Lecture 2 - COMPUTER FUNDAMENTALS

- BASICS OF A COMPUTER

Data: is a raw material and unorganized facts that need to be processed.

Information: When data is processed, organized, structured or presented in a given context so as to make them useful, it is called **Information**.

- CLASSIFICATIONS OF COMPUTERS

1- Personal Computer (or Microcomputer)

- **Desktop Computer**: a personal computer designed to fit on a desk. It is typically made up of a system unit, a keyboard, a mouse and a monitor.
- **Laptop Computer**: a portable computer with an integrated screen and keyboard. It is battery powered and more portable than a desktop computer.
- **Tablet Computer:** is a handheld computer that is more portable than a laptop. Instead of a keyboard and mouse, tablets use a touch-sensitive screen for typing and navigation.
- **Smartphone:** is a more powerful version of a traditional cell phone with a touch-sensitive screen. Smartphones can connect to the Internet and you can use it for browsing the Web, receiving and sending emails or playing games.

Desktop

Laptop

Tablet

Smartphone

2- Server

A server is a software or hardware device that accepts and responds to requests made over a network. The device that makes the request, and receives a response from the server, is called a client. On the Internet, the term "server" commonly refers to the computer system that receives requests for a web files and sends those files to the client.

3- Mainframe Computer

A very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe.

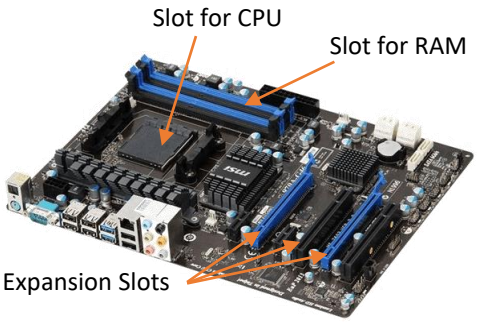
4- Supercomputer

The fastest and most powerful type of computer. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations, such as weather forecasting, nuclear energy research, and petroleum exploration.

- HARDWARE

The term hardware refers to the physical component of the computer. Computer hardware incudes input devices, output devices, central processing unit (CPU), motherboard, power supply, random access memory (RAM), and other components.

1- Motherboard



The motherboard is the main circuit board of your computer. It is where most of the parts and peripherals are connected. It holds the central processing unit CPU, random access memory RAM, read only memory and other components.

2- The Central Processing Unit (CPU)

Central processing unit (CPU) is the central component of the Computer System. Sometimes it is called as microprocessor or processor. It is the brain of the computer. All functions and processes that are done on a computer are performed directly or indirectly by the processor.

The CPU consists of transistors that receives data and instructions, process (calculate) the data according to the instructions and produces the results of the calculations. The most common types of computer processor are Intel and AMD.

- Parts of the processor:

1. **Arithmetic Logic Unit (ALU)**: It is the part of computer processor (CPU) used to perform arithmetic operations (such as: addition, subtraction, multiplication and division) and logic operations such as comparison.
2. **Control Unit (CU)**: It directs operations within a computer's processor. It receives instructions from a program, then passes them to the arithmetic logic unit (ALU), and sends these result of processing to the corresponding program as output.
3. **Register**: It is temporary storage areas of the computer processor. It holds data that is being worked on by the processor. The size of the register is measured in bits. The available size in the market is 32-bits or 64-bits.

- **How a processor works?**

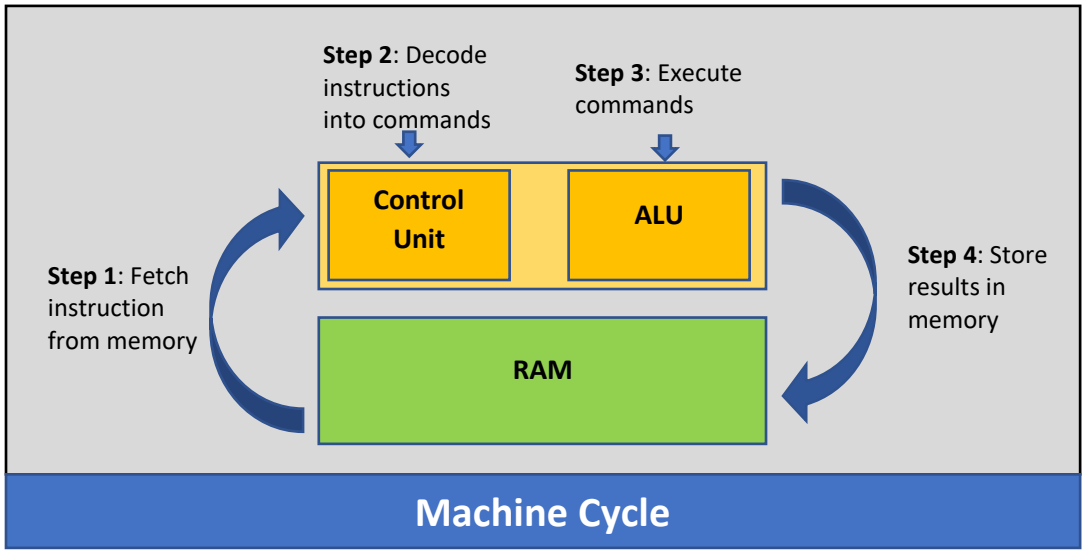
For every single instruction to be executed, the CPU repeats the machine cycle which consists of four operations: fetching, decoding, executing, and storing.

Fetching: is the process of getting the instruction or data from the memory.

Decoding: is the process of translating the instruction into signals that computer can execute.

Executing: is the process of carrying out the command.

Storing: means writing the result to the memory.



3- Memory

It is also called the primary memory. It consists of electronic chips that holds: a) the operating system and other system software, b) the application programs, and c) the data being processed and resulting information.

1- RAM (Random Access Memory)

The **RAM** is the main memory where the operating system is loaded and also where your applications are copied to, when you

load an application. The capacity of RAM plays an important role on the performance of the computer, the more capacity the RAM has, the more programs you can open at the same time. If your system is running slowly due to a lack of RAM, it is better to add more RAM modules to increase its capacity.

The content of the RAM is directly accessed by the CPU. The storage of data (or information) and instructions on RAM is temporary. So we can say that RAM is volatile memory. When the power is switched off the RAM becomes empty.

2- **ROM (Read-Only Memory)**: is a special chip held on your computer's system (motherboard) which can be read only (not changed). It contains software that is required to make your computer work with your operating system. The content in the ROM is permanent, so ROM is a non-volatile memory.

4- Storage Devices

Storage devices are called secondary memory. They are non-volatile and persistent in nature and is not directly accessed by a computer/processor. It allows a user to store data/information for a long-term period of time.

1. **Hard Disk Drive -** Hard disks are the main, large data storage area within your computer. Hard disks are used to store your operating system, your application programs and your data. The data is written on the platters by moving a magnetic head over the platters as they spin The storage capacity of the hard disk ranges from gigabytes (GBs) to terabytes (TBs).

2. **Solid State Drive:** SSDs use nonvolatile flash memory chips to store data. This means that they are faster than magnetic HDDs. Their storage capacity also ranges from GBs to TBs. SSDs have no moving parts and therefore make no noise, are more energy

efficient, and produce less heat than HDDs.

3. **Tape drive** - a device that reads and writes data on a magnetic tape, used for long term storage and backups. It could store up to 100 TB of data.

4. **Compact Disc (CD)** - the most common type of removable media, suitable for music and data. It has a memory size of 700 MB.

5. **Digital Versatile Disc (DVD)** - a popular type of removable media that is has same dimensions as a CD but stores more information. It is the most common way of transferring digital video, and is popular for data storage. A single layer DVD can store up to (4.7 GB), but a dual layer DVD can store up to (8.5 GB).

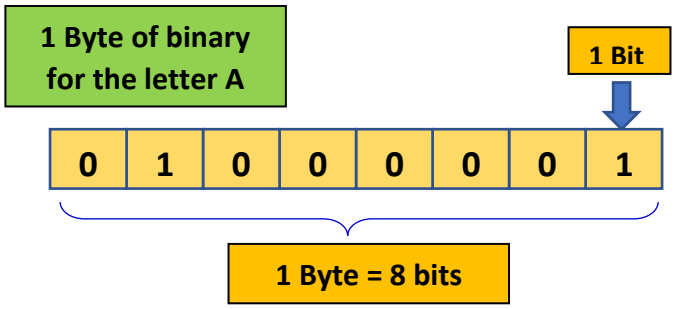
6. **Blu-ray Disc (BD) Drive:** is a digital optical disc data storage media that has Single Layered and Dual layered disc with a memory size of 25 GB and 50 GB respectively. It is capable of storing hours of video in High-Definition and Ultra High-Definition resolution.

7. **Universal Serial Bus (USB) Flash Drive** – is a flash memory data storage device integrated with a USB connector, typically small, lightweight, removable, and rewritable. Capacities vary, from hundreds of megabytes to tens of gigabytes.

8. **External Hard Disk** - External hard disk drives typically connect via USB; which has slower data transfer rates when compared to internally mount hard disk. The available capacities for external hard disk drives ranged from 500 GB to 10 TB.

- ## Units used to measure the memory capacity:

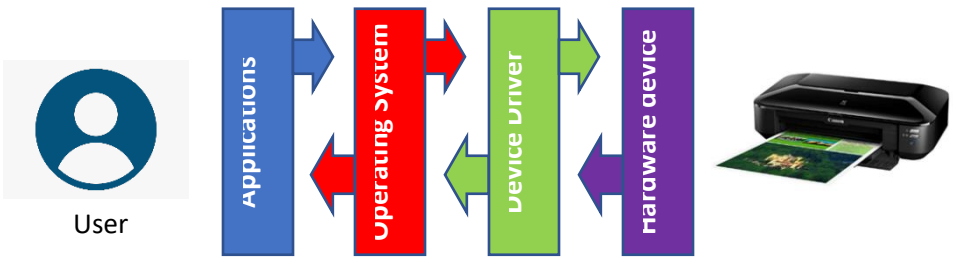
The smallest unit of data in a computer is a bit. A bit can hold a single binary value, either 0 or 1. Eight bits equal to one byte, which is an 8-digit number.



The following table lists the various units of memory.

1 Bit	0 (or) 1
1 Byte	8 Bits
1 Kilobyte (KB)	1,024 Bytes
1 Megabyte (MB)	1,024 KB
1 Gigabyte (GB)	1,024 MB
1 Terabyte (TB)	1,024 GB

- **Device driver:** is type of system software that is designed to enable interaction between the hardware device and the operating system or programs that use it. Without the device driver, the corresponding hardware device fails to work. Many hardware devices need drives such as: printers, graphic cards, sound cards, network cards and modems



- INSTALLING AND UNINSTALLING SOFTWARE

The installation process for software or apps depends on your operating system (Windows or MAC OS), your device (computer, smartphone, or tablet), and the program you are installing. The following are guidelines for installing a software:

1- **Installing from a disc or USB flash**: if you need to install software from a CD-ROM, simply insert the disc into your computer, then follow the instructions.

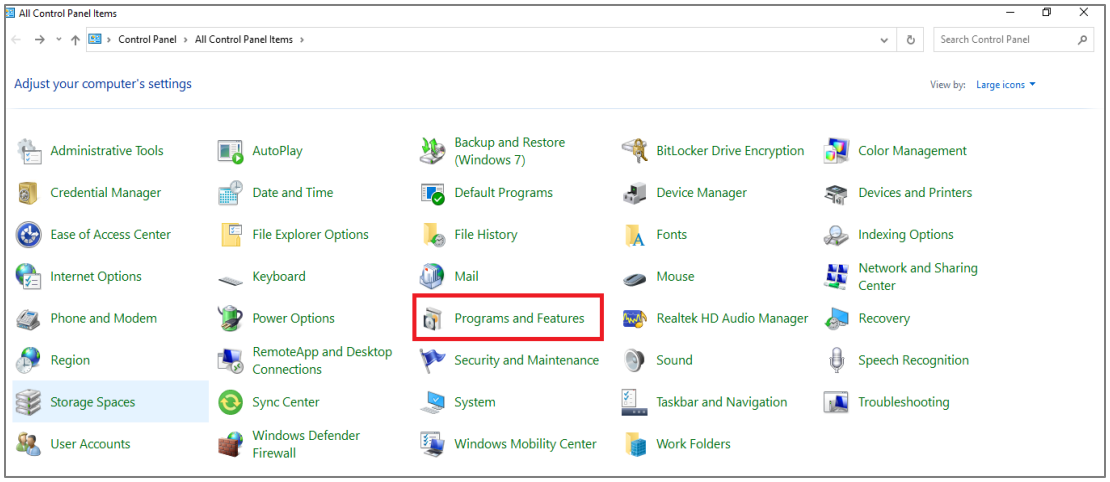
If you need to install software from a USB flash, open “This PC” or “File Explorer” and find the USB drive. After the drive is opened, double-click on the “setup” or the “executable file” to start the installation process.

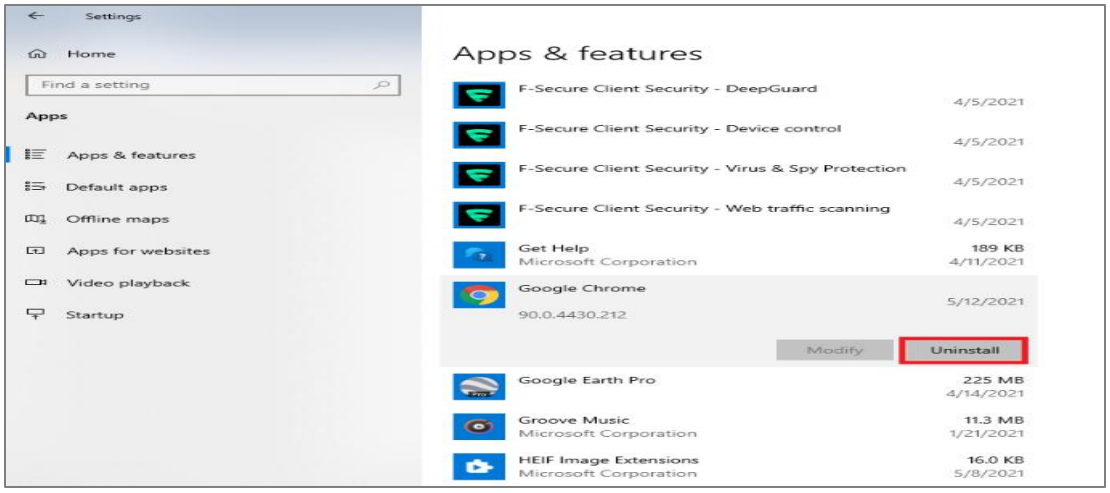
2- **Installing from the web**: After downloading the program from the website providing the program, open the *downloads folder* and double-click the file icon to start the setup process. If the downloaded file is compressed (e.g., .zip or .Rar), you must extract the file's contents before setup can begin.

- Uninstalling software application

To uninstall (or remove) a programs using windows 10, you can do it as following:

- **From Control Panel**: Control Panel >> Programs and Features >> select the program you want to uninstall >> click on “Uninstall” button.


All Control Panel Items
Control Panel › All Control Panel Items ›
Search Control Panel
Adjust your computer's settings
View by: Large icons
Administrative Tools
AutoPlay
Backup and Restore (Windows 7)
BitLocker Drive Encryption
Color Management
Credential Manager
Date and Time
Default Programs
Device Manager
Devices and Printers
Ease of Access Center
File Explorer Options
File History
Fonts
Indexing Options
Internet Options
Keyboard
Mail
Mouse
Network and Sharing Center
Phone and Modem
Power Options
Programs and Features
Realtek HD Audio Manager
Recovery
Region
RemoteApp and Desktop Connections
Security and Maintenance
Sound
Speech Recognition
Storage Spaces
Sync Center
System
Taskbar and Navigation
Troubleshooting
User Accounts
Windows Defender Firewall
Windows Mobility Center
Work Folders


Settings
Home
Find a setting
Apps
Apps & features
Default apps
Offline maps
Apps for websites
Video playback
Startup
Apps & features
F-Secure Client Security - DeepGuard
4/5/2021
F-Secure Client Security - Device control
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F-Secure Client Security - Web traffic scanning
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Get Help
Microsoft Corporation
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Google Chrome
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5/12/2021
Modify
Uninstall
Google Earth Pro
225 MB
4/14/2021
Groove Music
Microsoft Corporation
11.3 MB
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HEIF Image Extensions
Microsoft Corporation
16.0 KB
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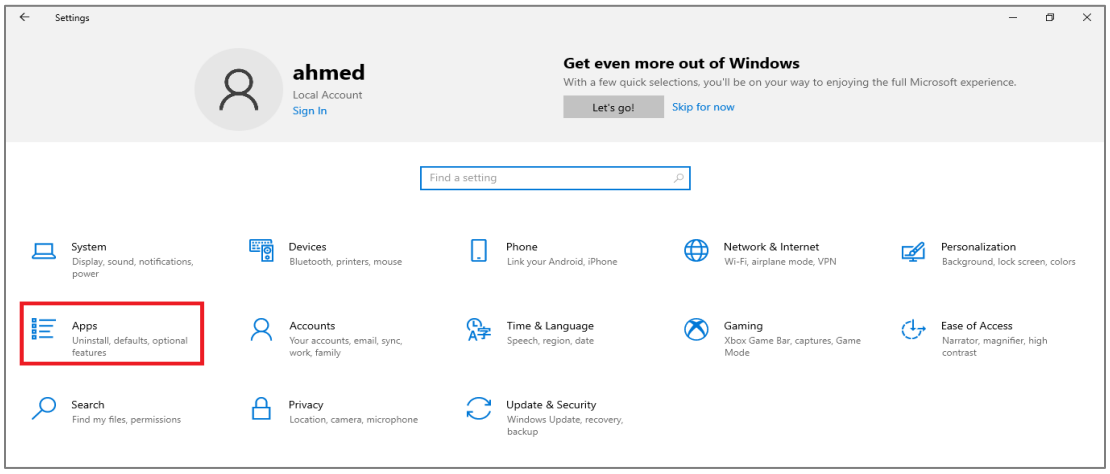
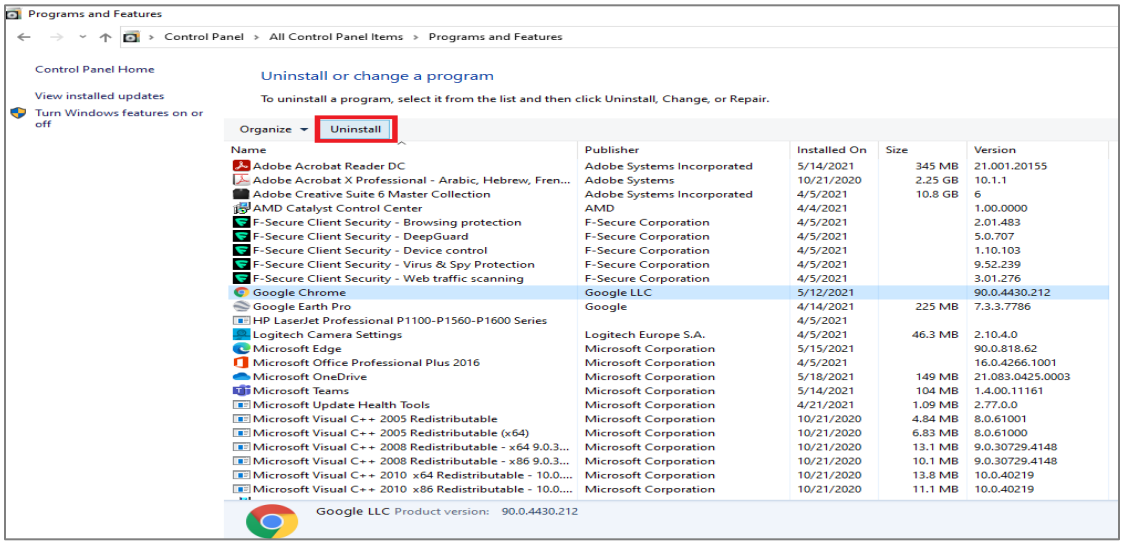
- **From Setting**: Settings >> Apps >> Apps and feature >> select the program you want to



uninstall >> click on “Uninstall” button



- SOFTWARE COPYRIGHT

Computer Software is usually protected under a single site or multi-site license based on number of users, type of users, number of computers, and size of institutions.

Software copyright is commonly used by proprietary software companies to prevent the unauthorized copying of their software. Open source licenses also rely on copyright law to enforce their terms.

1- Shareware

Refers to proprietary software that is provided to users without payment on a trial basis. Once the trial period has passed, the program may stop running until a license is purchased Example: Microsoft Office, Adobe Photoshop etc,

2- Freeware

Software that is fully functional for an unlimited time with no cost. The author usually restricts one or more rights to copy, distribute, and make derivative works of the software. Example: Mozilla Firefox, Google Chrome etc.

3- Proprietary software

Any software that is copyrighted and bears limits against use, distribution and modification that are imposed by its publisher, vendor or developer.

4- Open source software

Software made by many people and distributed which grants all the rights to use, modify, and share the software in modified and unmodified form. Software freedom is essential to enabling community development of open source software.