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Class: MIS 120 Section 1

Q1 – Computer Components with details

Computers are made up of components such as:

- CPU
- Motherboard
- Memory (Ram)
- Storage devices
- Display
- Keyboard
- Mouse
- Power Supply
- Network

I.CPU

A CPU (Central Processing unit) is the primary hub, or the “brain” of the computer, and it processes the instructions that comes from programs, operating system and other components that makes up a computer, such as mouse, keyboard, motherboard, etc.

+ Functions of a CPU:

Fetch instructions from other components that makes up a computer

Decode the construction from binary and send it to different parts of the CPU to be executed

Executes the instructions and sends them to the outputs of the computer, such as displays, speakers and so on. Some are stored in ram and storage devices.

+ Things that affect the Speed of a CPU :

- Instructions Per Clock of the cores
- CPU running speed. Ex: 5.1Ghz i9-9900k
- Cache level and size. Ex: 8Mb L3 Cache, 12Mb L2 Cache
- Thermal Headroom (How hot the CPU is running)
- Instruction set (32 bit,64bit)

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+ Types of CPUs that are available in the market:

- Consumer CPUs : Intel Core i Series (i3,5,7,9) and AMD Ryzen Series (3,5,7,9)
- Server or Pro-Consumer CPUs : AMD Epyc line, AMD Threadripper line, Intel Xeon lines, RISC (Bitcoin miners or custom made chips).
- Mobile CPUs : Intel i Series (Ex : i5-8300h), AMD Ryzen series (Ex: R7-4800h) and ARM based cpu such as snapdragon series, apple’s A series, Samsung’s Exynos series, Huawei’s HiSilicon series.....

II. Memory(Ram/Rom)

- ROM(Read only memory) = CPU can only read programs and data that is stored, but can't modify data or add any new data on it. Examples of ROM: Game cartridges, Cache on CPU, BIOS Chip.....
- Ram or Random Access Memory is a fast, but temporary data storage space that a computer needs to access right away. Can be modified or add new data in, remove data.
- Ram allows the computer to store and access program data very quickly, allowing the computer to be able to run multiple applications and process it quickly.

+ Types of Ram :

- FPM(Fast Page mode Ram) (1990)
- EDO Ram (Extended data operations – Read only Memory) (1994)
- SDRam(Single Dynamic RAM) = Cache
- RDRAM(Rambus Ram) (1998)
- DDR (Double Data Ram) (2000)
- DDR2 (2003)
- DDR3 (2007)
- DDR4 (2012)
- DDR5 (Coming soon)
- VRAM aka Video Ram, used for graphics card

+ Ram form factors :

- DIMM = for Desktops, it's larger and can be customized with heat spreaders and RGB
- SO-DIMM = Used for Laptops, it's small and consumes less power, but runs slower than DIMM sized rams

ROM

RAM (SODIMM and DIMM)

III. Motherboard

- A motherboard is a board that connects all the computer parts together and enabling them to communicate with one another. Without it, a computer wouldn't function.

+ Components that make up the motherboard:

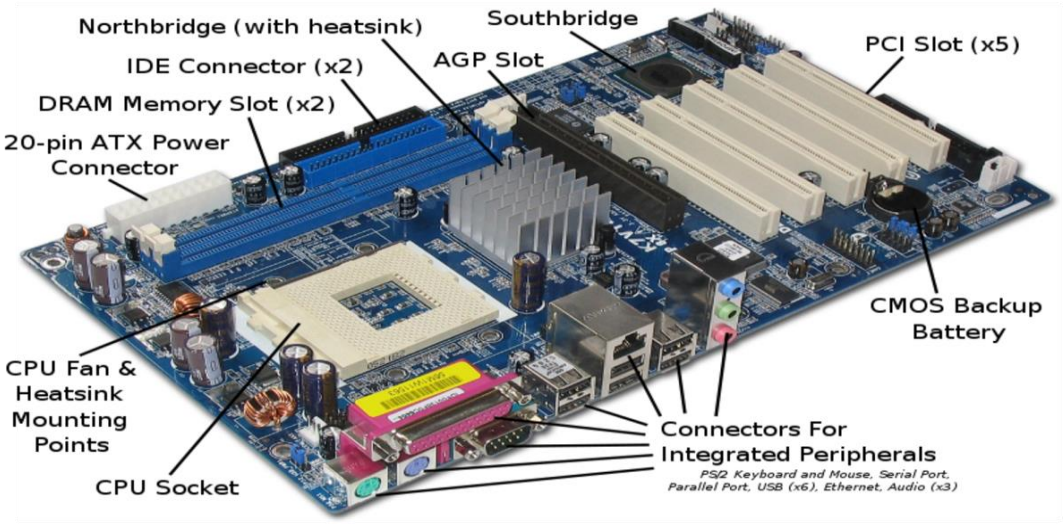
- CPU Chipset (LGA 1151, AM3+, AM4, ...)
- Ram socket (1-8 slots)
- VRMs (Voltage regulator Module) for controlling electrical power
- VRM Heatsink (Cools down VRM, Protects it from exploding)
- I/O (USB input, Display output, Headphone/Microphone jack, ...)
- Capacitors
- PCIE slot (for NVME Drives & GPUS)
- SATA Slot (for SATA Drives like SSD &HDD)
- Power Connectors
- CMOS Battery....

+Types of Motherboard:

- Single socket Motherboard = For consumers.
- Dual Socket Motherboard = For servers or pro-consumers
- Quad Socket Motherboard = For big servers / databases

+ Motherboard sizes:

- EATX (Largest)
- ATX
- Micro ATX
- Mini ATX



IV. Storage Device (Hard disks)

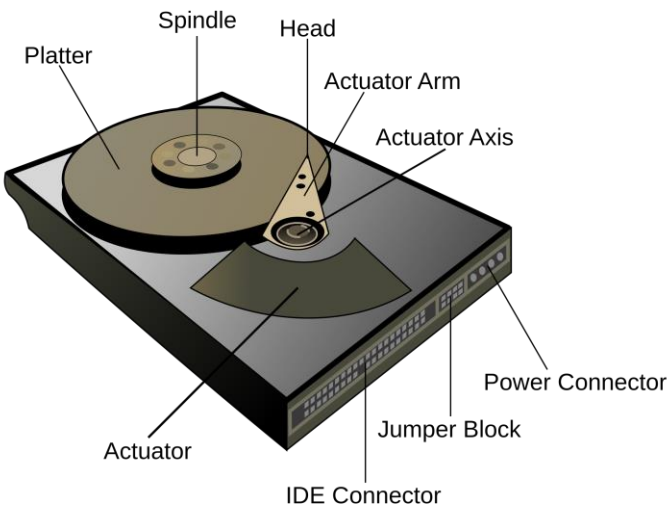
- Hard drives are a non-volatile storage device that stores data. Data is written on the platters using a magnetic head, which moves rapidly over them when they are spinning around. The faster it spins, the faster it can write and read data.
- Hard Drives can transfer 100-200MB of data in one second. Nowadays, people are using flash memory(SSD,NVME) as it is much faster than Hard drives, but costs more per GB compared to hard drives.

+ Hard drive components:

- Platter
- Spindle
- Head
- Actuator Arm
- Actuator Axis
- Actuator
- IDE Connector
- Jumper Block
- Power Connector

+ Speeds that a Hard drive operates:

- 3600 RPM
- 5400 RPM
- 7200 RPM
- 10000 RPM



V. Display

- A display device is a output device that can show information in visual or tactile form.

+ Types of Display:

- LCD: LCD or Liquid Crystal Displays consists of a matrix of Liquid crystals. This type of display needs a backlight to help illuminate the whole display, otherwise you won't be able to see.
- OLED: This type of displays uses tiny LEDs that can emit light by itself, reducing energy consumption and reducing panel size, as it doesn't need a backlight layer. This display is common in smartphones.
- CRTS: Cathode - Ray tube displays contain millions of tiny red, green and blue phosphor dots that glow when struck by an electron beams, creating a visible image to the viewers

+ Power Consumption: CRT consumes the most power, while LCD consumes less. OLEDS consume power based on the amount of tiny LEDs that are being used.

LCD(IPS) Display

CRT Display

VI. Keyboard

- A computer Keyboard is an input device that allows the user to enter words, numbers and other symbols by pressing the keys that are on it.
- Some keyboards are wireless, requiring no cables to be able to type out the preferred inputs.

+ Keyboard Sizes:

- 104-108 Keys (Full size)
- Tenkeyless board (No numpad)
- 60% Keyboards (No numpad and function keys, arrow keys.)
- 40% Keyboards (Just letters and important function keys)

+ Keyboard Switches

- Membrane switches (regular office keyboard)
- Mechanical switches: Cherry MX, Gateron, Holy Pandas, Kailh switches,etc.

Mechanical Keyboard

Membrane Keyboard

VII. Mouse

- A computer mouse is a hand-held pointing device that transmits your commands to the computer by controlling the movements of cursor on the computer screen. The cursor on screen mimics the movement of your mouse.

+ Types of mouse:

- Optical Mouse: Projects a infrared light onto the surface to track the movements of a mouse.
- Laser Mouse: Similar to optical, but uses a laser to track movements, which is faster and more accurate.
- Trackball Mouse: Uses a ball to track motion.

+ Connections:

- Wired: uses USB-C, USB-A, and ancient PS/2 cable connections to connect with the computer
- Wireless: uses Bluetooth technology & 2.4ghz/5ghz dongle to connect with the computer. It is slower than wired connetion.

Razer Viper (Laser Mouse)

Wireless mouse w/ 2.4ghz dongle

VIII. Power Supply

- A power supply is an electrical device that supplies electric power to an electrical load such as the motherboard. The primary function of it is to convert electric current from source to correct voltage, current and frequency to power the components. If it malfunctions, there will be a loud “KABOOOOM” noise coming from your computer case or laptop.

+ Power Supply Sizes:

- ATX
- Micro – ATX
- SFF (Small form factor)
- WTX (workstation form factor)
- .....

+ Power supply ratings:

- Standard (80% efficiency)
- Bronze (82% efficiency)
- Silver (85% efficiency)
- Gold (87% efficiency)
- Platinum (89% efficiency)
- Titanium (90%+ eficiency)

SFF PSU

ATX PSU(Modular), Silver Rating

VIII. Network Interface

- A network interface is the point of interconnection between a computer and a private or public network.

+Network Interface cards :

- Intel's 802.11 ac card for laptops (1300Mb/s speed)
- PCIe Wireless cards (802.11n cards = 300Mb/s +)
- Ethernet (using cables, speed up to 10Gb/s)

Ethernet Cable

Laptop WiFI & Bluetooth Card

PCIe Wireless Card for desktops