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# Topics for Term 1

This is a list of all the topics we will cover in Term 1 for the theory part of CAT. You may use this a scope for the term test. *Tick each topic off when we complete it in class.*

1. **System technologies: Introduction**
    - ☐ Explain what a computer is
    - ☐ Overview of the different types of computing devices
    - ☐ Definitions and examples of the main components of a computer system
    - ☐ ICTs used in everyday life
    - ☐ Concepts of 'data' and 'information'
2. **System technologies: Computer management**
    - ☐ Basic concepts and introduction to file organisation: drives, folders, and files
    - ☐ File specifications: drives, path, filename and file naming conventions, file extensions, file properties, File manager, hierarchy
    - ☐ Organise, copy, rename, delete, restore, move, search, view, and sort files and folders
3. **System technologies: Hardware**
    - ☐ What is hardware?
    - ☐ Overview of basic concepts relating to hardware
        i. Input, Output, Storage
    - ☐ Definition of peripheral devices
    - ☐ Methods for connecting peripheral devices (cabled and wireless)
4. **System technologies: Software**
    - ☐ What is software?
    - ☐ Overview of basic concepts relating to software
        i. GUI, minimising, restoring, resizing, moving and closing windows
        ii. System software vs application software
        iii. Basic accessories
    - ☐ Application software
    - ☐ System software
    - ☐ Basic security
5. **Social Implications**
    - ☐ Ergonomics and Health
    - ☐ Green computing
    - ☐ Economic reasons for using computers

# System Technologies: Introduction to computers

**What is a computer?**

A computer is an electronic device that receives data, manipulates the data, and then turns it into useful information, before storing it and/or sending it to someone, or somewhere, to be read or acted upon.

**Two general parts of a computer:**

**Hardware:** The physical components of a computer that you can touch.

**Software:** Applications (apps) or programs that consist of a list of instructions in a computer language that instructs the computer what to do.

**Two main categories of computers:**

1. **Multi-purpose/ General purpose devices:** These types of computers have an operating system that can run many applications at the same time. Some examples are devices, such as servers, laptops and smartphones.

2. **Dedicated devices/ Embedded devices:** These are devices that can only run one task. As such, these devices are usually excellent at their specific tasks, but they are also unable to do anything else. Embedded devices are designed to perform specific dedicated computing tasks.

**Examples of multi-purpose/general purpose devices:**

**1. Supercomputer**

- What is a Supercomputer? A supercomputer is the fastest, most powerful and most expensive type of computer made today. It Is used to perform many instructions per minute.

- What are supercomputers used for? Super computers are used for difficult of complicated, like predicting the weather or locating possible oil deposits.

**2. Mainframe**

- What is a mainframe? A mainframe is a powerful computer that has a high processing power and performance. It is big in size and can be used by several people at the same time.

- What are mainframes used for? It is used primarily by large organisations for critical tasks, such as: Bulk data processing and storing of vast amounts of data, for example, census. It is also used in banks, company head offices and IT organisations.

**3. Server**

- What is a server? A server is a computer that has really powerful processors, large hard drives and plenty of memory power.

- What are servers used for? Servers are computers that provide (or serve) information to other computers (for example, web pages). A server can be used in different environments, such as: Offices and schools where data or a printer needs to be shared amongst many people.

**4. Workstation**

- What is a workstation? A workstation is a type of computer with a high-resolution graphics screen and usually has a mass storage device, such as a disk drive.

- What are workstations used for? It is used to perform special tasks, such as: Precision drawings, Computer-aided design (CAD), 3D graphics and software development, it can also be used in different fields, such as engineering, or medicine research.

**5. Desktop**

- What is a desktop computer? A desktop computer is not designed to be carried around as it is made up of separate components. These computers are designed to be set up in a permanent location on a desk or table.

- What are desktop computers used for? Desktops are used in a variety of environments, such as: School - It helps school learners to gain knowledge by doing research for projects or assignments. Entertainment - You can watch videos, listen to music, or stream videos. Communication - Users can use desktops to make phone calls, send emails, and use instant messaging just by having a proper internet connection.

**6. Laptop**

- What is a laptop? Laptops are also known as notebooks and are portable PCs that combine the display, keyboard, processor, memory, hard drive, and cursor-positioning device, such as a touch- or trackpad, all in one package that is operated by a battery.

- What are laptops used for? Laptops are best used for the office or at home. It can be used for basic administration tasks and daily office use. It can also be used for personal use, such as browsing the internet, listening to music, or watching videos.

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**7. Tablet**

- What is a tablet? Tablets are smaller than normal laptops and are ultra-portable. Although tablets are generally cheaper than brand-new laptops, their processors and other components are less powerful than regular laptops. Tablets have virtual keyboards or make use of a digital pen instead of physical keyboards.

- What are tablets used for? Tablets generally have one user. With this device, you can access information and data from anywhere in the world at any time. Tablets can be used in a variety of environments:
  ● Home: Can be used for domestic use, such as listening to music, browsing the internet, listening to music, and streaming videos.
  ● Work: Can be used as a laptop replacement; however, you will need one that has at least a nine-inch screen.
  ● School: Can be used to access study material, as well as browsing the internet, listening to music, or doing research for projects.

**8. Smartphone**

- What is a smartphone? These handheld-sized computers use a flash memory instead of a hard drive for storage. It has virtual keyboards and uses touch-screen technology. Smartphones are lightweight and have a good battery life, depending on the make. You can access data and information as long as you have a good internet connection.

- What are smartphones used for? Smartphones are used in a variety of ways:
  ● To browse the internet
  ● To listen to music
  ● To take photos
  ● To navigate
  ● To make phone calls and send and receive messages.

**Examples of dedicated (embedded) devices:**

- ATM machines
- MP3 players
- DVD players
- Drones
- Anti-lock braking systems
- Airbag control systems
- Digital watches

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**Basic overview of the main components of a computer system:**

1. **Central Processing Unit (CPU):** The brain of the computer that performs calculations and executes instructions.

2. **Memory (RAM – Random Access Memory):** Temporary storage used by the CPU to store and access data quickly while the computer is running.

3. **Storage (HDD – Hard Disk Drive/ SSD - Solid State Drive):** Persistent storage for long-term data retention, such as files and the operating system.

4. **Motherboard:** The main circuit board connecting all components, facilitating communication between them.

5. **Input Devices:** Devices like keyboards and mice that allow users to interact with the computer.

6. **Output Devices:** Devices like monitors and printers that display or produce information from the computer.

7. **Power Supply:** Provides electrical power to the computer components.

8. **Graphics Card (GPU – Graphic Processing Unit):** Handles graphics rendering, crucial for gaming and graphical applications.

9. **Network Interface Card (NIC):** Enables communication between the computer and a network.

10. **Peripheral Devices:** Additional devices like printers, scanners, and external drives that extend the computer's capabilities.

**What is an ICT system?**

ICT stands for Information and Communication Technology. ICT systems are often confused with computers. It refers to the overall set-up, consisting of hardware, software, data/information, and the people that use it. It commonly includes communication technology, such as the internet. An ICT system depends on computers, data and people to make the system work. For ICT systems to function correctly, they need to receive, store, retrieve, manipulate and transmit/communicate data.

**Examples:**

- Supermarkets use point-of-sale (POS) system (cash register, barcode scanner, stock inventory, etc.)
- Banking system (ATM, database, bank cards, etc.)

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**Data vs Information**

**Data:** Data is raw and unprocessed. Data needs to be processed before it can become useful. Data can be in the form of text, words, numbers, or symbols which, if not put into some type of context, is pretty useless to us.

**Information:** Information is data that has been processed and formatted in such a way that we can actually use it.

**The GIGO principle:** GIGO is an acronym for Garbage In, Garbage Out. Simply put, it means that bad input will result in bad output. It is very important to remember the GIGO principle, because bad data will give you bad information. E.g. If a teacher enters incorrect marks on the school system, the reports going out to learners will be wrong.

**The information-processing cycle:**

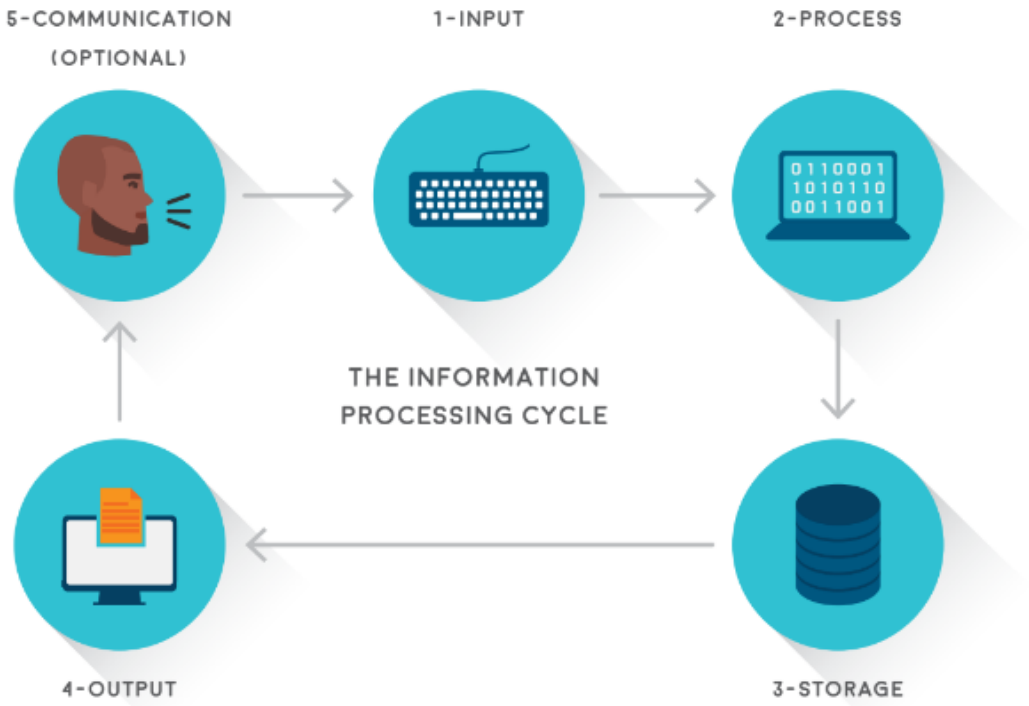



**Figure 1.3:** *The information-processing cycle*

The information-processing cycle is a series of stages carried out to get information from raw data. Although each of the first three stages explained above (input, processing and output) must be taken in order, the order is cyclic. The output stage can lead to the repeat of the data-collection stage, resulting in another cycle of data processing.

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# System technologies: Computer management

**Introduction to files, folders, and drives:**

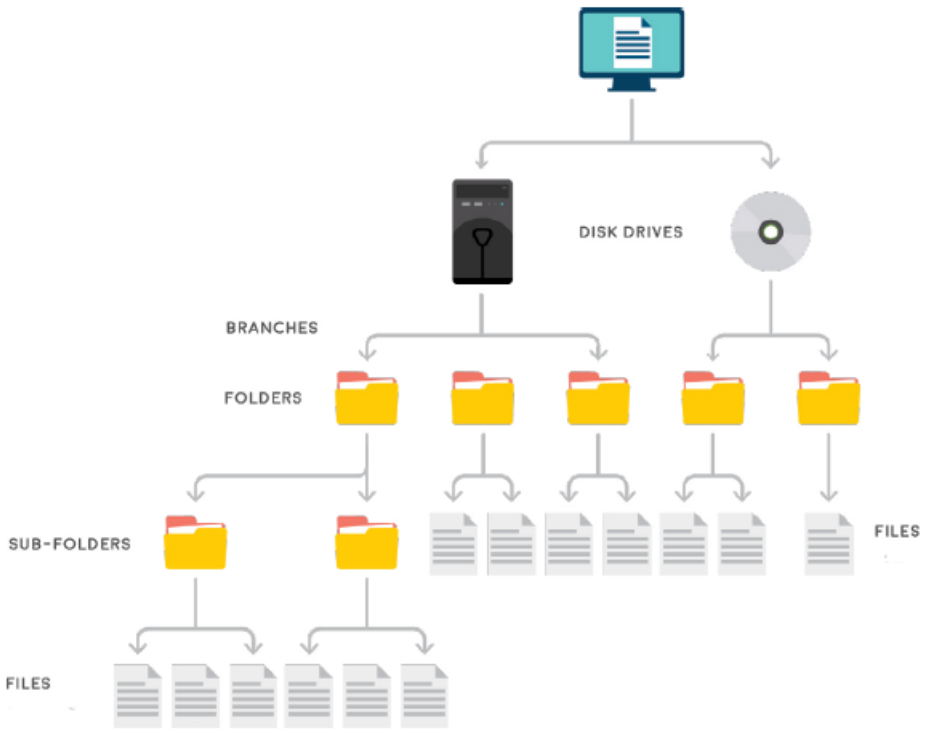
**What is a file:** A file is the common storage unit in a computer, and all programs and data are "written" into a file and "read" from a file. Files are identified by a short "extension" following a period at the end of their name.

**What is a folder:** A folder holds one or more files, and a folder can be empty until it is filled. A folder can also contain other folders, and there can be many levels of folders within folders. Folders provide a method for organizing files much like a manila file folder contains paper documents in a file cabinet.

**Drives** are the storage media of a computer, for example hard drive, USB drive, CD, DVD, etc. Files and folders are stored on and retrieved from a drive. Drives are often indicated by capital letters and colon.

- The C: Which is also known as the C-drive, usually refers to the hard disk drive (HDD).
- The D: or E: Which is also known as the D-drive/ E-drive, usually refers to an external hard drive, CD, or DVD drive.
- Other letters are also used to indicate storage media, for example, in this case F:, which refers to a removable disk (USB). Storage media, such as DVDs, USBs and hard drives, do not save data to the disks on the computer.

**Hierarchical Structure of File Management:**




The **file manager** of a computer running the Windows operating system, is **This PC**.

**Creating a new folder:**

1. Using the File explorer, go to the location where you want to create a folder.
2. Open the Action menu by either right clicking, or by using the ALT-F shortcut key.
3. Hold the mouse cursor over the New option and select the Folder option.
4. Enter a name for the new folder and press Enter on the keyboard.

**Creating a new file:**

1. Using the File explorer, go to the folder where you want to create a file.
2. Right click on an empty section of the folder.
3. Click on New, select the type of file that you want to create.
4. Enter a new name for the file.
5. Press Enter.

**File-naming convention:**

- Keep file names short, but meaningful.
- Include useful information, such as the name of the project or document on which you are working.
- Include the version number (e.g. v1 or -v1) and the date if there is more than one more version. Dates should always appear as yyyy/mm/dd to organise the files in order.

**Things to avoid when naming files:**

- Symbol characters, such as "\ / < > | " ? [ ] ; = + & $ α β"
- Abbreviations that are not easy to understand
- Simple words, such as "draft", "current" or "document".

**How to rename files:**

| ACTION MENU | SHORTCUT KEY | LEFT CLICK |
|---|---|---|
| 1. Select the files you want to rename.<br>2. Right click on one of the selected files.<br>3. From the *Action* menu, select the *Rename* option.<br>4. Enter a new name for the file and press the *Enter* key. | 1. Select the file you want to rename.<br>2. Press the *F2* key on the keyboard.<br>3. Enter a new name for the file and press the *Enter* key. | 1. Select the file you want to rename.<br>2. Using the mouse, click on the name of the selected file.<br>3. Enter a new name for the file and press the *Enter* key. |

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**How to copy and paste files:**

| ACTION MENU | SHORTCUT KEY | DRAG AND DROP |
|---|---|---|
| 1. Select the files you want to copy.<br>2. Right click on one of the selected files.<br>3. From the drop-down *Action* menu, select *Copy*.<br>4. Navigate to the folder where you want to place the copied file.<br>5. Right click on the folder and select the *Paste* option from the *Action* menu. | 1. Select the file you want to copy.<br>2. Press *Ctrl+C* on the keyboard.<br>3. Navigate to the folder where you want to place the copied files.<br>4. Press *Ctrl+V* on the keyboard to paste the files. | 1. Select the files you want to copy.<br>2. In a different *File explorer* window, navigate to the folder where you want to place the copied files.<br>3. While pressing the *Ctrl* key on the keyboard, drag the files from the source folder to the destination folder.<br>4. Drop the files once they are over the destination folder. |

**How to move files:**

| ACTION MENU | SHORTCUT KEY | DRAG AND DROP |
|---|---|---|
| 1. Select the files you want to copy.<br>2. Right click on one of the selected files.<br>3. From the *Action* menu, select the *Cut* option.<br>4. Choose the folder where you want to place the copied files.<br>5. Right click on the folder and select the *Paste* option from the *Action* menu. | 1. Select the file you want to copy.<br>2. Press *Ctrl+X* on the keyboard.<br>3. Navigate to the folder where you want to place the copied files.<br>4. Press *Ctrl+V* on the keyboard to paste the files. | 1. Select the file you want to copy.<br>2. In a different *File explorer* window, navigate to the folder where you want to place the copied files.<br>3. While pressing the *Shift* key on the keyboard, drag the files from the source folder to the destination folder.<br>4. Drop the files once they are over the destination folder. |

**How to use the Recycle Bin:**

| ACTION MENU | SHORTCUT KEY |
|---|---|
| 1. Select the files you want to remove.<br>2. Right click on one of the selected files.<br>3. From the *Action* menu, select the *Delete* option.<br>4. Click on the *Yes* button to remove the files. | 1. Select the files you want to remove.<br>2. Press the *Delete* key on the keyboard.<br>3. Click on the *Yes* button to remove the files. |

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**How to remove files from the computer permanently:**

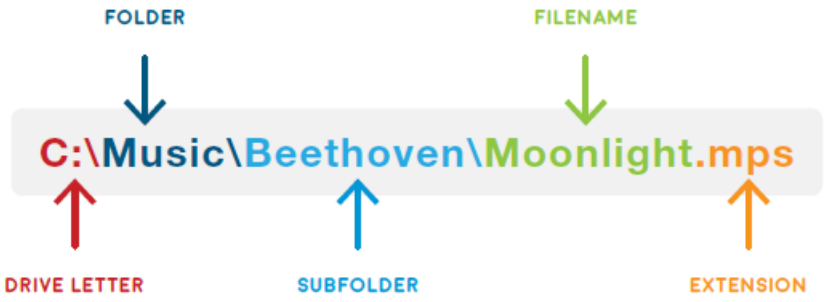
| EMPTY THE RECYCLING BIN | SHORTCUT KEY |
|---|---|
| 1. Remove the files from the computer, as shown in the previous steps.<br>2. Go to the computer's desktop.<br>3. Right click on the *Recycle Bin* icon and select the *Empty Recycle Bin* option.<br>4. Click on the *Yes* button to remove the files. | 1. Select the files you want to remove.<br>2. Hold *Shift* and press *Delete* on the keyboard.<br>3. Click on the *Yes* button to permanently remove the files. |

**File specifications/ File properties:**

The File properties window shows you a range of information about a file, such as its file type, size, author, title, location (file path) and when it was changed last.

What is a file path? A file path shows the location of where a file, web page, or other item is located on the computer. The file path shows you to which storage device the file is saved (i.e. the drive letter), in which folder and sub-folders the file is saved, the name of the file and finally, the type of file (given by the file extension).

Where do you find the file path? To find the file path of a folder, click on the address bar in File explorer.



# System Technologies: Hardware

**What is hardware?**

Hardware refers to all the physical parts or components of a computer, such as the monitor, keyboard, computer data storage, graphics card, sound card and motherboard. There are many kinds of hardware that can be installed inside, or connected to the outside of a computer.

**Input devices:**

Keyboard: Keyboards are used for entering information into a computer. Pressing any key on the keyboard is an input that the computer uses as data.
Different types of keyboards: Standard keyboard, laptop keyboard, ergonomic keyboard, gaming keyboard, foldable keyboard, laser keyboard.

Pointing devices: Pointing devices are used to control the movement of the cursor on the screen. The most common pointing device is a mouse.

**Output devices:**

Output devices receive data from a computer and converts this data to a display, projected image, print-out, or audio.

Monitor: A monitor, also known as a visual display unit, is the main output device of a computer.

- The size of a monitor is measured in inches diagonally from one corner to the other.
- Screen resolution is the clarity of text and images displayed on the monitor. It is measured in pixels; how many pixels the screen shows horizontally and vertically. Example: 1280x800px.

Printers: Printers allow a computer to convert electronic data (soft copy) into a hard copy (printed out on a piece of paper).

1. *Inkjet printer:* These printers operate by using cartridges that contain the ink.

2. *Ink-tank printer:* An ink-tank printer use ink tanks instead of cartridges to store ink.

3. *Laser printer:* A laser printer works by directing a laser beam onto a drum. The drum rotates and picks up ink-powder (toner) and transfer it to the paper.

4. *3D-printer*: 3-D printing is the process of making a three-dimensional solid model from a digital file.

**Types of printers:**

| TYPE OF PRINTER | ADVANTAGES | DISADVANTAGES |
|---|---|---|
| Inkjet | • Portability: These printers are quite small in comparison to other printers and are, therefore, easy to move from one place to another (portable).<br>• Cost: The initial cost of buying the printer is low.<br>• Page cost: Cost per page is lower than the laser type.<br>• Space: Compared to a laser printer, an inkjet printer takes very little space on a desk. | • Cost: Although the initial cost of the printer is affordable, the ink cartridges are quite expensive.<br>• Speed: These printers are slow and are not suitable for high volumes of printing.<br>• Quality: Copies might be slightly wet after the print job and might require time to dry. |
| Ink tank printer | • Portability: These printers are comparable in size to inkjet printers and can easily be moved from one place to another.<br>• Cost: The cost of refilling ink tanks is cheaper than replacing an ink cartridge.<br>• Page cost: Cost per page will be lower than an inkjet printer. | • Cost: The initial cost is more than that of an inkjet printer, but comparable to that of a colour laser printer.<br>• Speed: Comparable to an inkjet printer, but can be used for high-volume printing. |
| Laser | • Quality: Has high-quality print-outs.<br>• Speed: It can print more pages at the same time than the inkjet.<br>• Cost: Replacing toner in this type of printer is cheaper than inkjet printers.<br>• Noise: This type of printer hardly makes any noise. | • Cost: A laser printer is more expensive than an inkjet printer.<br>• Space: Laser printers are much bigger and heavier than inkjet printers. It therefore takes more space.<br>• Maintenance: Servicing or fixing can be quite costly. |
| 3D | • Speed: Speed of the parts of a design can be produced much quicker than normal manufacturing methods.<br>• Labour cost: One of the main advantages of 3D printers is the low cost of labour.<br>• Customisation: 3D printers allow complete freedom for customising designs. | • Quality: The quality of a part is not as efficient as manufacturing a part.<br>• Expensive: 3D printing equipment and material costs are expensive.<br>• Material: At the moment, the type of materials that can be used in 3D printers is mainly plastic.<br>• Emissions: 3D printers in homes can produce toxic emissions. |

**Storage devices:**

Storage devices are used to store data.

<u>Measuring the storage capacity:</u>

| CAPACITY | DESCRIPTION |
|---|---|
| Kilobytes (Kb) | This is defined as 1 024 bytes. A normal word document is usually about 100 kilobytes. |
| Megabytes (Mb) | This is defined as a 1 024 Kb. Programs, videos and music are examples of media that are measured in Mb. An average music file would be about 6 Mb. |
| Gigabyte (Gb) | This is defined as approximately 1 024 Mb. In 1988, a computer had a 30 Mb hard drive. Now, the hard drive of the average computer has about 400 Gb of storage space. |
| Terabyte (Tb) | One TB is approximately 1 024 Gb. External hard drives and modern computers have at least 1 Tb of storage available. |

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## Common storage devices:

| STORAGE DEVICE | DESCRIPTION | USES | IMAGE |
|---|---|---|---|
| Internal hard drive | Internal hard drives are found inside computer systems. Hard drives are not really used to transfer data between computers, or even to people. This is because most hard drives are fitted in the computer case and this is usually done with screws, which makes it difficult to move.<br>Modern hard drives can have up to 12 Tb of storage space. | Hard drives are the main storage device in computers because of their high speed and high storage capacity. It is used to store data in the form of images, music, documents and videos. |  |
| External hard drive | External (or portable) hard drives are **non-volatile** hard drives that are generally used outside the computer case and can be attached to the computer through a USB connection or wirelessly. | It is quick to connect to other computers and is really good in transferring files from computer to computer. |  |
| SD card | SD cards, especially MicroSD cards are small storage devices that can have a storage capacity of up to 512 Gb. | Due to their small size, SD cards are often used in portable devices, such as smartphones and cameras to provide extra storage capacity. |  |
| SSD | Solid-state drives (SSDs) are a type of internal hard drive that does not contain any moving parts, such as internal hard drives. It is quite similar to a CPU that has many small transistors, with each transistor storing one bit of data. Because of this, it has a much lower storage capacity and much higher cost per gigabyte. | Stores data and can be used in some laptops to transfer data. |  |
| Flash drives | Flash disks are small, portable devices that connect to a computer using a USB port. | Flash drives are used when transferring files from computer to computer. |  |

## Capacity and Robustness of storage devices:

| STORAGE DEVICE | STORAGE CAPACITY | ROBUSTNESS |
|---|---|---|
| Internal HDD | Up to 2 Tb | Hard drives contain sensitive moving parts and can be damaged if bumped or dropped, but they can last for many years if they are treated with care. |
| Portable HDD | Up to 2 Tb | Quite robust, but can easily get damaged if dropped. Some have a protective casing. |
| SSD | Up to 4 Tb | An SSD has no moving parts and cannot easily be damaged. |
| Flash drive | Up to 2 Tb | Flash drives are robust as long as they are treated carefully. They do not have moving parts. |
| SD card | Up to 512 Gb (but 1 Tb is possible) | SD cards are robust and cannot easily be damaged. |

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**Methods of connection:**

Ports allow computers to connect with different types of cabled hardware. Even some Bluetooth devices need a dongle to be connected to a port on the computer to use its wireless features.

Bluetooth (short range wireless) and Wi-Fi (Wireless Fidelity) do not use cables, but rather use radio waves transited on the gigahertz range.

List of common ports and connectors:

| PORT | IMAGE OF PORT | CONNECTOR | USES |
|---|---|---|---|
| USB port |  |  | Used to connect many devices, such as smartphones, flash drives and external hard drives |
| VGA port |  |  | Used to connect monitors and data projectors |

| PORT | IMAGE OF PORT | CONNECTOR | USES |
|---|---|---|---|
| DVI port |  |  | Used to connect display devices, such as monitors |
| HDMI port |  |  | Used to connect monitors, data projectors and gaming consoles |
| 3.5 mm port |  |  | Used to connect audio devices, such as speakers, head phones and microphones |
| Ethernet |  |  | Used to connect to a network device, such as a switch or router |
| RJ-11 |  |  | Used to connect an internet router to a telephone line |

## System Technologies: Software

**What is software?**

Software is a set of programs or instructions that tells the computer and its hardware how to perform specific tasks.

**Overview of basic concepts:**

**Graphical User Interface (GUI):** A Graphical User Interface (GUI) is a visual way for users to interact with computers and software applications. Unlike text-based interfaces, GUIs use graphics, icons, and menus to facilitate user interactions, making it more intuitive and user-friendly.

**Key Elements of a GUI:**

- Windows: The basic building blocks of a GUI. Windows contain the interface elements of an application, such as buttons, text boxes, and menus.
- Icons: Graphic symbols representing files, folders, or applications. Clicking on an icon typically opens or performs an action.
- Menus: Lists of commands or options presented to the user. Menus provide access to various functions within an application.
- Buttons: Interactive elements that perform specific actions when clicked or pressed.
- Dialog Boxes: Pop-up windows that prompt users for input or display information.

**Window Management**

**Minimizing a Window:** Minimizing a window reduces it to a taskbar or system tray icon, temporarily removing it from the desktop. This is useful when you want to keep an application running but need more screen space for other tasks.

How to Minimize:
- Click the "-" button in the top-right corner of the window.
- Use the keyboard shortcut: [Windows] + [D] (Windows)

**Restoring a Window:** Restoring a window brings it back to its previous size and position on the desktop after it has been minimized or resized.

How to Restore:
- Click the window's icon on the taskbar or system tray.
- Click the "+" button in the top-right corner of the window.

**Resizing a Window:** Resizing a window allows you to change its dimensions, making it larger or smaller to suit your preferences or accommodate other open applications.

How to Resize:
- Hover over the edge or corner of the window until the resize cursor appears.
- Click and drag to adjust the size.

**Moving a Window:** Moving a window lets you reposition it on the desktop, enabling better organization of your workspace.

How to Move:
- Click and hold the title bar of the window.
- Drag the window to the desired location.

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**Two categories:**

1. Application software: Application software allows you to perform tasks, such as playing games, creating slide show presentations, creating spreadsheets, and so on. There are many different types of application software programs.

2. System software: This includes the operating system and other software that controls and manages the operation of the computer.

**Application software:**

| APPLICATION SOFTWARE | EXAMPLES |
|---|---|
| Office suites | Microsoft Office, Libre Office, Google G-Suite |
| Internet browser | Chrome, Firefox, Internet Explorer, Edge |
| Movie player | VLC, Windows Media Player |
| Presentations | PowerPoint |
| Word processor | Microsoft Word |
| Portable Document Format (PDF) | Adobe Acrobat Reader, Foxit Reader |
| Operating system | Microsoft Windows, Linux, Android, iOS |
| Antivirus | Norton, AVG, McAfee, Symantec, Windows Defender |
| Spreadsheets | Microsoft Excel |
| Accounting | Pastel, QuickBooks |
| Gaming | Minesweeper, Solitaire, Counter Strike |
| Designing and graphics | Adobe Photoshop, AutoCAD |

Accessories: An accessory is any device or program that is not necessarily required, but it can be added to a computer to perform an additional function. *Example: Calculator, Paint and Snipping Tool*.

**System software:**

System software is the specific type of software that *manages the computer.*

What does system software do?

- Translating the instructions from the software to a language that the hardware can understand
- Sending these instructions to the correct hardware
- Receiving information from the hardware (such as, the button press on a keyboard) and sending it to the software
- Allowing different applications to speak to each other
- Making sure all the hardware and software on the computer are in a good condition

The **operating system (OS)** is the most *important type of system software* as it manages all

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the other programs in the computer. The operating system of a computer manages all the software and hardware of the computer. In other words, the operating system has many different functions and jobs. When there are a number of programs running at the same time on the computer, all of the programs need to access the computer's CPU, storage and memory.
The operating system manages and coordinates these processes so that the program gets what it needs to run. The operating system also provides the GUI for the user.

**Types/Examples of system software:**

| SYSTEM SOFTWARE | EXAMPLES |
|---|---|
| Operating systems | Microsoft Windows, Linux, Android, iOS |
| Device drivers | Drivers for the mouse, keyboard, sound card, display card, network card, printer, etc. |
| Firmware | Firmware is the operational software embedded within a flash drive, ROM, or EPROM memory chip for the operating system to identify it |
| Utilities: This kind of software is designed to maintain the computer | Antivirus and security software<br>Disk partition services<br>Disk defragmentation<br>File compression<br>Data back-up for security reasons<br>Hardware diagnostic services<br>Data recovery<br>Firewall<br>Screensaver |

**Basic Security:**

Authentication**:** Authentication is the *process of verifying the identity of a user, system, or entity* to ensure that they are who they claim to be. It is a fundamental security measure employed in various systems, applications, and services to prevent *unauthorized access* and protect sensitive information.

Unauthorised access refers to anyone that gets access to your computer without your permission.

| TIPS FOR CREATING A PASSWORD |
|---|
| • The longer the better – a minimum of 12-characters is recommended.<br>• Mix it up; use variations on capitalisation, spelling, numbers and punctuation.<br>• Avoid names, places and dictionary words.<br>• Use a sentence that you will remember, for example, your name and date of birth.<br>• Use the first letters of each word as your password, for example, "My name is Julia Mabula and I was born on 13 March 2001!" The password would then be "MniJMalwbo13M21!" – it consists of 16 characters: letters – upper- and lowercase, numbers and symbols. |

**Types of authentication safety measures:**

- Password: A password is a secret combination of characters (letters, numbers, and symbols) that a user selects and uses to access a system, application, or specific account.

- PIN (Personal Identification Number): A PIN is a numerical code, typically composed of digits.

- Two-Step authentication (Two-factor authentication/ 2FA): Two-step authentication is a security process that requires users to provide two different authentication factors to verify their identity.

- Screen lock pattern: A security method used on mobile devices. Users create a pattern by connecting a series of dots on a grid displayed on the device's screen. The pattern must be entered correctly to unlock the device and access its features.

- Biometric authentication: Biometric authentication involves using unique physical or behavioural characteristics to verify the identity of an individual. Biometric data is difficult to forge or replicate, making it a secure form of authentication. Examples:
    - Iris recognition
    - Facial recognition
    - Fingerprint scanner
    - Voice recognition

## Social Implications

**Ergonomics and Health:**

**Ergonomics** is the scientific discipline concerned with designing and arranging things so that people can interact with them *efficiently and safely*. The goal of ergonomics is to optimize the relationship between individuals and their environments to enhance *well-being, comfort, and performance while minimizing the risk of injury and discomfort.*

**Examples:**

- Adjustable office chairs: Providing chairs that can be adjusted to support proper posture and reduce strain on the back and neck.

- Ergonomic keyboards and mice: Designing input devices to reduce the risk of repetitive strain injuries and improve comfort during extended computer use.

- Proper lighting: Ensuring appropriate lighting conditions to reduce eye strain and enhance visibility in work environments.

- Optimal desk layout: Arranging workstations to minimize unnecessary movements and reach, promoting efficiency and reducing the risk of musculoskeletal disorders.

**Health risks of using a computer for prolonged periods:**

1. Eyestrain and Computer Vision Syndrome (CVS): Staring at a screen for extended periods can cause eyestrain, dry eyes, blurred vision, and headaches. This collection of symptoms is known as Computer Vision Syndrome.

2. Repetitive Strain Injuries (RSI): Prolonged use of a keyboard and mouse can lead to repetitive strain injuries, such as carpal tunnel syndrome, tendonitis, and other musculoskeletal issues affecting the hands, wrists, and arms.

3. Neck and Shoulder Pain: Poor posture and incorrect monitor height can contribute to neck and shoulder pain. Holding the head in a forward position for extended periods strains the neck muscles.

4. Back Pain: Sitting for long periods without proper lumbar support or breaks can lead to lower back pain and discomfort.

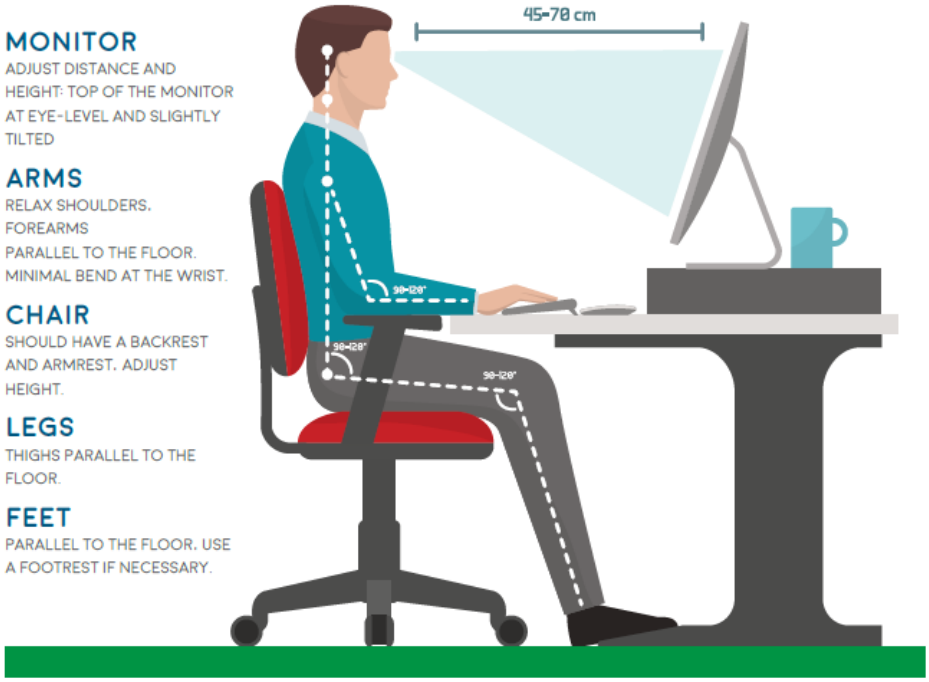
5. Obesity and Metabolic Issues: Inactive behaviour, common in prolonged computer use, is associated with weight gain, obesity, and metabolic issues. Lack of physical activity can contribute to health problems over time.

6. Cardiovascular Issues: Sitting for long periods is linked to cardiovascular issues, including an increased risk of heart disease. It's important to take breaks and move regularly.

7. Mental Health Concerns: Excessive computer use, especially when combined with sedentary behaviour, can contribute to stress, anxiety, and depression. The blue light emitted by screens may also affect sleep quality.

8. Poor Ergonomics: Incorrect workstation setup, including the chair, desk, and monitor, can lead to discomfort and contribute to various health issues over time.

**Good posture:**



**Green computing:**

**Green computing** is about using computers in an environmentally responsible and eco-friendly manner. Green computing aims to reduce the use and impact of hazardous materials, maximise energy efficiency and promote recycling of computers that are no longer being used.

**Some examples of green computing include:**

- Computers going to "sleep" after they have been inactive for a certain amount of time.
- Data stored on SSDs use considerably less electricity than data on disk drives.
- Improved CPU architecture allows less electricity to create more power.
- More efficient software requires less processing and storage space, which requires less electricity.
- Better resource allocation means unnecessary computers in data centres can be turned off, saving a lot of electricity.
- Print documents when necessary, and rather file and send documents electronically (for example, through email).
- Save paper by printing on both sides of the paper (double-sided/duplex printing), as well as by recycling paper.
- Disposing printer cartridges in the wrong way (throwing them out in the environment) can cause serious damage to the environment. Rather, find a disposal outlet that has special bins for this purpose.

**Economic reasons for using computers:**

1. Saving paper: Companies and individuals can save paper by working electronically on computers. People can now send letters (emails), magazines and read books electronically instead of having to print out hard copies. This also saves money and time in the long run. Estimates have shown that there can be a 10 to 30% decrease in paper usage if the correct technology is used.

2. Saving labour: Businesses can save money and labour (people) by using computer-controlled devices to perform repetitive functions that require several employees to perform.

3. Communication speed and costs: Telephone and postage costs can be decreased drastically using computers and the internet. It also allows information to be sent and received faster than in the past. For example, the use of email allows instant communication with staff, clients and other individuals at any place or time. The use of smartphones will help employers to keep in touch with their employees regularly, which ultimately saves time and phone calls.

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4. Efficiency: Instead of being swamped with paperwork or sorting out piles of paperwork, files can be stored on computers. Retrieval of old documents is much easier when it is stored electronically. Also, computers can do the work of more than one person in less time than normal employees.

5. Accuracy: Computers produce more accurate data or results than human beings. This, however, depends on the quality of the input data. If the information entered is incorrect, the results produced will most likely be incorrect. Computers can, however, detect certain human errors and might highlight these errors.

6. Reliability: Computers that are maintained properly will be reliable in the long run. It is safe to say that we can rely on computers to perform the tasks that they have been programmed to do.

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