UMARU MUSA YAR'ADUA UNIVERSITY, KATSINA

FACULTY OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF COMPUTER SCIENCE

COS 103

COMPUTER HARDWARE AND PERIPHERALS

LECTURE NOTE

2024

COMPUTER HARDWARE

Computer Hardware is the physical components of the computer system which you can see and touch. They are interconnected with cables of various shapes and sizes to facilitate data flow. An example of a piece of hardware is the system unit i.e., the box which houses the central processing unit (CPU) others are RAM, Hard disk drive, Motherboard, Graphics card, etc.

Hardware Upgrade

A hardware upgrade refers to a new hardware, or a replacement for the old one, or additional hardware developed to improve the performance of the existing hardware. A common example of a hardware upgrade is a RAM upgrade that increases the computer's total memory, and video card upgrade, where the old video card is removed and replaced with the new one.

Peripheral Devices

Peripherals or I/O devices are connected to computers, either internally or externally. They serve the purpose of transferring data. In a computer, the usual tasks involve data input and displaying processed data. Various devices can be utilized for receiving data and showing processed information.

Peripherals are an integral part of the computer system, as they receive commands from the CPU to either read information from or write in the memory unit. These devices, which require signal value conversion, can be classified as electromechanical or electromagnetic. Common examples of peripherals include printers, scanners, keyboards, mouse, microphones, and external modems, all of which are externally connected to the computer.

Difference between Hardware and Peripherals:

S/N	Hardware	Peripherals
1.	Computer Hardware is physical parts that make your computer.	Peripherals are pieces of hardware that are added to a computer to expand its abilities and to work more efficiently.
2.	It is used to take input, store data, display output and execute commands.	It is used to put information into and get information out of the computer.
3.	Features of hardware include functionality, portability, efficiency, user documentation, etc.	Features of peripherals include storage, processing, usability, speed, etc.
4.	Benefits of hardware include improving customer service, developing more effective communication, improving business efficiency, implementing the right business technology, etc.	Benefits of peripheral devices include making networking easier, increasing efficiency, making the functioning of computers more effective, caution about information, etc.
5.	Hardware is designed to provide instructions to software or render results from its execution.	Peripherals are designed to provide extra function as well as data input and output functionality to computer.

Classification of Computer Hardware

Computer hardware devices are classified into four different Categories such as input devices, output devices, processing devices and memory/storage devices.

1. INPUT HARDWARE

An input device is any hardware component that allows you to enter data and instructions into a computer. Five widely used input devices are the keyboard, mouse, microphone, scanner, Joystick and Webcam.

Keyboard contains keys you press to enter data into the computer. For security purposes, some keyboards include a finger print reader, which allows you to work with the computer only if your finger print is recognized.

The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions. Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for windows and Internet.

Figure.1: Keyboard

Mouse

Mouse is most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base which senses the

movement of mouse and sends corresponding signals to CPU when the mouse buttons are pressed. Generally, it has two buttons called left and right button and a wheel is present between the buttons. Mouse can be used to control the position of cursor on screen, but it cannot be used to enter text into the computer.

Figure 2. Mouse

Joystick

Joystick is also a pointing device which is used to move cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions. The function of joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

Figure.3: Joystick

Scanner

Scanner is an input device which works more like a photocopy machine. It is used when some information is available on a paper and it is to be transferred to the hard disk of the computer for further manipulation. Scanner captures images from the source which are then converted into the digital form that can be stored on the disc. These images can be edited before printing.

Figure.4: Scanner

2. OUTPUTDEVICES

An output device is any hardware component that conveys information to one or more people. Three commonly used output devices are a printer, a monitor, and speakers. A printer produces text and graphics on a physical medium such as

paper. A monitor displays text, graphics, and videos on a screen. Speakers allow you to hear music, voice, and other audio (sounds).

Furthermore, following are few of the important output devices which are used in a computer. These are monitors, Graphic Plotter and Printer.

Monitors

Monitors, commonly called as Visual Display Unit (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels. There are two kinds of viewing screen used for monitors. Cathode-Ray Tube (CRT) and Flat-Panel Display.

Figure.5: Flat-Panel Display Monitor.

Printers

Printer is an output device, which is used to print information on paper. There are two types of printers: Impact Printers and Non-Impact Printers.

Impact Printers

The impact printers print the characters by striking them on the ribbon which is then pressed on the paper. Characteristics of Impact Printers are the following: low consumable costs, noisy, useful for bulk printing due to low cost. There is physical contact with the paper to produce an image. These printers are of two types, Character printers and Line printers.

Non-impact Printers

Non-impact printers print the characters without using ribbon. These printers print a complete page at a time so they are also called as Page Printers.

These printers are of two types

- Laser Printers
- Inkjet Printers

3. SYSTEMUNIT

The system unit is a case that contains the electronic components of the computer that are used to process data. The circuitry of the system unit usually is part of or is connected to a circuit board called the motherboard. Two main components on the motherboard are the processor and memory. The processor also called a CPU (central processing unit) is the electronic component that interprets and carries out the basic instructions that operate the computer. Memory consists of electronic components that store instructions waiting to be executed and data needed by those instructions. Although some forms of memory are permanent, most memory keeps data and instructions temporarily, which mean its contents, are erased when the computer is shut off.

4. MEMORY/STORAGE UNIT

This unit can store instructions, data and intermediate results. Supply information to the other units of the computer when needed. Known as internal storage unit

or main memory or primary storage or Random Access Memory (RAM). Its size affects speed, power and capability. Categorized into primary memory and secondary memory. Functions of memory unit are: storage of all the data and the instructions required for processing. Store processed result, temporary storage of pre-process input, all inputs and outputs are transmitted through main memory.

Control Unit

This unit controls the operations of all parts of computer but does not carry out any actual data processing operations. Responsible for controlling the transfer of data and instructions among other units of a computer, management and coordination of all the computer units, read the instructions from the memory, interprets them, and directs the operation of the computer, communicates with the input/output devices for transfer of data or results from the storage,

ALU (Arithmetic Logic Unit).

This unit consists of two sub sections namely **Arithmetic** section and **Logical** section.

Arithmetic Section

The main function is the performance of arithmetic operations like addition, subtraction, multiplication and division. All complex operations are done by making repetitive use of the above operations.

Logical Section

The main function is performing the logical operations such as comparing, selecting, matching and merging of data.

MEMORY MODULE AND HARD DISK DRIVE

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in 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. For example, if computer has 64k words, then this memory unit has 64*1024=65536 memory locations. The address of these locations varies from 0 to 65535.

Memory is primarily of three types

- Cache Memory
- Primary Memory/Main Memory
- Secondary Memory

Cache Memory

Cache memory is a very high-speed semi-conductor memory which can speed up CPU. It acts as a buffer between the CPU and main memory. It is used to hold those parts of data and program which are most frequently used by CPU. The parts of data and programs are transferred from disk to cache memory by operating system, from where CPU can access them.

Advantages

The advantages of cache memory are as follows

- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.

Disadvantages

The dis advantages of cache memory are as follows. Cache memory has limited capacity. It is very expensive.

Figure.6: Cache Memory

Primary and Secondary Memories

Primary Memory (Main Memory)

Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data is lost when power is switched off. It is generally made up of semi-conductor device. These memories are not as fast as registers. The data and instruction required to be processed re side in main memory.

Characteristics of Main Memory

- These are semiconductor memories.
- It is known as main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without primary memory.

Figure.7: Main Memory

Random Access Memory (RAM)

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program and program result. It is read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased. Access time in RAM is independent of the address that is, each storage location inside the memory is as easy to reach as other locations and takes the same amount of time. Data in the RAM can be accessed randomly but it is very expensive. RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence a back-up uninterruptible power system (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.

RAM is of two types

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

Static RAM (SRAM)

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors

do not require power to prevent leakage, so SRAM need not have to be refreshed on a regular basis. Because of the extra space in the matrix, SRAM uses more chips than DRAM for the same amount of storage space, thus making the manufacturing costs higher. So, SRAM is used as cache memory and has very fast access.

Characteristic of the Static RAM

- It has long life
- There is no need to refresh
- Faster
- Used as cache memory
- Large size
- Expensive
- High power consumption

Dynamic RAM (DRAM)

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

Characteristics of the Dynamic RAM

- It has short data life time
- Need to be refreshed continuously
- Slower as compared to SRAM
- Used as RAM
- Lesser in size
- Less expensive

- Less power consumption

Secondary Memory

This type of memory is also known as external memory or non-volatile. It is slower than 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. Contents of secondary memories are first transferred to main memory, and then CPU can access it. For example: disk,CD-ROM, DVD etc.

Characteristic of Secondary Memory

- These are magnetic and optical memories.
- It is known as back up memory.
- It is non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without secondary memory.
- Slower than primary memories.

Read Only Memory

ROM stands for Read Only Memory. The memory from which we can only read but can not write on it. This type of memory is non-volatile. A ROM stores such instructions that are required to start a computer, this operation is referred to as bootstrap. The information is stored permanently in such memories during manufacture.
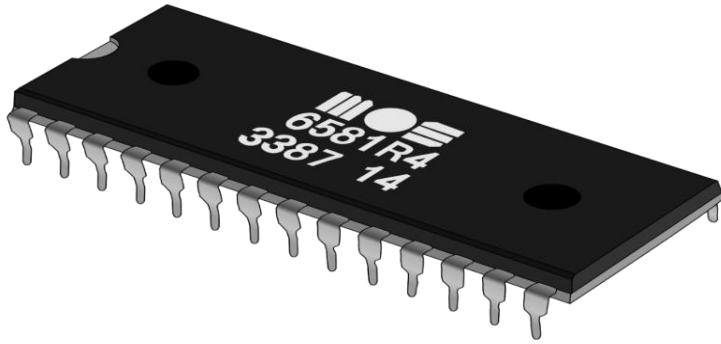
Figure.8: Read Only Memory (ROM)

MROM (Masked ROM)

The very first ROMs were hardwired devices that contained a pre-programmed set of data or instructions. These kinds of ROMs are known as masked ROMs which are inexpensive.

PROM (Programmable Read Only Memory)

PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip there are small fuses which are burnt often during programming. It can be programmed only once and is not erasable.

EPROM (Erasable Programmable Read Only Memory)

EPROM will overcome the problem of PROM. EPROM chip can be programmed time and again by erasing the information stored earlier in it. EPROM chip has to be exposed to sunlight for sometime so that ultraviolet rays fall on the chip and that erases the data on the chip and the chip can be re-programmed using a special programming facility. There is another type memory called EEPROM that stands for Electrically Erasable Programmable Read Only Memory in which we can erase the data and re-program it with fresh content.

EEPROM (Electrically Erasable and Programmable Read Only Memory)

The EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10ms (milli second). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one at a time, rather than erasing the entire chip.

Advantages of ROM

The advantages of ROM are as follows:

- Non-volatile in nature
- These cannot be accidentally changed
- Cheaper than RAMs
- Easy to test
- More reliable than RAMs
- These are static and do not require refreshing
- Its contents are always known and can be verified

Motherboard

The motherboard serves as a single platform to connect all of the parts of a computer together. A motherboard connects 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.
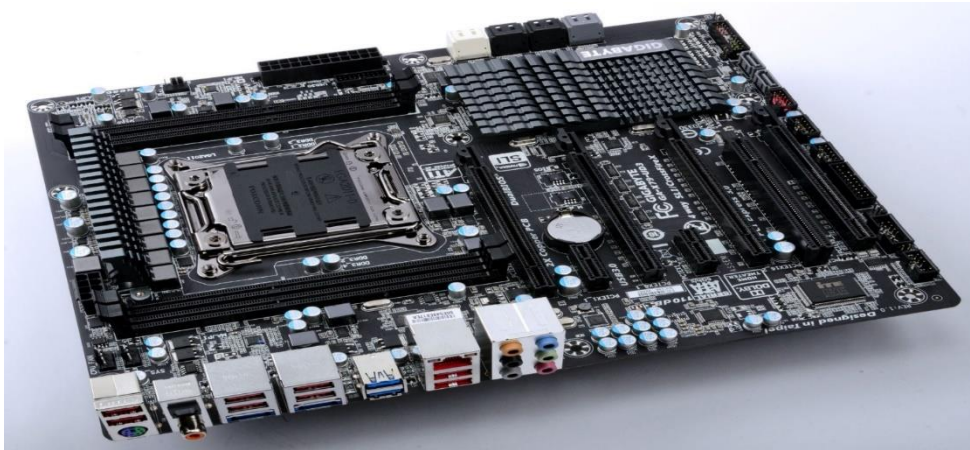
Figure. 9: Motherboard

Features of Motherboard

A motherboard comes with the following features:

- Motherboard varies greatly in supporting various types of components.
- Normally a motherboard supports a single type of CPU and few types of memories.
- Video Cards, Hard disks, Sound Cards have to be compatible with motherboard to function properly.

Motherboards, cases and power supplies must be compatible to work properly together. Popular Manufacturers include **Intel, ASUS, AOpen, ABIT, Biostar, Gigabyte, ECS and MSI.**

Hard Disk Drive (HDD)

A **hard disk** is also known as a hard drive or fixed disk. It is said to be rigid magnetic disc that stores data. It is located within a drive unit. Hard disk is a non-

volatile storage device that contains platters and magnetic disks rotating at high speeds. Non-volatile means the data retains when the computer shuts down.

It is installed internally in our computer systems. Hard disk is located within a drive unit on the computer's motherboard and comprises one or more platters packed in an air-sealed casing.

Figure.10: Hard disk drive

Its main components include a read/write actuator arm, head actuator, read/write head, spindle, and platter. A circuit board (also called as the interface board or disk controller) is present on the back of a hard drive. It lets the hard drive to communicate with the computer.

Function of Hard disk

The hard disk is a secondary storage device, which is designed to store data permanently. The secondary storage devices include a large storage capacity as compared to the primary storage devices. The data stored in a hard disk is retained when our computer system shuts down. The data stored in the hard disk can be of many types such as the operating system, installed software, documents and other files of computer.

COMPUTER SOFTWARE AND OPERATING SYSTEM

Software is a set of programs designed to perform a well-defined function. A program is a sequence of instructions written to solve a particular problem. There are two types of software: **System Software** and **Application Software**.

System Software

The system software is collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System softwares are generally prepared by computer manufacturers. These software products comprise of programs written in low-level languages which interact with the hardware at a very basic level. System software serves as the interface between hardware and the end users. Some examples of system software are Operating System, Compilers, Interpreter, Assemblers, etc.

Features of system software are as follows:

- Close to system
- Fast in speed
- Difficult to design
- Difficult to understand
- Less interactive
- Smaller in size
- Difficult to manipulate and

- Generally written in low-level language.

Application Software

Application software products are designed to satisfy a particular need of a particular environment. All software applications prepared in the computer lab can come under the category of Application software. Application software may consist of a single program, such as a Microsoft's note pad for writing and editing simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task, such as a spreadsheet package.

Examples of Application software are: Payroll Software, Student Record Software, Inventory Management Software, Income Tax Software, Railways Reservation Software Microsoft Office Suite Software, Microsoft Word, Microsoft Excel, Microsoft Powerpoint.

Features of application software are as follows:

- Close to user
- Easy to designand
- More interactive.
- Slow in speed
- Generally written in high-level language
- Easy to understand
- Easy to manipulate and use
- Bigger in size and requires large storage space.

OPERATING SYSTEM (OS)

What is an Operating System?

An operating system is the most important software that runs on a computer. An operating system acts as an interface between the user and the computer. It manages the computer's memory and processes, as well as all its software and hardware. It also allows you to communicate with the computer without knowing how to speak the computer's language. Without an operating system, a computer is useless.

Functions of an OS:

Your computer's operating system (OS) manages all the software and hardware on the computer. Most of the time, there are several different computer programs running at the same time, and they all need to access your computer's central processing unit (CPU), memory, and storage. The operating system coordinates all of this to make sure each program gets what it needs. The following are some of the services provided by the Operating System:

- Program Execution

- I/O Operations

- File System Manipulation

- Communication

- Error Detection

- Accounting

- Resource Allocation

- Protection

Types of an Operating System (OS)

Operating systems usually come pre-loaded on any computer you buy. Most people use the operating system that comes with their computer, but it's possible

to upgrade or even change operating systems. The three most common operating systems for personal computers are Microsoft Windows, mac OS, and Linux.

Modern operating systems use a graphical user interface, or GUI. A GUI lets you use your mouse to click icons, buttons, and menus, and everything is clearly displayed on the screen using a combination of graphics and text.

Each operating system's GUI has a different look and feel, so if you switch to a different operating system, it may seem unfamiliar at first. However, modern operating systems are designed to be easy to use, and most of the basic principles are the same.

Microsoft Windows

Microsoft created the Windows operating system in the mid-1980s. There have been many different versions of Windows, but the most recent ones are Windows 10 (released in 2015), Windows 8 (2012), Windows 7 (2009), and Windows Vista (2007). Windows comes pre-loaded on most new PCs, which helps to make it the most popular operating system in the world.
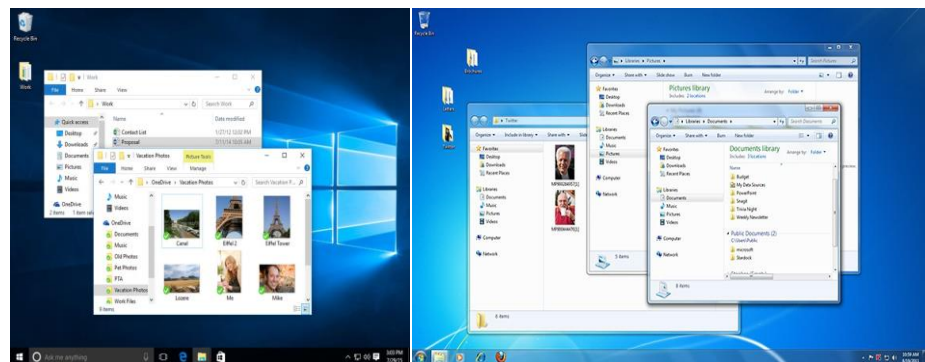

Figure.11: Windows 10 and Windows 7 OS

Mac OS

Mac OS (previously called OSX) is a line of operating systems created by Apple. It comes preloaded on all Macintosh computers, or Macs. Some of the specific versions include Mojave (released in 2018), High Sierra (2017), and Sierra (2016).

☐According to Stat Counter Global Stats, mac OS users account for less than 10% of global operating systems—much lower than the percentage of Windows users (more than 80%). One reason for this is that Apple computers tend to be more expensive. However, many people do prefer the look and feel of mac OS over Windows.

Figure.12: Mac OS

Linux

Linux is a family of open-source operating systems, which means they can be modified and distributed by anyone around the world. This is different from proprietary software like Windows, which can only be modified by the company that own sit. The advantages of Linux are that it is free, and there are many different distributions—or versions—you can choose from.

☐According to Stat Counter Global Stats, Linux users account for less than 2% of global operating systems. However, most servers run Linux because it's relatively easy to customize.

Figure. 13: Linus OS

Operating systems for mobile devices

The operating systems we have been talking about so far were designed to run

On desktop and laptop computers. Mobile devices such as phones, tablet computers, and MP3 players are different from desktop and laptop computers, so they run operating systems that are designed specifically for mobile devices. Examples of mobile operating systems include Apple iOS and Google Android. In the screen shot below, you can see iOS running on an iPad.
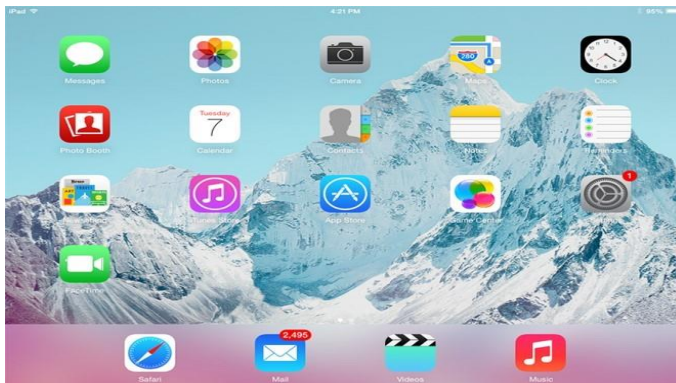

Figure.14: Mobile OS.

Operating systems for mobile devices generally are not as fully featured as those made for desktop and laptop computers, and they aren't able to run all of the same software. However, you can still do a lot of things with them, like watch movies, browse the Web, manage your calendar, and play games.

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Computer Maintenance Tools and Their Functions

Computer maintenance is the practice of keeping computers in a good state of repair. A computer containing accumulated dust and debris may not run properly.

Dust and debris will accumulate as a result of air cooling. Any filters used to mitigate this need regular service and changes. If the cooling system is not filtered then regular computer cleaning may prevent short circuits and overheating.

When it comes to computer maintenance and repair tools, they can either be hardware or software. Hardware tools are physical pieces of equipment like screw drivers that are used to repair the physical components of the computer. Software maintenance tools on the other side are used to maintain and repair programs parts of the system. The main computer hardware maintenance tools are pliers, screws and nut drivers, multimeters, tweezers, and cable clippers among others. They are used for a variety of functions depending on the tool. Tools can be used for cutting, holding, tightening, or loosening among other special functions.

TYPES OF COMPUTER MAINTENANCE

Computer maintenance processes are the cornerstone of effectiveness and **reliability**. Thus, many types of maintenance coexist in order to provide computer users with **opportunities to optimize their system performance**. You can use these various kinds of maintenance to ensure that if a problem occurs, you handle it effectively, prevent the issue altogether, or upgrade the system to improve speed, functionality, and performance. The main types of computer maintenance are:

Predictive maintenance

In predictive maintenance, a system user uses diagnostic tools that help in preventing some potential problems that can occur with your computer. These include diagnostic tools that can monitor computer systems and conduct checks on whether it is functioning

normally. For instance, such tools can control and advise you regarding the battery levels, the temperature of your CPU, and various other features.

Preventive maintenance

Preventive maintenance is employed to avoid possible failures, enhance the overall functioning of your computer and increase the lives of various components. The advantages of using preventative maintenance include observing weak points in your system and managing them with less number of repairs. When you are talking about the hardware, preventive maintenance includes the actual routine cleaning of various components.

Corrective maintenance

If predictive and preventive maintenance is unable to solve a problem that has occurred in your computer, you need to go for corrective maintenance. If your operating system fails, you need to apply some measures based on the situation to enable it to work without any mistakes. During the options in corrective support, you also need to see what the cause behind the problem is.

Evolutionary maintenance

Evolutionary maintenance focuses on developing the main system of your computer to help the PC in performing more efficiently. You are extending the computing resources that you have at your disposal. The computer is developing continuously, and you need to catch up with your system to help it in working well. This kind of support is related to both hardware and software. You can update the system or even replace the different parts of your computer, if needed, to offer it better performance.

Hardware Maintenance and Repair Tools

1. **Screwdrivers**: used to tighten or loosen screws. Different types of screwdrivers are flat-head for slotted screws, Phillips-head for cross-headed screws, and star for star-headed screws.

2. **Nut drivers**: they are also called hex drivers. Nut drivers are used to tighten or loosen nuts and bolts.

3. **Tweezers**: used to remove tiny components or removing small wires on the personal computer (PC).

4. **Wire cutter and stripper**: it is used to cut the wire and strip the insulation material to uncover the wires. They can be used to strip cables when terminating network cables.

5. **Multimeter**: it is used to measure multiple electrical values such as voltage, ohms, and current. The best is a digital multimeter which has an LCD display.

6. **Memory module tester**: it is special equipment that tests main memory (RAM) functionality.

7. **Pliers**: Used for cutting and gripping or holding parts. Types include needle-nose, slip-joint, and cutting piers among others.

8. **Soldering rod**: it is used to remove solder from components and fix others. The rod is used during repair to fix components on the motherboard.

9. **Flashlight**: Used to light up areas that you cannot see well. It can be used at the repair table.

10. **Cable crimper**: Used to attach connectors to wires. The most common is the network cable crimper that terminates the RJ45 to the ethernet cable.

11. **Soft cleaning cloth**: Used to clean computer components without scratching or damaging them.

12. **Cleaning agent**: use the correct type of cleaning agent to clean different components either when maintaining or repairing. The recommended agent is isopropyl alcohol or distilled water. What is used depends on which part is being cleaned.

13. **Antistatic wrist strap**: it is used to protect computer components against static electricity.

14**. Cables ties**: they are used to bundle cables together in an organized manner. When you use cable ties you cannot remove them unless you cut the tie complete.

15. **Air blower**: used to blow away dust from different parts of the computer. They can be used in general maintenance routines or before you repair components.

Software Maintenance and Repair Tools

Software maintenance and repair tools are used to manage the software components and can also check the functionality of computer hardware. Mostly they are specialized for a specific function. The main software repair and maintenance tools are:

1. **Data recovery software:** This is software that is used to help recover data that is lost due to storage media problems. They can be used to repair and recover data. We have some that are freeware and others more advanced that are for pay.
2. **Disk utility software**: Hard disk is a critical component that holds all user data and it has a number of repair tools dedicated to it. Some disk management programs are disk cleaners, defragmenters, partitioners, formatting, and checker among others. We have a more detailed article about different types of disk utility software you can read.
3. **Antivirus and malware**: antivirus programs are used to scan, detect, and remove malicious programs from the computer. By using this software, we can reduce many problems that are associated with computer viruses. There are many antivirus programs on the market such as Norton, Kaspersky, Avast, Bit defender, Comodo, and Avira among others.
4. **The driver's installer and updater**: up-to-date drivers ensure that all components are functioning optimally. These repair tools are used to detect any

missing drivers and install them. They also check the version and update it to the latest drivers.

5. **Software uninstaller**: when you uninstall a program from your computer, most of the time it only removes the directory where the program was but other files still remain. The uninstaller software deletes all data for the specific programs including the registry data. This frees up storage space for other programs.

HOW TO MAINTAIN AND TAKE CARE OF HARDWARE TOOLS

How long your hardware tools will last depend on how you take care of them. Better care better service they will offer and for a long time. These are some of the tips you can use to ensure your hardware repair tools last longer.

1. **Always clean your tools after use**. Depending on the type of the tool clean it using the appropriate cleaning agent after use.
2. **Return the tools to the right location**. You should have a designated storage location for all your tools like a tool rack. After use return them to the right.
3. **Use the tool for the right job**: each tool is designed to be used for a specific function try and stick to the basic use of that tool. This ensures that you don't damage the item and the component that is being repaired.
4. **Keep your tool dry to avoid then rusting**: most hardware repair tools are metallic which means theta re susceptible to rust if left wet. Always ensure they are dry before returning them to the toolbox or rack.
5. **Follow safety guidelines:** check the safety rules and guidelines that are given in the tool user manual and follow them. This ensures the equipment work as specified and the user is also safe.

Troubleshooting is a systematic process used to locate the cause of a fault in a computer system and correct the relevant hardware and software issues. Approaching problem solving using a logical and methodological approach is essential to successful

resolution. Although experience is very useful to problem solving, following a troubleshooting model will enhance effectiveness and speed.

Data Backup

A **data backup** is a copy of the data on a computer hard drive that is saved to another storage device or to cloud storage. **Cloud storage** is online storage that is accessed via the Internet. Backups may be performed on a daily, weekly, or monthly basis.

If you are unsure about whether a backup has been done, do not attempt any troubleshooting activities until you check with the customer. Here is a list of items to verify with the customer regarding whether a backup has been performed:

- Date of the last backup
- Contents of the backup
- Data integrity of the backup
- Availability of all backup media for a data restore.

Troubleshooting Process Steps

The **troubleshooting process steps** are as follows:

- **Step 1.** Identify the problem.
- **Step 2.** Establish a theory of probable cause.
- **Step 3.** Test the theory to determine the cause.
- **Step 4.** Establish a plan of action to resolve the problem and implement the solution.
- **Step 5.** Verify full system functionality and, if applicable, implement preventive measures.
- **Step 6.** Document findings, actions, and outcomes.

Computer Cables and their uses

A computer cable is an essential component of modern technology that serves as a physical conduit for transmitting data, signals, or power between various electronic devices. These cables come in a myriad of types and configurations, each designed for specific purposes. Common examples include USB cables for connecting peripherals like keyboards and mice, HDMI cables for transmitting high-definition video and audio, Ethernet cables for networking, power cables for supplying electricity to devices, and countless others. Computer cables are typically composed of conductive materials like copper or fiber optics to ensure efficient data transfer, and they are often shielded to minimize interference and signal degradation. The type of cable required depends on the devices being connected and the data or power requirements, making them a crucial part of the modern digital ecosystem, enabling seamless communication and functionality among our interconnected gadgets and systems.

Types of Computer Cables

In the computer system, there are several different parts which are connected to the system. These parts can be directly plugged into the computer system computer motherboard, or there can be a requirement of some cable to connect computer parts to the system. These parts can be digital cameras, hard drives, mice or other devices. There are different types of cables in the market, like HDMI cable, VGA cable, DVI cable, Ethernet cable, PS/2 cable, 3.5 mm audio cable, USB cable, and computer power cord cable.

HDMI cable

HDMI (High definition Media Interface) is a type of computer cable used to transmit high definition video and audio signals. Using the HDMI cables, the audio and video signal can be easily transmitted without compromising the quality of images and can

send crystal clear images using this cable. The HDMI cables are used to connect cable boxes, TVs, DVD players, media streamers and other electronic devices. All types of Av devices can be connected to one standard cable, which is an HDMI cable. Also, one HDMI cable is capable of transmitting both audio and video signals at the same time.

Figure 1: HDMI Cable

VGA cable

VGA (Video Graphics Ray) cable is another type of computer cable which is used for sending video signals and is used to link the monitor and the CPU of a computer. The VGA cable can also be used in HD televisions. All the information displayed on the monitor is coming from the VGA cable. There is a total of 15 pins in the plugin the cable, which have three rows containing 5 pins each. And the cable is easily fitted in the monitor and the other end is fixed in the CPU of a computer system.

Figure 2: VGA Cable.

How to connect VGA cable with computer system?

This cable consists of a plugin in which there are **15 pins** which also includes three rows. In each of the three rows, it contains 5 pins. Now, you need to fit one end of this cable to your monitor and the other end to the CPU of the computer system.

Computer power cord

Connect one end to: AC power socket

Connect other end to power supply unit (see image below), computer monitor.

Note: Always turn off your power supply unit (with the 1–0 switch at the back) before connecting a power cord to it.

Figure 3: Computer power cord

3 Common Power Plugs

• **IEC 60320 C13 &C14**: The standard plug for desktop computers. Also known as the "kettle plug", because it looks just like the one we use for electrical kettles.

• **IEC 60320 C5 & C6:** This is the standard plug for the chargers of most laptops, also known as the "cloverleaf".

• **IEC 60320 C7 & C8:** Yet another standard plug for the chargers of laptops and even some speakers.

SATA Cable

SATA cables are used for connecting hard drives to the system motherboard. This types of computer cables consists of **7 pins** which is easily recognized as it has the shape of an L. IDE is been replaced by SATA, the reason behind this is it deliver a high data transfer speed.

Figure 4: SATA Cable

DVI Cable

Digital Visual Interface is another kind of computer cable which is used for connecting the LCD monitor and video card. The high image quality is been visible to users and hence such cables are used in CRT, LCD monitors. It is feasible to transmit both signals analog and digital to the computer machine. The reason behind this is that this type of computer cables is compatible with both digital and analog connections.

Figure 5: DVI Cable

Ethernet Cable

The Ethernet cable is a type of computer network cable which is used for a wired network. The Ethernet cable is used to connect the switches, monitors, PCs to the LAN (Local Area Network). The length and durability of the Ethernet cable describe the quality of the connection. If the cable is too long and is not durable, it will contain a poor quality of the signal. And due to this factor, there are different types of Ethernet cables present in the market. The Ethernet cables are plugged into the Ethernet port present on the motherboard. The Ethernet cable looks like a phone cable but contains more wires than phone cables. There are eight wires in the Ethernet cable, and they can be available in different colors in the market.

The PS/2 Cable

The PS/2 cable is a standard cable to connect the mouse and keyboard to the computer system. The length of the PS/2 cable is long enough so that the user can easily connect the mouse and keyboard to the system and use the system. There are a total of 6 pins in PS/2 cables and have a round connector. There are majorly two sizes of PS/2 cable. The smaller size is the most common cable, but some adaptors can be used to convert it into a larger size. This cable is now replaced with USB cables as they are universal cables and can be easily plugged into any system.

The 3.5 mm Audio Cable

The 3.5mm audio cables are a type of computer cables that are used in computer audio applications. This cable can be used for connecting a mini-stereo audio device, PC sound card or any portable CD player to any multimedia speaker. This cable can also be used to connect earphones and headphones to the system.

The green port is for headphones and computer speakers. Blue port is for DVD player, MP3 player and pink port is used for connecting microphones.

USB Cables

The USB (Universal Serial Bus) cable is a standard cable used to connect universal devices or personal computers. It is mainly used for short-distance digital communication. The digital data can be transferred using a USB cable. Nowadays, the USB cable is used to charge devices like smartphones, Bluetooth speakers, trimmers and many more. Sometimes, your USB flash drive doesn't appear when connected to the PC, but you can try a few simple methods to troubleshoot the issue. The USB cables can be used to connect two devices directly. The USB cable is connected to the USB port present in the computer system. The mouse and keyboard are also connected to a USB port as they have USB cables. As the device is connected through the USB cable, the unplugging of the USB cable when a device is running can cause damage to a device, so whenever there is a need of removing the USB cable, first it should be ejected safely and then it should be removed from the system.

Figure 6: USB Cable

Advantages of Computer Cables

The computer cables can be used to connect various devices to the system and perform several operations. The computer cables can easily transmit the digital and analog signal through it. Some of the computer cables are capable enough to transmit electric power through it like a USB cable. Using a computer cable, one can see movies, play games, listen to music, and do many more things. Ethernet cables can be used to connect the computer system to the internet world.
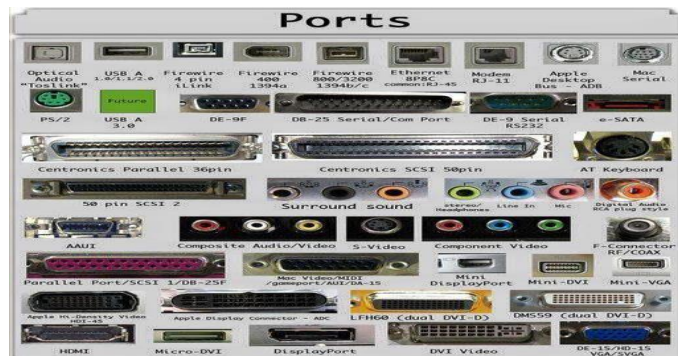
COMPUTER PORT

A port is a physical docking point using which an external device can be connected to the computer. It can also be programmatic docking point through which information flows from a program to the computer or over the Internet.

A port has the following characteristics −

- External devices are connected to a computer using cables and ports.

- Ports are slots on the motherboard into which a cable of external device is plugged in.
- Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speakers, etc.

Types of ports

Serial Port

- Used for external modems and older computer mouse
- Two versions: 9 pin, 25 pin model
- Data travels at 115 kilobits per second

Parallel Port

- Used for scanners and printers
- Also called printer port
- 25 pin model
- IEEE 1284-compliant Centronics port

PS/2 Port

- Used for old computer keyboard and mouse
- Also called mouse port
- Most of the old computers provide two PS/2 port, each for the mouse and keyboard

Universal Serial Bus (or USB) Port

- It can connect all kinds of external USB devices such as external hard disk, printer, scanner, mouse, keyboard, etc.
- It was introduced in 1997.
- Most of the computers provide two USB ports as minimum.
- Data travels at 12 megabits per seconds.
- USB compliant devices can get power from a USB port.

VGA Port

- Connects monitor to a computer's video card.
- It has 15 holes.

• Similar to the serial port connector. However, serial port connector has pins, VGA port has holes.

Power Connector

• Three-pronged plug.
• Connects to the computer's power cable that plugs into a power bar or wall socket.

Firewire Port

• Transfers large amount of data at very fast speed.
• Connects camcorders and video equipment to the computer.
• Data travels at 400 to 800 megabits per seconds.
• Invented by Apple.
• It has three variants: 4-Pin FireWire 400 connector, 6-Pin FireWire 400 connector, and 9-Pin FireWire 800 connector.

Modem Port

• Connects a PC's modem to the telephone network.

Ethernet Port

• Connects to a network and high speed Internet.
• Connects the network cable to a computer.
• This port resides on an Ethernet Card.
• Data travels at 10 megabits to 1000 megabits per seconds depending upon the network bandwidth.

Game Port

• Connect a joystick to a PC
• Now replaced by USB

Digital Video Interface, DVI port

• Connects Flat panel LCD monitor to the computer's high-end video graphic cards.
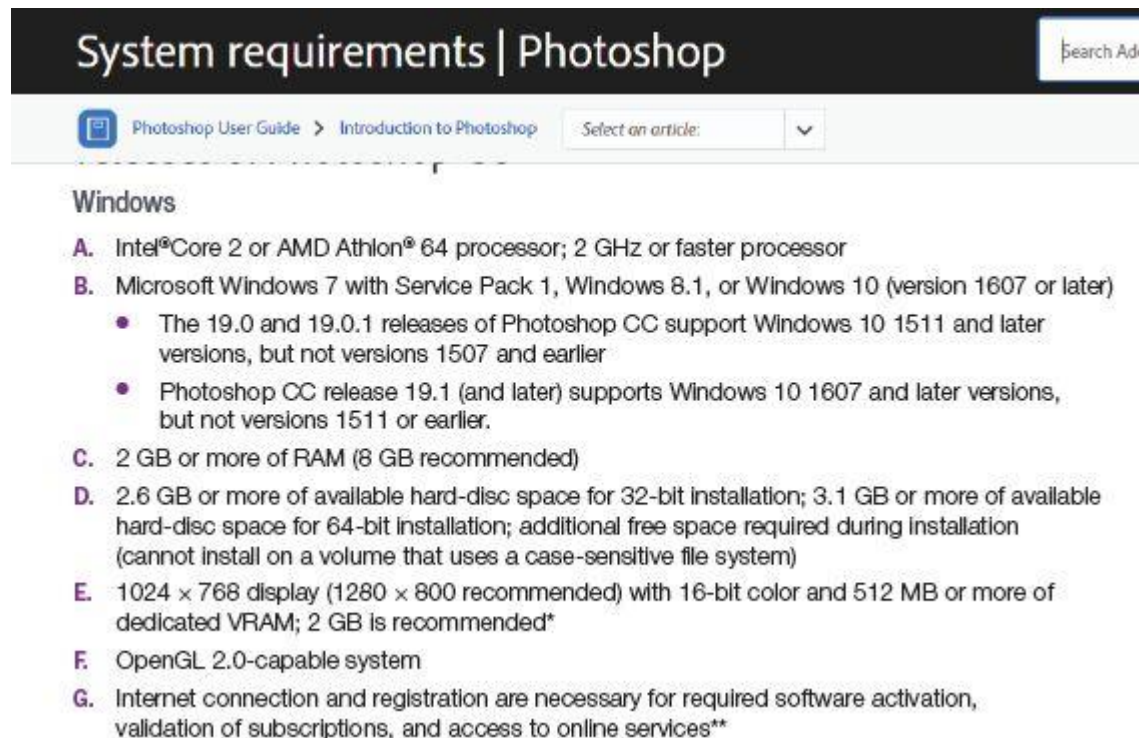• Very popular among video card manufacturers.

Sockets

• Sockets connect the microphone and speakers to the sound card of the computer.

Basic system requirements for installation

System requirements are the minimum necessary specifications that you will need to make sure that the software runs smoothly and does not overwork the hardware on your computer. It is basically a list of what you need to make sure that a game or program runs properly.

If your computer does not meet these requirements, you may not be able to install the software or, if you can install the software, it may run slowly. The system requirements for software are usually printed on the package that the software comes in or are listed on the software's website.

System requirements | Photoshop

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Windows

A. Intel®Core 2 or AMD Athlon® 64 processor; 2 GHz or faster processor

B. Microsoft Windows 7 with Service Pack 1, Windows 8.1, or Windows 10 (version 1607 or later)
- The 19.0 and 19.0.1 releases of Photoshop CC support Windows 10 1511 and later versions, but not versions 1507 and earlier
- Photoshop CC release 19.1 (and later) supports Windows 10 1607 and later versions, but not versions 1511 or earlier.

C. 2 GB or more of RAM (8 GB recommended)

D. 2.6 GB or more of available hard-disc space for 32-bit installation; 3.1 GB or more of available hard-disc space for 64-bit installation; additional free space required during installation (cannot install on a volume that uses a case-sensitive file system)

E. 1024 × 768 display (1280 × 800 recommended) with 16-bit color and 512 MB or more of dedicated VRAM; 2 GB is recommended*

F. OpenGL 2.0-capable system

G. Internet connection and registration are necessary for required software activation, validation of subscriptions, and access to online services**

Knowing what the system requirements are for the software you will be using most often will help you decide what computer to buy when you are shopping for one.

Most of the information you will need will be on a label on the computer or will be listed in an advertisement for the computer.

System requirements will also let you know if you need to purchase any additional hardware (such as microphones when using audio recording software). Hardware items, such as printers, also come with system requirements. For example, a printer may only be compatible with Windows 8.1 and 10 or Apple's macOS and cannot be connected to a computer running Windows 7.

For your computer to be able to run all the newest gaming software, you would need to look at the graphics card. A GPU is a programmable logic chip to render images, animations and video for the computer's screen. GPUs can be located in plug-in cards, in a chipset on the motherboard or in the same chip as the CPU. The gaming software's system requirements will recommend the size of the additional GPU.

If your computer does not meet all the requirements to run specific software or communicate with a specific device, you will not necessarily have to buy a whole new computer. It is possible to upgrade your RAM, GPU or CPU. You can, for example, upgrade your operating system or you can install the latest device drivers to make sure that your computer and hardware can communicate with each other.

Software installation

Once you have worked out what requirements you need to install software, you will need to begin the installation process. Before installing the software, you need to:

1. Download the software files from a website; or

2. Purchase a CD or DVD from a store.

After downloading the installation software, you can install it. Usually this installation software is an **installation wizard** to assist you with the installation process.

ONLINE DOWNLOAD

The most common way to get new software is to download it from the internet. To do this, you must go to the website where the software is available and download the files. Make sure that you download software from trusted publishers or verified retailers only. This ensures that you are getting the software you want and that you do not accidentally download malware or a virus.

You will usually use a credit card to buy the software to download. Once you have purchased the software, you will click on the download link to begin the process.

You can also buy software from app stores, such as Google's Play Store, Apple's App Store or the Windows Store. The software you are looking for is usually sorted according to its category, for example, gaming, word processing or design.

DOWNLOADING CHROME

To download software from the internet, do the following:

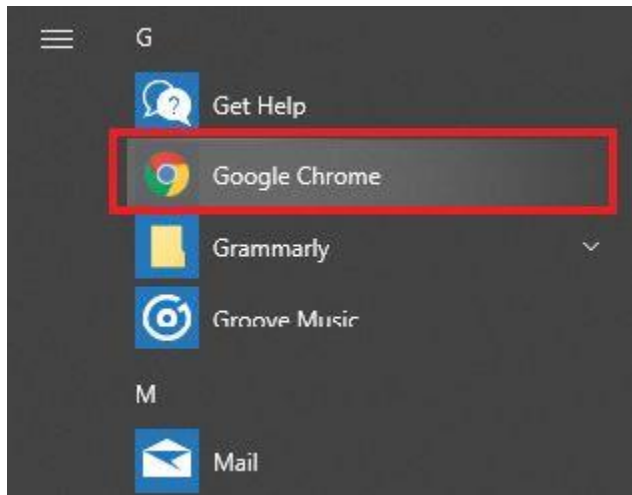1. Go to https://www.google.com/chrome/ (or the site where the software is available to download).

2. Click on the *Download* button. A dialog box will appear. Accept the *Terms of Service* and make sure that you are downloading the correct version for your computer.

3. Follow the instructions to install the software.

4. Open the application from the *Start* menu.

PORTABLE STORAGE MEDIUM INSTALLATION

Some software can be installed using the files found on a CD or DVD. This includes software such as the operating system, Microsoft Office (not Microsoft Office 365) and some games.

Figure 1: *An example of software on a portable storage medium*

To get this software, you will need to go to a store and buy the product and bring it home with you to install. You do this by inserting the disk into your computer's

optical disk drive (its CD or DVD player). The installation program will usually start automatically but you can also look for the setup program to start the installation.

HOW TO INSTALL SOFTWARE

Once you have downloaded the software or inserted the disk, the installation wizard will guide you through what to do. While the installation wizard does not handle all the aspects of the installation, since these may be different from one program to the next, the process is very similar for all software.

SOFTWARE STEPS FOR INSTALLATION

You will usually start by either clicking on the downloaded file or inserting the disk and then letting the program setup file run (usually called *Setup.exe* or *Install.exe*).

STEP	DESCRIPTION
Accept the license agreement	Most software cannot complete the installation if you do not agree to the manufacturer's terms of use. This license agreement is a legally binding contract between you and the manufacturer and outlines what you can and cannot do with the software.
Enter the product key/activation code/registration number	The product key is the way that the manufacturer links the software to you, stops the software from being installed on more devices than the licensing terms agree to and prevents piracy. It also links you to any online support available.
Choose the installation location	The installer will suggest a default folder. It is usually best to stick to this suggestion. For example, if your installer suggests installing all your software on the C:/ drive, you will know where to look for a program.
Choose the type of installation you want	You can usually choose between the following types of installation: • Typical installation, which installs the components that are used most often. • Custom installation, where you can choose which components to install. • Full installation, which installs all the components of the software. This is not always an option in an installation.
Install extras	Some software comes with extra software bundled in (such as McAfee antivirus with some Microsoft products). In this step you can choose which extra software to install. Often these extras are ticked by default and you will have to untick them to not install them. You should always check which extras are installing to your computer and untick the ones you do not want.
Check for updates	Once a program has installed, the installer may ask if you want to check for the latest version. This is usually done with software that is installed from a disk. Downloaded software is often more up to date.
Register your product	Some programs require that you register on their online portal so that the company can contact you with news and notifications of updates. You should be allowed to skip this step if you do not want to be contacted by the manufacturer.
Add shortcuts	The last step in the installation process is to add a shortcut. Most software will ask you if you want a shortcut to the program on your desktop. If you do not, deselect this option.
Take a tour	Some software offers a tutorial the first time you open the program. These tutorials will usually highlight important features and how to use them. If it is the first time you are using a specific program, you should work through the tutorial before getting started.

HOW TO UNINSTALL SOFTWARE

Uninstalling software is when you remove the program and all its files from your computer.

UNINSTALL A PROGRAM

To uninstall a program in Windows 10:
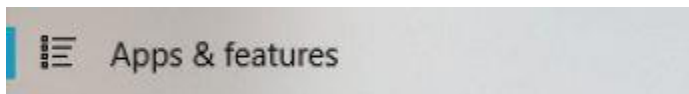
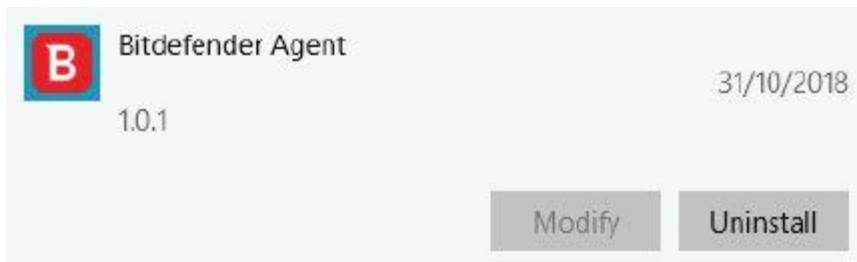**Step 1:** Click on the *Windows* icon.

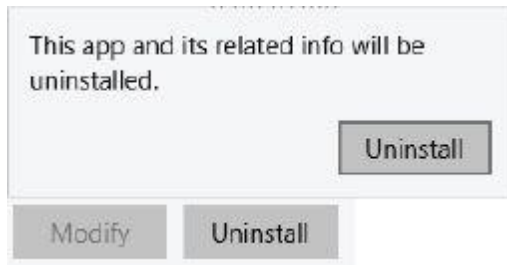**Step 2:** Click on *Settings*.

Step 3: Click on *Apps*.

Apps
Uninstall, defaults, optional features

Step 4: Click on *Apps & Features* in the left pane. A list of all installed apps will appear.

Apps & features

Step 5: Click on the one you want to uninstall and then click on the *Uninstall* button (if this button is greyed out, it is a system app and cannot be uninstalled).

Bitdefender Agent

1.0.1

31/10/2018

Modify   Uninstall

Step 6: Click on *Uninstall* in the pop-up window that appears and wait for the system to uninstall the app.

File management is the process of organizing, storing, naming and deleting files. It is important because it can make a difference in how easy it is to find and access files you need.

It can be done manually or with a software program. There are many file management system that are available, but they all have the same basic functions:

-Organizing – putting files into folders

-Storing – keeping your files saved on your computer

-Naming – giving your files an appropriate name for easy identification

-Deleting – deleting old or unnecessary files to free up space on your hard drive

DIGITAL SYSTEM DESIGN LABORATORY

Digital Systems Laboratory provides a convenient environment for experimenting with digital logic circuits, microprocessors and Field Programmable Gate Arrays (FPGAs). Students develop engineering skills necessary to design and implement a digital system through experiments and projects. Laboratory complements the theoretical background established through courses such as digital logic design, digital system design, microprocessors, Advanced digital system design.

Moreover, laboratory provides various microcontroller, microprocessor and FPGA development boards and required electronic design automation software for the design, simulation and testing of various digital systems. Digital lab being it a research laboratory also contribute in exploring the design, implementation, optimization, and applications of digital systems, post-quantum cryptography, homomorphic encryption, error correction codes, and artificial intelligence in both software and hardware.

Internet Connectivity

An internet is a global network that serves billions of users world-wide. It is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols Therefore, internet connectivity is a facility or service that provides connectivity for a computer, a computer network, or other network device to the Internet, and for individuals or organizations to access or use applications such as email and the World Wide Web.

INTERNET CONNECTIVITY FAILURES

Internet connectivity issues are situations in which devices can't establish or maintain a stable connection to the Internet.

Internet connectivity can encounter a range of common issues capable of causing disruptions or diminishing the quality of your online connection. Below, are some prevalent issues identified in internet connectivity failure.

- **Network Congestion**: When many users in the same area or on the same network are simultaneously accessing the internet, it can lead to network

congestion. This can slow down internet speeds, cause latency, and result in intermittent connectivity issues.

- **Router Problems**: Issues with your router, such as outdated firmware, overheating, or hardware malfunctions, can disrupt internet connectivity. Restarting or resetting the router can often resolve these problems.

- **Wi-Fi Interference**: Interference from other electronic devices, neighboring Wi-Fi networks, or physical obstacles (e.g., walls and furniture) can disrupt Wi-Fi signals and cause poor connectivity or dropouts.

- **ISP Outages**: Internet Service Providers (ISPs) can experience outages due to maintenance, technical problems, or infrastructure issues. These outages can result in a loss of internet connectivity until the ISP resolves the problem.

- **DNS Issues**: Domain Name System (DNS) problems can affect your ability to access websites. Incorrect DNS settings or server issues can lead to domain resolution failures and prevent you from reaching websites.

- **Cable or Wiring Problems**: Faulty or damaged cables, such as Ethernet cables or coaxial cables, can result in connectivity issues. Loose or damaged connections at the modem or router can also cause problems.

- **Malware or Viruses**: Malware or viruses on your device can consume network resources or disrupt internet connectivity. It's essential to have up-to-date antivirus software and regularly scan for malware.

- **Overloaded Modem**: If your modem is overloaded with too many devices or connections, it may struggle to handle the traffic, leading to slow speeds or connectivity issues.

- **Outdated Hardware**: Aging or outdated devices, including computers, smartphones, or modems, may not support the latest network technologies or may have hardware failures that impact connectivity.

- **ISP Speed Throttling**: Some ISPs may intentionally throttle (slow down) certain types of internet traffic, such as peer-to-peer file sharing or video streaming, which can lead to slower speeds for specific applications.

- **Firewall or Security Software**: Overly restrictive firewall settings or security software can block legitimate internet traffic and disrupt connectivity. Adjusting firewall rules and configurations may be necessary.

- **ISP Bandwidth Limitations**: Your ISP may have data caps or bandwidth limitations on your plan. Exceeding these limits can result in slower speeds or additional charges.

- **Geographical or Weather-Related Issues:** Geographical factors, such as your proximity to the ISP's infrastructure or extreme weather conditions that harm network equipment, can affect internet connectivity.

- **Hardware Failures**: Hardware failures within your ISP's infrastructure, such as problems with servers, routers, or cables, can lead to widespread internet outages in your area.

HOW TO TROUBLESHOOT INTERNET CONNECTIVITY FAILURE

1. Restart your device.
2. Connect with an Ethernet cable.
3. Check for an internet outage.
4. Try using a different device.
5. Check your wires and cables.
6. Run your computer's internet troubleshooter.
7. Reposition your router/gateway.

Restart your modem and router or internet gateway (modem/router combo)

An equipment restart is the golden rule of internet troubleshooting. This should always be your first step; it's simple, easy, and incredibly effective.

Check your wires and cables

Loose or damaged cables can cause a wide range of internet issues. Sometimes the fix is as simple as tightening a connection, other times you may need to replace a cable or require the help of a broadband technician.

Move your router to a better spot

If you're using the internet over Wi-Fi, router placement is crucial. Sometimes moving your router just a few feet or changing the angle of the antennae can make a world of difference.

Reboot the Computer

Failures in the operating system software controlling the adapter can frequently occur.

This is why it is always a good idea to restart your computer. By doing so, you can clear the cache and ensure the settings are not following old configurations.

We see this happen frequently. Sometimes after applying all the correct changes, it is only after restarting the computer that the fixes are actually applied.

Contact Your Internet Service Provider

If you're using a satellite internet service, you may notice that the connection is not as reliable during periods of extreme weather. Sometimes, internet service providers or cellular internet carriers in densely populated urban areas are unable to support network traffic peaks that cause sporadic downtimes for some users. If you can't figure out why you can't connect to the internet, your ISP can offer informed advice.

Reach Out to IT Professionals

Ultimately, if you've tried everything and your internet connection still fails to restore, it is best to reach out to a professional IT support team to troubleshoot your issue and restore your connection before the downtime impacts your operations further.

Check the Wi-Fi Adapter

The settings on your Wi-Fi adapter can also sometimes lead to connectivity issues. To check if this is the case, open Device Manager > Network Adapters and click on your adapter name. Select Advanced and look for your Wireless Mode setting to make sure it's set to the mode your network is using.

Reset Network Settings

A network reset should be one of the last troubleshooting options you try if you can't connect to the internet, as it can affect other software you might be using. However, network resets are occasionally needed if, for example, you have recently performed an OS upgrade.

On Windows, open Settings > Network & Internet > Advanced network settings > Network reset. On this screen, select Reset Now and Yes to confirm.

For Apple devices, open the Apple menu > System Preferences > Network. Select your Wi-Fi name, click the minus symbol, and select Apply. Then, re-add your connection settings by clicking the plus symbol, selecting your Wi-Fi, and clicking Apply.

Check Windows Services

As above, open the Task Manager on your PC by selecting CTRL + ALT + DEL. Open the Services tab and click Open Services at the bottom of the window. Find

DHCP Client in the list and check the status is set to Running. If it says Stopped or Disabled, right click and select Properties. Set the Startup Type to Automatic, then select Start > Apply > OK

Check Service is not Being Blocked

Sometimes, Internet Service Providers (ISPs) can decide to block access from your account due to non-payment or violation of the provider's Terms of Service. If you're using paid hotspots that charge hourly or daily, it's easy to forget to keep your subscription updated.

Other times, your ISP might block your account when you're exceeding bandwidth caps, downloading illegal or inappropriate content, or sending spam emails. Most internet providers will notify you while you are trying to visit a webpage if your account has been suspended. It is always good practice to contact your ISP promptly if you suspect your account has been suspended.

Open Windows Network Diagnostics and Check Your DNS settings

Windows features a tool known as Windows Network Diagnostics, which lets users troubleshoot internet connection issues. Simply go to Windows Settings > Network & Internet > Status. Next, open Network Settings and click Network Troubleshooter.

The Windows Network Diagnostics tool will then run a couple of tests to determine what's possibly causing your internet connection issues. If any issue is discovered, Windows will give you a list of possible actions to take to restore your connection.

Reset Internet Explorer Settings

If you're using Internet Explorer, perform the following reset of your browser settings to see if this restores your connection:

Close all open programs.

Open Internet Explorer > Tools > Internet options, and select the Advanced tab.

Open Reset Internet Explorer Settings and click Reset.

Wait for the default settings to restore, select Close > OK, then restart your device.