**CompTIA A+ Assignment**

**Module 1 [Hardware and its components]**

**Topic: The Visible Computer**

1. What is hardware?

Computer hardware is a collective term used to describe any of the physical components of an analog or digital computer. The term hardware distinguishes the tangible aspects of a computing device from software , which consists of written, machine-readable instructions or programs that tell physical components what to do and when to execute the instructions.

1. What is the purpose of Hardware?

Hardware provide support for major functions such as input, processing (internal storage, computation and control), output, secondary storage (for data and programs), and communication.

1. List out two types of hardware.

Hardware devices can be classified into four distinct categories:

Input devices: For raw data input.

Processing devices: To process raw data instructions into information.

Output devices: To disseminate data and information.

Storage devices: For data and information retention.

1. What is core hardware?

The core hardware refers to the minimum hardware required to run an application. A core hardware can be referred to as the core of a CPU. Each core of a CPU will independently perform operations from the others.

**Topic: Category of components**

1. What are the category of components in hardware?

1. Input Devices

Components which are used to input raw data are categorized under input devices. They aid in feeding data such as text, images, and audio-visual recordings. They even aid in file transfers between computers.

2. Processing Devices

Processing is the core function of a computer. It is the stage where raw data is transformed into information. Once data has been processed, it can be used for useful purposes.

3. Output Devices

The output device displays the result of the processing of raw data that is entered in the computer through an input device. There are a number of output devices that display output in different ways such as text, images, hard copies, and audio or video.

4. Storage Devices

Components that retain/store data are classified under memory/storage devices. Storage is sub-divided under primary and secondary memory. They are either volatile or non-volatile. Primary memory usually refers to random-access memory (RAM) but can also refer to all memory that works in tandem with the processor. RAM is volatile, meaning that it retains data only when the computer is powered up.

1. Why category is needed in Hardware?

The classification of Hardware is important because we can know about a device better by categorizing it by its functions and it becomes easy to identify a device which are categorized by some parameters.

**Topic: Input Device**

1. What is input device?

An input device is any hardware device that sends data to a computer, allowing you to interact with and control it.

The most commonly used or primary input devices on a computer are the keyboard and mouse.

1. Why input device needed?

Input devices are important because they are what allows you to interact with and add new information to a computer. For example, if a computer had no input devices, it could run by itself but there would be no way to change its settings, fix errors, or other various user interactions.

1. List out the input device.

Following are some of the important input devices which are used in a computer

* Keyboard
* Mouse
* Joy Stick
* Light pen
* Track Ball
* Scanner
* Graphic Tablet
* Microphone
* Magnetic Ink Card Reader(MICR)
* Optical Character Reader(OCR)
* Bar Code Reader
* Optical Mark Reader(OMR)

**Topic: Output Device**

1. What are output device?

The output device displays the result of the processing of raw data that is entered in the computer through an input device. There are a number of output devices that display output in different ways such as text, images, hard copies, and audio or video.

1. How does output device work?

An output device works by receiving a signal from the computer and using that signal to perform a task to display the output.

1. List out the output device.

Monitor - The main output device of a computer. It forms images by converting electrical energy into light in the form of tiny dots on the screen called pixels. The sharpness of the image depends upon the number of pixels.

Printer - Used to print information on paper. Commonly uses either lasers or inkjets to precisely place ink onto the page to recreate text and high-quality images.

Speaker - Converts digital signals into audible sound waves.

Projector - A device that is used to project video output from the computer onto a wall or screen.

**Topic: Motherboard**

1. What is motherboard?

The motherboard serves as a single platform to connect all of the parts of a computer together. It connects the CPU, memory, hard drives, optical drives, video card, sound card, and other ports and expansion cards directly or via cables. It can be considered as the backbone of a computer.

1. Why it is called motherboard?

It's called a motherboard because it is the main circuit board in the computer, and it can be extended by plugging other circuit boards into it.

1. What it is called if we remove all components from the motherboard?

The computer motherboard also knows as the printed circuit board is the foundation of a computer that allocates power and allows communication to and between the CPU, RAM, and all other computer hardware components.

1. Describe types of motherboard.

1. AT Motherboard

These motherboards have bigger physical dimensions of hundreds of millimetres and hence they are not the right fit for the mini desktop category of computers. Bigger physical size also inhibits installing new drivers. Sockets and six-pin plugs are used as power connectors in these motherboards. These power connectors are not that easily identifiable and hence users face difficulties in connecting and using it.

2. ATX Motherboard

ATX denotes advanced technology extended, it was developed by Intel during the 1990s and it was an improved version over an earlier version of AT motherboard. It is smaller in size when compared to AT and it provides interchangeability of the connected components. There is a marked improvement in the connector aspects.

3. LPX Motherboard

This board had two improvements over earlier versions. The first one is Input and Output ports were taken to backside and the second one was the introduction of Riser card to facilitate more slots and easier connection. Some of these features were deployed in the AT motherboard. The main disadvantage in this board is the lack of Accelerated Graphic Port (AGP) slots which led to a direct connection to PCI. Issues in these motherboards were addressed in NLX boards.

4. BTX Motherboard

BTX denotes Balanced Technology Extended, intended to manage demands of new technologies in terms of more power requirements hence generation of more heat. Intel stopped further development of BTX boards during the mid-2000s to concentrate on low power CPU.

5. Pico BTX motherboard

These boards are smaller in size and hence the word Pico. Two expansion slots are supported in spite of being sharing the top half of BTX. Half-height or riser cards are its unique features and it supports the demands of digital applications.

6. Mini ITX motherboard

It’s a miniature version of motherboard over its earlier versions. Designed in the early 2000s and its dimension is 17 x 17 cm. Mainly used in small form factor (SFF) computer due to its lower power consumption and faster cooling ability. This motherboard is the most preferred in the home theatre domain due to its lower level of fan noise that will improve the quality of the theatre system.

**Topic: CPU**

1. What is CPU?

Central Processing Unit (CPU) consists of the following features −

* CPU is considered as the brain of the computer.
* CPU performs all types of data processing operations.
* It stores data, intermediate results, and instructions (program).
* It controls the operation of all parts of the computer.

1. Write the full form of CPU.

Central processing unit (CPU), principal part of any digital computer system, generally composed of the main memory, control unit, and arithmetic-logic unit.

1. What are the types of CPU?

The major types of CPU are classified as single-core, dual-core, Quad-core, Hexa core, Octa-core, and Deca core processor.

1. What do we need to keep the CPU Healthy?

Buy Uninterruptible Power Supply (UPS).

Buy high-quality power supply.

Buy two motherboards.

Keep dust away by using lots of fans.

Redundancy.

Temperature control.

Monthly maintenance.

**Topic: Monitor**

1. What is Monitor?

A computer monitor is an output device that displays information in pictorial or text form. A monitor usually comprises a visual display, some circuitry, a casing, and a power supply.

1. List out the types of monitor.

There are 9 different types of monitors, which are given below.

LCD Monitor

LED Monitor

Curved Monitor

CRT Monitor

Flat Panel Monitors

Touch Screen Monitors

OLED Monitors

DLP Monitors

TFT Monitors

1. What are the Technologies used in monitor?

These are the technologies used to create the various displays in use today.

* Liquid crystal display (LCD)
* Light-emitting diode (LED) backlit LCD
* Thin-film transistor (TFT) LCD
* Quantum dot (QLED) display
* Light-emitting diode (LED) display
* OLED display
* AMOLED display
* Super AMOLED display

1. Describe how does the CRT monitor works?

A CRT monitor contains millions of tiny red, green, and blue phosphor dots that glow when struck by an electron beam that travels across the screen to create a visible image. The illustration below shows how this works inside a CRT.The terms anode and cathode­ are used in electronics as synonyms for positive and negative terminals. For example, you could refer to the positive terminal of a battery as the anode and the negative terminal as the cathode.In a cathode ray tube, the "cathode" is a heated filament. The heated filament is in a vacuum created inside a glass "tube." The "ray" is a stream of electrons generated by an electron gun that naturally pour off a heated cathode into the vacuum. Electrons are negative. The anode is positive, so it attracts the electrons pouring off the cathode. This screen is coated with phosphor, an organic material that glows when struck by the electron beam.

There are three ways to filter the electron beam in order to obtain the correct image on the monitor screen: shadow mask, aperture grill and slot mask. These technologies also impact the sharpness of the monitor's display.

**Topic: system bus**

1. What is system bus?

A bus is a high-speed internal connection. Buses are used to send control signals and data between the processor and other components.

1. List out the types of system bus.

Three types of buses

* Address bus - carries memory addresses from the processor to other components such as primary storage and input/output devices. The address bus is unidirectional.
* Data bus - carries the data between the processor and other components. The data bus is bidirectional.
* Control bus - carries control signals from the processor to other components. The control bus also carries the clock's pulses. The control bus is unidirectional.

1. Describe the working of system bus.

A system bus works by sharing data and other information between various aspects of the computer's hardware. For example, if you plug a universal serial bus (USB) device or connector into your computer, the system bus recognizes that data and takes it to the computer's central processing unit. Once there, you might download files from the USB onto your computer's memory, which means the system bus moves it from the CPU to your computer's hard drive for storage.

A system bus usually operates based on the size and complexity of the computer. However, the basic functions of a system bus include:

* Internal function
* External function
* Data Sharing
* Addressing
* Power

**Topic: Chipset**

1. What is chipset?

A chipset is a group of interdependent motherboard chips or integrated circuits that control the flow of data and instructions between the central processing unit (CPU) or microprocessor and external devices. A chipset controls external buses, memory cache and some peripherals. A CPU is unable to function without impeccable chipset timing.

1. What are the types of chipset?

Intel chipsets:-

* Ninth-generation CPUs: 300 series
* The B365
* The Z390
* 10th-generation CPUs: 400 series
* The Z490
* 10th-generation X series CPUs: X200 series

AMD chipsets:-

* 400 series
* B450 series
* Z470 series
* 500 Series
* X570 series

1. Which chipset does have direct contact with the CPU?

The Northbridge handles a computer's faster interaction requirements and controls communication between the CPU, RAM, ROM, the basic input/output system (BIOS), the accelerated graphics port (AGP) and the Southbridge chip. The Northbridge links I/O signals directly to the CPU.

1. Describe how does the Northbridge chipset work

North Bridge is bridge that manages communication between Central Processing Unit (CPU) and parts of motherboard. After CPU, North Bridge chip is essentially main component of motherboard and is only motherboard circuit besides CPU that normally runs at full processor bus speed (Front side bus). System controller and memory controller functions are mostly implemented by North Bridge. North Bridge chip is usually located near upper edge of board and hence it has got unique name. It is core of chipset and incorporates interface between processor and rest of motherboard.

Functions of the North Bridge:

The major functions of the North Bridge are described below.

* Processor Support – One of most important decisions made by anyone choosing or building a new PC in which processor is desired. Motherboard, in particular chipset, decides what type, speed and even what number of processors to use on motherboard. Processor support functions of the.
* L2 Cache Support – North Bridge of chipset contains cache controller circuitry to control functioning of Level 2 (L2) cache. Cache buffers recent memory accesses by processor, which improves performance drastically since it operates much faster than system memory.
* Main Memory Support – As a memory controller, North Bridge links processor to memory system logically and electronically, establishes main memory and cache architectures, and assures ne reliability of data stored in RAM chips. As there are different kinds of memory and different speeds of RAM chips, a North Bridge chip supports a specific type of RAM at specific speeds.
* Maximum Memory Support – The chipset dictates maximum amount of RAM possible on the motherboard.
* DRAM Support – North Bridge decides type of memory motherboard can use. Changing memory type impacts way that memory is read and written to, which is controlled by chipset. Moreover, some chipsets are better than others with certain types of memory, i.e. a chipset can be optimized to provide faster access to a certain kind of memory, while being less efficient in using a different type of memory.
* AGP functionality – North Bridge also determines AGP functionality on motherboard. Some chipsets have integrated video, while others support AGP slot on motherboard. AGP slot is used to house video card. AGP is essential for high performance graphics cards.

**Topic: Memory**

1. What is memory?

Memory refers to the processes that are used to acquire, store, retain, and later retrieve information. There are three major processes involved in memory: encoding, storage, and retrieval.

1. What are the types of memory?

Although many types of memory in a computer exist, the most basic distinction is between primary memory, often called system memory, and secondary memory, which is more commonly called storage.

The key difference between primary and secondary memory is speed of access.

Primary memory includes ROM and RAM, and is located close to the CPU on the computer motherboard, enabling the CPU to read data from primary memory very quickly indeed. It is used to store data that the CPU needs imminently so that it does not have to wait for it to be delivered.

Secondary memory by contrast, is usually physically located within a separate storage device, such as a hard disk drive or solid state drive (SSD), which is connected to the computer system either directly or over a network. The cost per gigabyte of secondary memory is much lower, but the read and write speeds are significantly slower.

1. Describe memory in detail.

Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one.

Memory is primarily of three types −

* Cache Memory - Cache memory is a very high speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU and the main memory. It is used to hold those parts of data and program which are most frequently used by the CPU. The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.
* Primary Memory/Main Memory - Primary memory holds only those data and instructions on which the computer is currently working. It has a limited capacity and data is lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instruction required to be processed resides in the main memory. It is divided into two subcategories RAM and ROM.
* Secondary Memory - This type of memory is also known as external memory or non-volatile. It is slower than the main memory. These are used for storing data/information permanently. CPU directly does not access these memories, instead they are accessed via input-output routines. The contents of secondary memories are first transferred to the main memory, and then the CPU can access it. For example, disk, CD-ROM, DVD, etc.

1. What are memory types?

There are 2 types of memory

Primary memory - Primary memory is a segment of computer memory that can be accessed directly by the processor.

1. Random Access Memory: Primary memory is also called internal memory. This is the main area in a computer where data, instructions, and information are stored. Any storage location in this memory can be directly accessed by the Central Processing Unit. As the CPU can randomly access any storage location in this memory, it is also called Random Access Memory or RAM. The CPU can access data from RAM as long as the computer is switched on. As soon as the power to the computer is switched off, the stored data and instructions disappear from RAM. Such type of memory is known as volatile memory. RAM is also called read/write memory.
2. Read-Only Memory: Read-Only Memory (ROM) is a type of primary memory from which information can only be read. So it is also known as Read-Only Memory. ROM can be directly accessed by the Central Processing Unit. But, the data and instructions stored in ROM are retained even when the computer is switched off OR we can say it holds the data after being switched off. Such type of memory is known as non-volatile memory.

Secondary memory - In a computer, memory refers to the physical devices that are used to store programs or data on a temporary or permanent basis.

Fixed storage - In secondary memory, a fixed storage is an internal media device that is used to store data in a computer system. Fixed storage is generally known as fixed disk drives or hard drives. Generally, the data of the computer system is stored in a built-in fixed storage device. Fixed storage does not mean that you cannot remove them from the computer system, you can remove the fixed storage device for repairing, for the upgrade, or for maintenance, etc. with the help of an expert or engineer.

Types of fixed storage:

* Internal flash memory (rare)
* SSD (solid-state disk)
* Hard disk drives (HDD)

**Topic: System Unit**

1. What is System Unit?

A system unit is the part of a computer that houses the primary devices that perform operations and produce results for complex calculations. It includes the motherboard, CPU, RAM and other components, as well as the case in which these devices are housed. This unit performs the majority of the functions that a computer is required to do.

1. How does system unit work?

The computer system unit performs several functions. The main function of the computer is to process data as fast as possible. This data can be input from users, software, and even other computers. Users input data when doing activities such as submitting a search request on the internet or typing a paper. Data can be processed by software for example when rendering a video in an editing program and then exporting that video to YouTube. Computers can talk to each other by having data transferred. A great example of this is when using the internet. When people are interested in finding funny videos for example, this search submits a request from the computers at YouTube, and then data is sent back to your computer with your request. Computer system units are also capable of storing data on a hard drive.

1. What are the components and system unit?

In a nutshell, system unit components allow us to work properly with computer. One may determine six main system unit components:

* Motherboard – core of the system. Literally, it is a hub of the computer. It is also called the system board or main board. All other components are linked to it one way or another. This part includes all the controllers managing all the standard peripheral devices, such as mouse, keyboard, the display screen and the disk drive.
* Processor – a small chip located inside the computer. It is also called a Central Processing Unit (CPU). It is an integrated circuit accepting coded instructions for execution. Processors can be with pins or pinless.
* RAM (Random Access Memory) – system memory. It is an installed memory module temporarily storing all the information that PC needs right now or may need in the nearest future.
* Hard Drive – internally installed archival storage memory. It is a place where all files and folders are located. It contains a stack of discs placed inside a solid encasement. They spin extremely fast so that data could be read from any place on the drive.
* Video Card (Graphics Adapter) – expansion card connected to the computer motherboard and displaying the computer outputs on the screen. Modern Video Cards support HDMI (High Definition Multimedia Interface) VGA (Video Graphics Array) and DVI (Digital Visual Interface).
* Power Supply – electrical device providing every part of a computer with electrical power.
* Functions of components

Each component has peculiar indispensable functions, which provide proper system functioning. They are:

* Motherboard - Being a backbone of the computer, motherboard coordinates various devices, serves as a place for installing other crucial parts of the computer.
* Processor - responsible for interpreting most of computer commands. It handles almost all operations, but several processes are controlled by other components such as Graphic Processing Units (GPUs).
* RAM - aims at saving data for short-term use and providing a quick access to them.
* Hard Drive - serves as an instrument for installing and storing the operating system.
* Video Card - provides additional memory and data for image and video viewing without limiting the available processing power required for other programs.
* Power Supply - provides PC with electrical power by converting alternating current (AC) power into direct current (DC) power.

**Topic: BIOS**

1. What is BIOS?

BIOS, in full Basic Input/output System, computer program that is typically stored in EPROM and used by the CPU to perform start-up procedures when the computer is turned on. Its two major procedures are determining what peripheral devices (keyboard, mouse, disk drives, printers, video cards, etc.) are available and loading the operating system (OS) into main memory. After start-up, the BIOS program manages data flow between the OS and the peripherals, so neither the OS nor the application programs need to know the details of the peripherals (such as hardware addresses). In the early 21st century, BIOS was supplanted by United Extensible Firmware Interface (UEFI), which can handle much larger drives and operate faster than BIOS.

1. What is the full form of BIOS?

BIOS stand for Basic Input Output System. It is built-in software. It is the first software run by the computer when you turned on your computer system. This software is usually stored in Read Only Memory (ROM) and located on the motherboard. In modern computer systems, the BIOS contents are stored in a flash memory. It is not possible for an operating system to continue without BIOS as it is the BIOS that loads the drivers of the hard disk and primary portions of the operating system like MBR, FAT and GPT into the memory to enable the operating system to continue loading itself.

1. Describe working process of BIOS

BIOS comes included with computers, as firmware on a chip on the motherboard. In contrast, an OS like Windows or iOS can either be pre-installed by the manufacturer or vendor or installed by the user. BIOS is a program that is made accessible to the microprocessor on an erasable programmable read-only memory (EPROM) chip. When users turn on their computer, the microprocessor passes control to the BIOS program, which is always located at the same place on EPROM.

When BIOS boots up a computer, it first determines whether all of the necessary attachments are in place and operational. Any piece of hardware containing files the computer needs to start is called a boot device. After testing and ensuring boot devices are functioning, BIOS loads the OS -- or key parts of it -- into the computer's random access memory (RAM) from a hard disk or diskette drive (the boot device).

These tasks are each carried out by BIOS' four main functions:

Power-on self-test (POST). This tests the hardware of the computer before loading the OS.

Bootstrap loader - This locates the OS.

Software/drivers - This locates the software and drivers that interface with the OS once running.

Complementary metal-oxide semiconductor (CMOS) setup. This is a configuration program that enable users to alter hardware and system settings. CMOS is the name of BIOS' non-volatile memory.

**Topic: CMOS**

1. What is CMOS?

The term CMOS stands for “Complementary Metal Oxide Semiconductor”. This is one of the most popular technology in the computer chip design industry and it is broadly used today to form integrated circuits in numerous and varied applications. Today’s computer memories, CPUs, and cell phones make use of this technology due to several key advantages. This technology makes use of both P channel and N channel semiconductor devices. One of the most popular MOSFET technologies available today is the Complementary MOS or CMOS technology. This is the dominant semiconductor technology for microprocessors, microcontroller chips, and memories like RAM, ROM, EEPROM and application-specific integrated circuits (ASICs).

1. What is the full form of CMOS?

Complementary metal–oxide–semiconductor (CMOS, pronounced "see-moss"), also known as complementary-symmetry metal–oxide–semiconductor (COS-MOS).

1. Describe the working process of CMOS.

The structure as shown consists of the NMOS transistor inverted on the top of the PMOS transistor. The substrate is of the P-type, and three N++ regions. The two N++ regions are small and the third N++ region is large. The two smaller regions are a part of the NMOS transistor, while the third N++ region is a part of the PMOS transistor. The two P++ regions are diffused into the larger N++ region to form the PMOS transistor. The top surface is protected and covered using the Silicon dioxide layer (SiO2) with aluminium’s metallization.

CMOS has the least amount of power dissipation in the switching applications. It is because when one transistor is OFF, the other becomes ON. For example, if PMOS is ON, the NMOS transistor will be OFF.

The value of VDD voltage is generally selected between 5V and 15V.

1. How do we know that CMOS is not working?

It is a 3V battery. If the voltage drops between certain levels, your computer loses the memory. The CMOS settings like date and time get changed. In some instances, the date and time get set to factory default. For example, your computer date will be set to factory settings, something like 12/01/2008.

All of the settings like drive type, FDD, NUMs lock, etc., in the computer setup will be changed. It may be causing booting problems since your computer does not remember information about the disk drive.

Your computer will show a message such as “Booting Error, unable to detect disk drive.”

The computer may be shutting down and will not allow you to perform any task.

Your computer may be too slow. It may be due to wrong time and date. It is time to replace the CMOS battery to correct these issues.

Some of the drivers may be missing or may not work properly. So, you may not be able to print out on the printer. Even if you install the printer driver correctly, your computer may keep on showing the message “can’t find printer.”

Your mouse may not respond properly. You may feel that your mouse might have gotten damaged and be ready to replace the mouse. But it might be solved by simply replacing the CMOS battery. Therefore, before ordering a mouse you can try the same mouse on another computer to check if it is actually defective. So, you can save your hard-earned money!

You may not be able to connect to the internet. It keeps on showing error when connecting to the internet. You need to check whether time and date are correct. If the date and time are wrong, try correcting. Then, check again; if the computer is still not connecting to the internet, you need to replace the CMOS battery.

If you hear a constant beeping sound when working with your computer, it is a sign that you need to replace the CMOS battery.

The computer will also display CMOS battery failure, CMOS read error, or CMOS checksum error, etc. If this happens, you need to switch on your computer and leave it on for a day. If the computer is not showing the errors after rebooting, the CMOS battery is charging. Otherwise, you need to replace the CMOS battery.

**Topic: Boot process**

1. What is Boot Process?

Booting is basically the process of starting the computer. When the CPU is first switched on it has nothing inside the Memory. In order to start the Computer, load the Operating System into the Main Memory and then Computer is ready to take commands from the User.

1. What is the first process of Boot?

Boot Loader - Computers powered by the central processing unit can only execute code found in the system's memory. Modern operating systems and application program code and data are stored on non-volatile memories. When a computer is first powered on, it must initially rely only on the code and data stored in non-volatile portions of the system's memory. The operating system is not really loaded at boot time, and the computer's hardware cannot perform many complex systems actions.

The program that starts the chain reaction that ends with the entire operating system being loaded is the boot loader or bootstrap loader. The boot loader's only job is to load other software for the operating system to start.

1. What is the final stage in the Boot process?

The term run level refers to a mode of operation in one of the computer operating systems that implement Unix System V-style initialization. A run level is a state of init and the whole system that defines what system services are operating. Run levels are identified by numbers. Run levels stop at six for practical and historical reasons, but it is entirely possible to have more if desired.

Each mode has its own list of settings for what services to start and what services to shut down. Not only does this list contain what is supposed to be running, but also what order each service should be started in. The exact setup of these configurations will vary from OS to OS, and from one Linux distribution to another. Different run levels are typically assigned to:

* single-user mode
* multi-user mode without network services started
* multi-user mode with network services started
* system shutdown
* system reboot

1. Describe the boot process in Linux?

Stages of Linux Boot Process:-

* The machine’s BIOS or boot microcode hundreds and runs a boot loader.
* Boot loader finds the kernel image on the disk and loads it into memory, to start the system.
* The kernel initializes the devices and their drivers.
* The kernel mounts the basis filesystem.
* The kernel starts a program referred to as init with a method ID zero
* Init sets the remainder of the system processes in motion.
* For some purpose, init starts a method permitting you to log in, typically at the top or close to the top of the boot sequence.

1. Describe about working with the grub Bootloader.

The GRUB (Grand Unified Bootloader) is a bootloader available from the GNU project. A bootloader is very important as it is impossible to start an operating system without it. It is the first program which starts when the program is switched on. The bootloader transfers the control to the operating system kernel.

GRUB Features

GRUB is the default bootloader for many of the Linux distributions. This is because it is better than many of the previous versions of the bootloaders. Some of its features are:

GRUB supports LBA (Logical Block Addressing Mode) which puts the addressing conversion used to find files into the firmware of the hard drive

GRUB provides maximum flexibility in loading the operating systems with required options using a command based, pre-operating system environment.

The booting options such as kernel parameters can be modified using the GRUB command line.

There is no need to specify the physical location of the Linux kernel for GRUB. It only required the hard disk number, the partition number and file name of the kernel.

GRUB can boot almost any operating system using the direct and chain loading boot methods.

GRUB Boot Process

The boot process using GRUB requires the GRUB to load itself into memory. This is done in the following steps:

The stage 1 boot loader is loaded into the memory by the BIOS. This boot loader is also known as the primary boot loader. It exists on 512 bytes or less of disk space within the master boot record. The primary boot loader can load the stage 1.5 or stage 2 boot loader if required.

The stage 1.5 boot loader is loaded into the memory by the stage 1 boot loader if required. This may be necessary in some cases as some hardware require a middle step before moving on to the stage 2 loader.

The secondary boot loader is also known as the stage 2 boot loader and it can be loaded into the memory by the primary boot loader. Display of the GRUB menu and command environment are functions performed by the secondary boot loader. This allows the user to look at system parameters and select the operating system to boot.

The operating system or kernel is loaded into the memory by the secondary boot loader. After that, the control of the machine is transferred to the operating system.

1. Describe working process of Boot loader
   * When our computer is switched on, it can be started by hardware such as a button press, or by software command, a computer's central processing unit (CPU) has no software in its main memory, there is some process which must load software into main memory before it can be executed. Below are the six steps to describe the boot process in the operating system, such as:-
   * Once the computer system is turned on, BIOS (Basic Input /Output System) performs a series of activities or functionality tests on programs stored in ROM, called on POST (Power-on Self Test) that checks to see whether peripherals in the system are in perfect order or not.
   * After the BIOS is done with pre-boot activities or functionality test, it read bootable sequence from CMOS (Common Metal Oxide Semiconductor) and looks for master boot record in the first physical sector of the bootable disk as per boot device sequence specified in CMOS. For example, if the boot device sequence is:

* Floppy Disk
* Hard Disk
* CDROM
  + After this, the master boot record will search first in a floppy disk drive. If not found, then the hard disk drive will search for the master boot record. But if the master boot record is not even present on the hard disk, then the CDROM drive will search. If the system cannot read the master boot record from any of these sources, ROM displays "No Boot device found" and halted the system. On finding the master boot record from a particular bootable disk drive, the operating system loader, also called Bootstrap loader, is loaded from the boot sector of that bootable drive· into memory. A bootstrap loader is a special program that is present in the boot sector of a bootable drive.
  + The bootstrap loader first loads the IO.SYS file. After this, MSDOS.SYS file is loaded, which is the core file of the DOS operating system.
  + After this, MSDOS.SYS file searches to find Command Interpreter in CONFIG.SYS file, and when it finds, it loads into memory. If no Command Interpreter is specified in the CONFIG.SYS file, the COMMAND.COM file is loaded as the default Command Interpreter of the DOS operating system.
  + The last file is to be loaded and executed is the AUTOEXEC.BAT file that contains a sequence of DOS commands. After this, the prompt is displayed. We can see the drive letter of bootable drive displayed on the computer system, which indicates that the operating system has been successfully on the system from that drive.

**Topic: SMPS**

1. What is SMPS?

SMPS stands for Switched Mode Power Supply. It is an electronic gadget or module that comprises a combination of inductors, capacitors and semiconductor gadgets like diodes and MOSFETs. It is utilized to change over a specific DC voltage to another DC voltage level. It is utilized rather than straight or ohmic converters since of higher efficiency. It could be a key portion an in almost all domestic electronic equipment’s (like portable chargers, PC control supplies). It works by employing a semiconductor switch like MOSFET to switch on-off the supply voltage at a specific exchanging recurrence to control the yield voltage. Varying the exchanging recurrence will alter the yield voltage.

1. What is the process of SMPS?

Switch Mode Power Supply (SMPS) applications, for the most part, include power connectors, desktop power, or server control. SMPS plan is isolated into essential and auxiliary areas due to segregation topology. The essential area includes EMI sifting, input correction, and control calculate redress (PFC) gadgets. The foremost critical plan concept is PFC to make strides proficiency. Great execution of a PFC rectifier enables the control supply to function productively beneath a light current stack. Ultra-fast recuperation time of the rectifier and low Qg of the exchanging MOSFET are the foremost critical variables related with PFC. No matter what kind of topology is included, PFC is the key not as it were to expanding effectiveness, but moreover to progressing warm execution, particularly for 80-plus SMPS. For EMI, film capacitors and ceramic plate capacitors are great for X-capacitor and Y-capacitor plan, individually. With respect to input rectifier gadgets, single-phase bridge rectifiers are the finest arrangement.

Advantages

* The switch mode power supply encompasses a smaller in size.
* The switch mode power supply has light weight.
* It includes a way better power effectiveness ordinarily 60 to 70 percent.
* It features a solid against interference.
* SMPS has wide yield range.

Disadvantages

* The switch mode power supply is complex.
* The SMPS has higher yield swell and its control is worse.
* It can be utilized as it were as a step down regulator.
* It has as it were one output voltage.
* SMPS moreover cause harmonic distortion.

1. How many SATA connectors are there in normal SMPS?

SMPS comes with 24 pin detachable connector (20 + 4) that can be split into 20 pin and 4 pin cables.

1. Do a practical to troubleshoot a SMPS without plugging it to the system.

* Open your computer's casing. Be sure that your computer is completely turned off prior to starting. Remove the screws that are present in the side panel of your computer. You need to remove only one side of the panel.
* Remove the connections from the SMPS to all the peripherals of your computer. Please note that some connections contains a clip attached to it. Make sure to remove the clips before you remove your connections.
* With your SMPS removed, take a paper clip and bent it in a shape of 'U' shape.
* Find the 24 pin connector from your SMPS (obviously it is the bigger connector from SMPS). Try to locate green and black wire. Please note, that there will be one green wire and many black wires. You can select any black wire you want.
* Insert one end of the bent paper clip into the green terminal and the other end to the black terminal.
* Turn on the SMPS with the wire inserted. The SMPS should be running now. If it does not turn ON, insert the paper clip firmly and try once more. If still your SMPS didn't turn ON, your SMPS might be faulty.

1. How many pins does ATX power connector have?

The ATX 24-pin power supply connector is the standard motherboard power connector in computers today. The connector itself is a Molex 39-01-2240 connector, often called a Molex Mini-fit Jr.

**Topic: RAM**

1. What is RAM?

RAM, which stands for Random Access Memory, is a hardware device generally located on the motherboard of a computer and acts as an internal memory of the CPU. It allows CPU store data, program, and program results when you switch on the computer. It is the read and write memory of a computer, which means the information can be written to it as well as read from it.

1. What is the full form of RAM?

RAM, which stands for Random Access Memory

1. What are the types of RAM?

There are two main types of RAM: Dynamic RAM (DRAM) and Static RAM (SRAM).

DRAM (pronounced DEE-RAM), is widely used as a computer’s main memory. Each DRAM memory cell is made up of a transistor and a capacitor within an integrated circuit, and a data bit is stored in the capacitor. Since transistors always leak a small amount, the capacitors will slowly discharge, causing information stored in it to drain; hence, DRAM has to be refreshed (given a new electronic charge) every few milliseconds to retain data.

SRAM (pronounced ES-RAM) is made up of four to six transistors. It keeps data in the memory as long as power is supplied to the system unlike DRAM, which has to be refreshed periodically. As such, SRAM is faster but also more expensive, making DRAM the more prevalent memory in computer systems.

**Topic: Device and cable**

1. What are the types of devices?

Hardware devices can be classified into four distinct categories:

* Input devices: For raw data input.
* Processing devices: To process raw data instructions into information.
* Output devices: To disseminate data and information.
* Storage devices: For data and information retention.

1. What are the types of cable?

Cables are classified into 5 types depending upon their purpose as follows:

* Ribbon Electric Cables - It consists of multiple insulated wires running parallel with one another and is used for transmission of multiple data simultaneously. For example, this is used to connect the CPU with the motherboard and are generally used for interconnection of networking devices.
* Shielded Cables - It consists of 1 or 2 insulated wires which are covered by a woven braided shield or aluminium Mylar foil for better signal transmission and removing irregularities in the frequency of power and external interference in radio. These cables transmit high voltage electric current and are protected by a shield.
* Twisted Pair Cables - It has two or more insulated copper wires which are twisted with each other and are colour-coded. These types of wires are usually used in telephone cables and the resistance to external interference can be measured by the number of wires.
* Coaxial Cables - This consists of solid copper or steel conductor plated with copper which is enclosed in the metallic braid and metallic tape. This is entirely covered with an insulated protective outer jacket. These type of cables are used for computer networking and audio-video networking.
* Fibre Optics Cable - There are these types of cables which transport optical data signals from an attached light source to the receiving device. We are pretty much aware of what is an optical fibre and its uses in a wide variety of applications.

1. What cables are used to connect printer?

We can connect different types of cables for connecting printer:-

* USB A-to-B cable
* Parallel cable
* Ethernet cable

1. What was the first cable founded by Apple for data transfer?

Lightning is a proprietary computer bus and power connector created and designed by Apple Inc. Introduced on September 12, 2012, to replace its predecessor, the 30-pin dock connector.

**Topic: Expansion card and slots**

1. Why expansion card needed?

Expansion cards allow the capabilities and interfaces of a computer system to be extended or supplemented in a way appropriate to the tasks it will perform. For example, a high-speed multi-channel data acquisition system would be of no use in a personal computer used for bookkeeping, but might be a key part of a system used for industrial process control. Expansion cards can often be installed or removed in the field, allowing a degree of user customization for particular purposes. Some expansion cards take the form of "daughter boards" that plug into connectors on a supporting system board.

1. Why expansion slots needed?

Computers have expansion slots to give the user the ability to add new devices to their computer. For example, a computer gamer may upgrade their video card to get better performance in their games. An expansion slot allows them to remove the old video card and add a new video card without replacing the motherboard.

1. What are the types of expansion card?

Types of expansion cards in a computer:-

* Interface card (ATA, Bluetooth, EIDE, FireWire, IDE, parallel, RAID, SCSI, serial, and USB).
* MIDI
* Modem
* MPEG decoder
* Network card
* Sound card
* Tuner card
* Video capture card
* Video card

**Topic: I/O Ports**

1. What is I/O ports?

An input/output port refers to any computer port that is capable of sending (output) and receiving (input) data.

1. List out the I/O ports available

There are two types of ports:-

* Internal Port: It connects the system’s motherboard to internal devices like hard disk, CD drive, internal Bluetooth, etc.
* External Port: It connects the system’s motherboard to external devices like a mouse, printer, USB, etc.

1. Serial Port:

Used for external modems and older computer mouse

Two versions-9pin, 25pin

Data travels at 115 kilobits per second

2. Parallel Port :

Used for scanners and printers

25 pin model

3. Universal Serial Bus (or USB) Port:

It can connect all kinds of external USB devices such as external hard disks, printers, scanners, mouse, keyboards, etc.

Data travels at 12 megabits per second.

4. Fire wire Port:

Transfers large amounts of data at a very fast speed.

Connects camcorders and video equipment to the computer.

Data travels at 400 to 800 megabits per second.

5. Ethernet Port:

Connects to a network and high-speed Internet.

Data travels at 10 megabits to 1000 megabits per second depending upon the network bandwidth.

**Topic: BIOS & CMOS**

1. What is the role of BIOS in I/O?

BIOS, in full Basic Input/output System, computer program that is typically stored in EPROM and used by the CPU to perform start-up procedures when the computer is turned on. Its two major procedures are determining what peripheral devices (keyboard, mouse, disk drives, printers, video cards, etc.) are available and loading the operating system (OS) into main memory. After start-up, the BIOS program manages data flow between the OS and the peripherals, so neither the OS nor the application programs need to know the details of the peripherals (such as hardware addresses). In the early 21st century, BIOS was supplanted by United Extensible Firmware Interface (UEFI), which can handle much larger drives and operate faster than BIOS.

1. What is the role of I/O in CMOS?

A CMOS digital input has a very high impedance. Consequently, when it’s not driven it will float, creating an undetermined input logic level. More importantly, the input may not stay that way and, in fact, it likely will not. For instance, reading the input in software will show a logical high or low, but waving a hand above the circuit board can be enough to cause the input levels to change.

Over time, however, the floating input tends to accumulate a charge and float toward the logic level change-over point. When it reaches that point, it causes both the high and low MOSFETs to be partially on, resulting in shoot through current.

When the input buffer output switches state, the floating input can lose charge, causing the circuit to switch back. This keeps the charge hovering around the change-over point and makes the floating input very susceptible to noise, especially from signals switching on adjacent pins. Engineers need to be especially careful of a floating programming control or reset pins where a nearby toggling line may generate enough noise to make the microcontroller repeatedly drop in and out of programming or reset mode.

A floating input hovering around the change-over point, and thus causing shoot-through current, will cause the CMOS device to exhibit higher than expected power draw. This may not be especially noticeable when the device is running. However, it can be significant for devices such as microcontrollers in their low-power state. In addition, the input’s logic level may change at any time and trigger unexpected responses from the device.

**Topic: Laptop & storage**

1. What is laptop?

Alternatively referred to as a notebook, a laptop is a portable computer that is more efficient than and nearly as powerful as a desktop computer. Portable computers run off AC power or batteries such as NiMH, NiCad, or Li-ion packs, for several hours.

1. Why laptop is used widely now a days?

These are some reasons why laptops are widely used this days:-

* + Better resale value.
  + Portable.
  + Space-saver
  + Energy-saver.
  + More ergonomic keyboards.
  + Better screens.
  + Easier to access the internals.
  + Proprietary architecture means everything works better.
  + Easy-access USB.
  + It’s always on-hand.

1. Describe the working process of laptop?

Laptops combine all of the input and output capabilities and components of a desktop computer, including its display screen, keyboard, speakers, data storage, disc drives, and pointing devices (a touchpad or a trackpad), with a processor and operating system into a smaller device.

**Topic: Printer**

1. What is printer?

A printer is a hardware output device that is used to generate hard copy and print any document. A document can be of any type such as a text file, image, or the combination of both. It accepts input command by users on a computer or on other devices to print the documents.

1. Why is printer needed?

Printers are used to give some output which are available in computer as a documents.

1. Describe the working process of printer.

In short, printers work by converting digital images and text into physical copies. They do this using a driver or specialised software that has been designed to convert the file into a language that the printer can understand. The image or text is then recreated on to the page using a series of miniscule dots.

1. What are the types of Printer?

Different types of printers

There are many different printer manufacturers available today, including Canon, Epson, Hewlett-Packard, Xerox and Lexmark, among many others. There are also several types of printers to choose from, which we'll explore below.

Inkjet printers recreate a digital image by spraying ink onto paper. These are the most common type of personal printer.

Laster printers are used to create high-quality prints by passing a laser beam at a high speed over a negatively charged drum to define an image. Color laser printers are more often found in professional settings.

3D printers are a relatively new printer technology. 3D printing creates a physical object from a digital file. It works by adding layer upon layer of material until the print job is complete and the object is whole.

Thermal printers produce an image on paper by passing paper with a thermochromics coating over a print head comprised of electrically heated elements and produces an image in the area where the heated coating turns black. A dye-sublimation printer is a form of thermal printing technology that uses heat to transfer dye onto materials.

All-in-one printers are multifunction devices that combine printing with other technologies such as a copier, scanner and/or fax machine.

LED printers are similar to laser printers but use a light-emitting diode array in the print head instead of a laser.

Photo printers are similar to inkjet printers but are designed specifically to print high-quality photos, which require a lot of ink and special paper to ensure the ink doesn't smear.

Dot matrix printer: Dot matrix printing is an older impact printer technology for text documents that strikes the paper one line at a time. Dot matrix printers offer very basic print quality.

Line printer: A line printer prints a single line of text at a time. While an older form of printing, line printers are still in use today.

**Topic: Storage devices**

1. . What is storage device?

A storage unit is a part of the computer system which is employed to store the information and instructions to be processed. A storage device is an integral part of the computer hardware which stores information/data to process the result of any computational work. Without a storage device, a computer would not be able to run or even boot up. Or in other words, we can say that a storage device is hardware that is used for storing, porting, or extracting data files. It can also store information/data both temporarily and permanently. Computer storage is of two types:

Primary Storage Devices: It is also known as internal memory and main memory. This is a section of the CPU that holds program instructions, input data, and intermediate results. It is generally smaller in size. RAM (Random Access Memory) and ROM (Read Only Memory) are examples of primary storage.

Secondary Storage Devices: Secondary storage is a memory that is stored external to the computer. It is mainly used for the permanent and long-term storage of programs and data. Hard Disk, CD, DVD, Pen/Flash drive, SSD are examples of secondary storage.

1. Why we need storage device?

Computer storage devices are used to store huge amounts of data and information permanently. If you want any of your data kept safe and lastingly, then your choice should be these devices. Usually these kinds of devices are called secondary storage or permanent storage.

1. List out the types of storage devices.

Primary storage devices

(i) RAM: It stands for Random Access Memory. It is used to store information that is used immediately or we can say that it is a temporary memory. Computers bring the software installed on a hard disk to RAM to process it and to be used by the user

ROM: It stands for Read-Only Memory. The data written or stored in these devices are non-volatile, i.e., once the data is stored in the memory cannot be modified or deleted. The memory from which will only read but cannot write it. This type of memory is non-volatile.

Magnetic Storage Devices

(I) Floppy Disk: It is also known as a floppy diskette. It is generally used on a personal computer to store data externally. A Floppy disk is made up of a plastic cartridge and secures with a protective case. Nowadays floppy disk is replaced by new and effective storage devices like USB, etc.

(ii) Hard Disk: It is a storage device (HDD) that stores and retrieves data using magnetic storage. It is a non-volatile storage device that can be modified or deleted n number of times without any problem. Most of the computers and laptops have HDDs as their secondary storage device.

Magnetic Card: It is a card in which data is stored by modifying or rearranging the magnetism of tiny iron-based magnetic particles present on the band of the card. It is also known as a swipe card. It is used like a passcode (to enter into house or hotel room), credit card, identity card, etc.

(iv) Tape Cassette: It is also known as a music cassette. It is a rectangular flat container in which the data is stored in an analog magnetic tape. It is generally used to store audio recordings.

(v) Super Disk: It is also called LS-240 and LS-120. It is introduced by Imation Corporation and it is popular with OEM computers. It can store data up to 240 MB.

Flash memory Devices

It is a cheaper and portable storage device. It is the most commonly used device to store data because is more reliable and efficient as compare to other storage devices. Some of the commonly used flash memory devices are:

(i) Pen Drive: It is also known as a USB flash drive that includes flash memory with an integrated USB interface. We can directly connect these devices to our computers and laptops and read/write data into them in a much faster and efficient way. These devices are very portable. It ranges from 1GB to 256GB generally.

(ii) SSD: It stands for Solid State Drive, a mass storage device like HDDs. It is more durable because it does not contain optical disks inside like hard disks. It needs less power as compared to hard disks, is lightweight, and has 10x faster read and write speed as compared to hard disks. But, these are costly as well. While SSDs serve an equivalent function as hard drives, their internal components are much different. Unlike hard drives, SSDs don’t have any moving parts and thus they’re called solid-state drives. Instead of storing data on magnetic platters, SSDs store data using non-volatile storage. Since SSDs haven’t any moving parts, they do not need to “spin up”. It ranges from 150GB to a few and more TB.

(iii) SD Card: It is known as a Secure Digital Card. It is generally used with electronic devices like phones, digital cameras, etc. to store larger data. It is portable and the size of the SD card is also small so that it can easily fit into electronic devices. It is available in different sizes like 2GB, 4GB, 8GB, etc.

(iv) Memory Card: It is generally used in digital cameras. Printers, game consoles, etc. It is also used to store large amounts of data and is available in different sizes. To run a memory card on a computer you require a separate memory card reader.

(v) Multimedia Card: It is also known as MMC. It is an integrated circuit that is generally used in-car radios, digital cameras, etc. It is an external device to store data/information.

4. Optical Storage Devices

Optical Storage Devices is also a secondary storage device. It is a removable storage device. Following are some optical storage devices:

(i) CD: It is known as Compact Disc. It contains tracks and sectors on its surface to store data. It is made up of polycarbonate plastic and is circular in shape. CD can store data up to 700MB. It is of two types:

CD-R: It stands for Compact Disc read-only. In this type of CD, once the data is written cannot be erased. It is read-only.

CD-RW: It stands for Compact Disc read Write. In this type of CD, you can easily write or erase data multiple times.

(ii) DVD: It is known as Digital Versatile Disc. DVDs are circular flat optical discs used to store data. It comes in two different sizes one is 4.7GB single-layer discs and another one is 8.5GB double-layer discs. DVDs look like CDs but the storage capacity of DVDs is more than as compared to CDs. It is of two types:

DVD-R: It stands for Digital Versatile Disc read-only. In this type of DVD, once the data is written cannot be erased. It is read-only. It is generally used to write movies, etc.

DVD-RW: It stands for Digital Versatile Disc read Write. In this type of DVD, you can easily write or erase data multiple times.

(iii) Blu-ray Disc: It is just like CD and DVD but the storage capacity of blu ray is up to 25GB. To run a Blu-ray disc you need a separate Blu-ray reader. This Blu-ray technology is used to read a disc from a blue-violet laser due to which the information is stored in greater density with a longer wavelength.

5. Cloud and Virtual Storage

Nowadays, secondary memory has been upgraded to virtual or cloud storage devices. We can store our files and other stuff in the cloud and the data is stored for as long as we pay for the cloud storage. There are many companies that provide cloud services largely Google, Amazon, Microsoft, etc. We can pay the rent for the amount of space we need and we get multiple benefits out of it. Though it is actually being stored in a physical device located in the data centres of the service provider, the user doesn’t interact with the physical device and its maintenance.

1. Describe the working process of storage devices.

A storage device is any type of computing hardware that is used for storing, porting or extracting data files and objects. Storage devices can hold and store information both temporarily and permanently. They may be internal or external to a computer, server or computing device.

**Topic: ATA**

1. What is ATA?

ATA stands for Advanced Technology Attachment. ATA is the older name of PATA. ATA is renamed Parallel ATA (PATA) when newer Serial ATA (SATA) was introduced. ATA is a standard physical interface that connects the storage devices like hard-drive, CD-ROM, and other drives to the motherboard. ATA standards only allow cable upto 18 inches due to which it works internally. It is designed to connect portable storage devices without using an external controller.

ATA is the most common and low cost interface that provides a reliable speed. It is basically made of thin wires and cable bus. It is also known as Integrated Device Electronics (IDE). The ATA standards are backward compatible. It means each newer version of ATA or new ATA drives can be used with older ATA interfaces.

1. Describe working of ATA.

Advanced Technology Attachment (ATA) is a standard physical interface for connecting storage devices within a computer. ATA allows hard disks and CD-ROMs to be internally connected to the motherboard and perform basic input/output functions.

**Topic: SATA**

1. What is SATA?

Short for serial AT attachment, SATA 1.0 was first released in August 2001 and is a replacement for the parallel ATA interface used in IBM compatible computers. Serial ATA is capable of delivering 1.5 Gbps (approximately 187 MBps) of performance to each drive within a disk array. It is backward-compatible with ATA and ATAPI devices, and offers a thin, small cable solution, as seen in the "SATA Data Cable" picture. This cable helps makes cable routing easier and offers better airflow in the computer compared to the earlier ribbon cables used with ATA drives.

E-SATA connection

SATA also supports external drives through External SATA more commonly known as eSATA. E-SATA offers many more advantages compared to other solutions. For example, it is hot-swappable, supports faster transfer speeds with no bottleneck issues like USB and FireWire, and supports disk drive technologies (e.g., S.M.A.R.T.).

1. Describe the working of SATA.

SATA, in full serial advanced technology attachment, also called serial ATA, an interface for transferring data between a computer’s central circuit board and storage devices. SATA replaced the long-standing PATA (parallel ATA) interface.

Serial communication transfers data one bit at a time, rather than in several parallel streams. Despite the apparent advantage of the parallel model, in practice serial transmission is less susceptible to interference, allowing SATA to operate at significantly higher speeds than PATA. The serial model also allows for simpler and slimmer cabling

1. Where SATA is used.

SATA short for Serial ATA (Serial Advanced Technology Attachment), is an IDE standard first released in 2001 for connecting devices like optical drives and hard drives to the motherboard.

**Topic: SCSI**

1. What is SCSI?

Short for Small Computer System Interface, SCSI is pronounced as "Scuzzy" and is an interface for disk drives that was first completed in 1982. Unlike competing standards, SCSI is capable of supporting eight devices, or sixteen devices with Wide SCSI. However, with the SCSI host adapter on ID number 07 and booting from the ID 00. This leaves the availability of six device connections. In the picture below, is an example of a SCSI adapter expansion card with an internal and external connection. Once installed in the computer, this adapter would allow multiple SCSI devices to be installed in the computer. More advanced motherboard may also have available SCSI connections on the motherboard.

1. Why SCSI needed?

SCSI (Small Computer Systems Interface) is a smart bus, controlled with a microprocessor that allows you to add up to 15 peripheral devices to the computer. These devices can include hard drives, scanners, printers, and other peripherals. High-end single SCSI boards have two controllers and support up to 30 peripherals on a single expansion card. An advantage of SCSI is that you can connect several peripherals to one host adapter, using only one slot in the bus.

SCSI is widely used in workstations, servers, and mainframes; it is less commonly used in desktop PCs. The advantage of SCSI in a desktop PC is that you can add a scanner and several other drives (for example, CD-Rs, DVD-RAM, Zip drives), as well as hard drives, to one SCSI cable chain. This has become less important as alternate interfaces such as USB and FireWire have become popular.

SCSI is useful in network servers, where several hard drives can be easily set up as a RAID configuration. If one drive fails, it can be removed and a new one inserted, without loss of data, while the system is still operational. This feature of RAID hardware is called hot-swapping.

1. What is the RPM of SCSI?

SCSI drives come in 10,000 or 15,000 rotations per minute (RPM) versions, meaning it will access data much faster than your desktop will (desktop drives are generally 5400 or 7200 RPM).

**Topic: Laptop**

1. What are the types of laptop?

There are different types of laptop computer, which names are given below.

* Chromebook
* Notebook
* Ultrabook
* Netbook
* MacBook Air
* MacBook
* Convertible 2 in 1

1. Different names of laptop.

* Microcomputer.
* Minicomputer.
* Notebook computer.
* Palmtop.

1. What are the parts of laptop?

The parts of laptop include display screen, keyboard, base panel, top panel, Cooling Fan, RAM, hard disk, palm rest assembly, battery, hinges, speaker, optical drive, antenna etc. Introduction: As we know laptop is most common computing device used around the world due to its portable nature.

**TOPIC: PRINTER**

1. Describe inkjet printer.

The most popular printer for home computer users that prints by spraying streams of quick-drying ink on paper. The ink is stored in disposable ink cartridges, and often a separate cartridge is used for each of the major colours. These colours are usually CMYK (cyan, magenta, yellow, and black). The picture is an example of a computer inkjet printer.

Although inkjet printers themselves are often relatively inexpensive, the ink cartridges used in the printers can increase the overall cost of the printer.