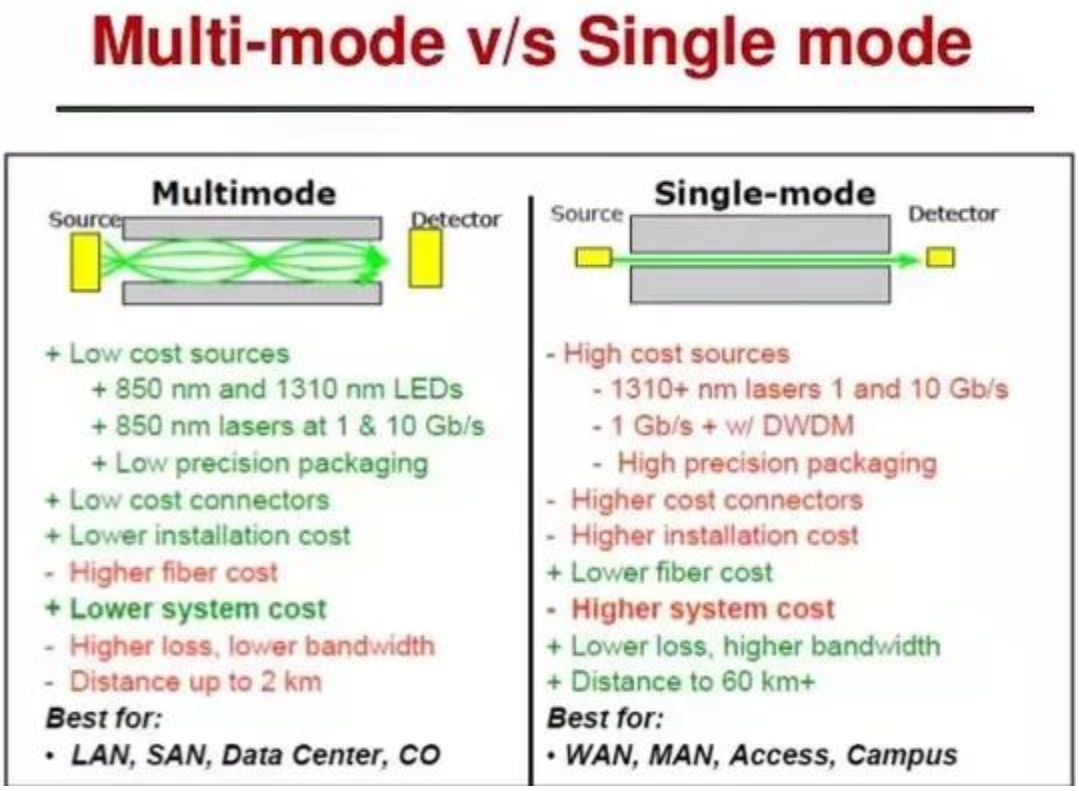
RJ connector are a family of push-and-click connector for twisted-pair wiring in telephone and network wiring. RJ stands for Registered Jack. RJ types define both jack or receptacle (Female) and a plug (Male) type of connector.

The most common types of RJ connectors are as following:
RJ-11 connector: A 4wire or 6-wire telephone-type connector
RJ-45 connector: An 8-wire telephone type connector
RJ-48 connector: An 8-wire telephone-type connector TP

COMPUTER HARDWARE INFORMATION

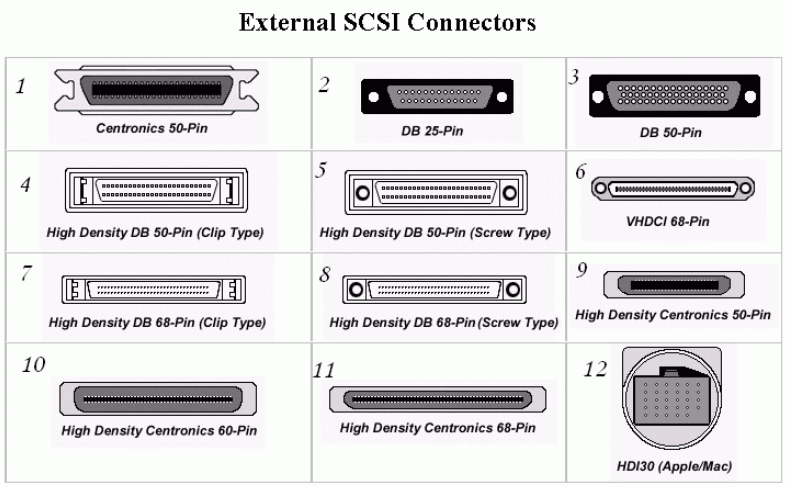
Fiber-optic connectors (ST/SC/LC):

Connector types that are generally use for connecting fiber-optic cabling to networking devices. Both are recognized by the electronic industries Alliance/Telecommunications industry association **(EIA/TIA) 568A" https://en.wikipedia.org/wiki/ANSI/TIA-568"** standard.
SC (Subscriber Connector): *This Connectors is for structural cabling it is used for high speed and for single mode fiber cabling.*
ST (Straight Tip): *This connector is for structural cabling it is used for high speed and for multi-mode fiber cabling.*
LC (Lucent connector): *Lc connectors can be used with both single-mode and multi-mode cables.*



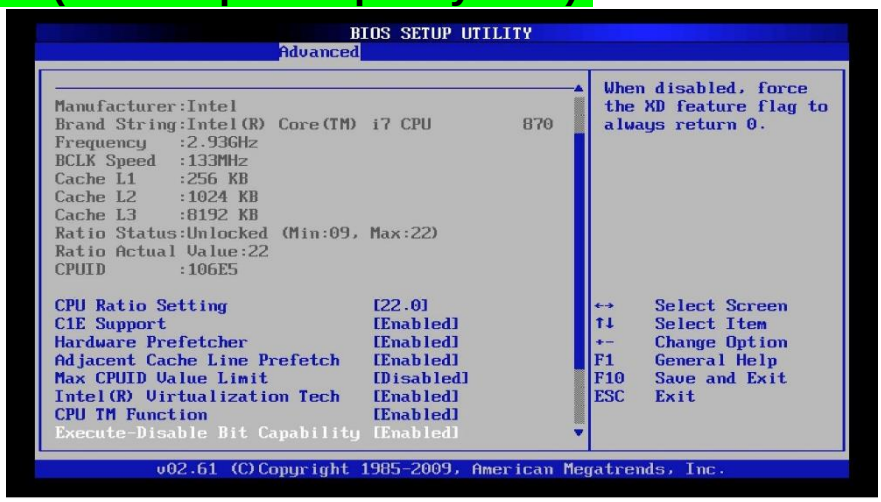
COMPUTER HARDWARE INFORMATION

SCSI (Small Connection System Interface):



SCSI stands for small computer system interface, is a hardware bus specification For connecting **peripherals** to a computer using a parallel transmission interface.
SCSI-1 5mbps over 8bit
SCSI-2 20mbps over 16bit
SCSI-3 40mbps over 16bit
SCSI-4 512mbps over 64bit

BIOS (Basic input/output system):



- The software used to start your computer
  - The firmware
  - System BIOS, ROM BIOS
  - ROM or flash memory

- Post
  - Power-on self-test

- Look for a boot loader
  - Start the operating system

COMPUTER HARDWARE INFORMATION

Legacy BIOS:

- The Original/ traditional BIOS its been around 25 years ago
- Older OS (operating system) talked to hardware through the BIOS
- Limited hardware support
- No drivers for modern network, video, and storage devices

UEFI (Unified extensible firmware interface) BIOS:

- Unified extensible firmware interface (UEFI)
  - Based on INTEL's EFI (extensible firmware interface)
- A defined standard
  - Implemented by the manufactures
- Designed to replace the legacy bios
  - Need to modern bios for modern computers

CMOS battery:

- Not needed for today's flash-based storage
  - Maintains older bios configurations
  - May only be used to maintain date/time
- A bad battery will require a BIOS configuration on every boot

Difference between Legacy BIOS and UEFI BIOS:

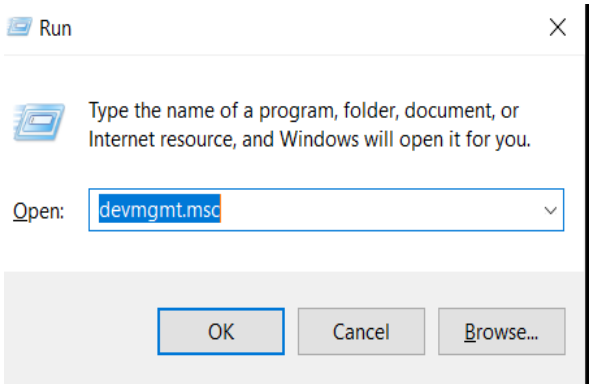
S.no	LEGACY BIOS	UEFI BIOS
1	BIOS uses the Master Boot Record(MBR) partitioning scheme	UEFI uses the GUID Partition Table (GPT)
2	Max partition size in MBR is ~2TB	Maximum partition UEFI it is ~9 ZetaBytes
3	MBR can have at max 4 primary partition	GPT can have 128 Partitions
4	MBR can store only one boot loader	GPT has a separate dedicated EFI System Partition(ESP) for storing multiple boot loaders
5	No Secure boot	UEFI offers secure boot
6	Used VBIOS for Graphics output	Used GOP for Graphics output
7	Assembly language	C- language
8	Take long time to boot	Fast POST and Boot

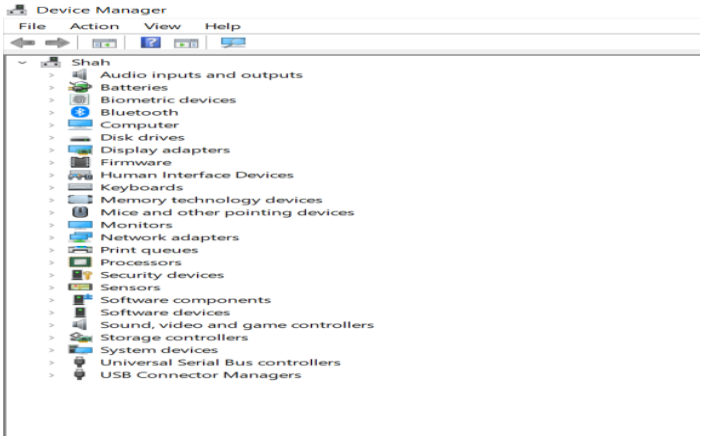
COMPUTER HARDWARE INFORMATION

Device drivers:

A device driver or hardware driver is a group of files that enable on more hardware devices to communicate with the computers **operating system**. Without drivers, the computer would not be able to send and received data correctly to hardware devices, such as a printer.

open device drivers using run: devmgmt.msc





Drivers needed devices are as below:

Hardware devices that unknown by the operating system or that have features that are unknown by the operating system all required drivers. Below is a list of hardware devices and **peripherals** that require drivers.

1. Card reader
2. Controller
3. Modem
4. Motherboard chipset
5. Network card
6. Printer
7. Scanner
8. Sound card
9. USB device
10. Video card

Drivers are not installed for device will not run:

If the appropriate driver is not installed, the device may not function properly, if at all
With some devices, the device may work, but all of its features may not work, for example-
A computer mouse usually works without drivers, but if it has more buttons than the traditional mouse, those extra buttons will not work until the drivers are installed.

Update or install devices drivers:

1. As same got RUN and search “devmgmt.msc”
2. Select drivers you want to update
3. Right click on driver and update or install
4. Wait for completed
5. Restart your pc
6. After restart check driver has updated or not

COMMAND line code every computer expert should know here is **click for command code**

COMPUTER HARDWARE INFORMATION

Display issues:

1. **No display:** No display is occurred sometime disturbance of RAM, CMOS, HDD or some other components or cable check your components in cabinet and clean all components and also check the main power supply source with the whole power cable.
2. **BSOD:** a stop error, commonly called the blue screen of death, blue screen, or BOSD is an error screen displayed on a windows computer which the operating system has reached a condition where it can no longer operate safely.
3. **No Signal:** No signal error is a basic kind of error which is generally occurs when your data transmission cables like VGA, DVI or HDMI are defected check whether they are properly connected or not check with other devices as well and also try with other cables.
4. **Colored Display:** colored display is a general error which occurs when some chemicals crystals or electrical properties become disbalanced due to same fluctuation form power supply side. To solve the problem, we were used to chance picture tube in CRT and for LED we have to change color IC and color crystal panels.
5. **Resolution and brightness error:** Resolution is also a basic problem where you to set your own as per the scale and for brightness and contrast there are some buttons present in monitor where you get the control to increase or decrease brightness and contrast of monitor display.

Here the some video for installation:

- **How to make USB bootable**
- **How to install windows OS(any version)**
- **Reset forgot windows password**
- **How to clean up computer drivers for the fast-runining applications**