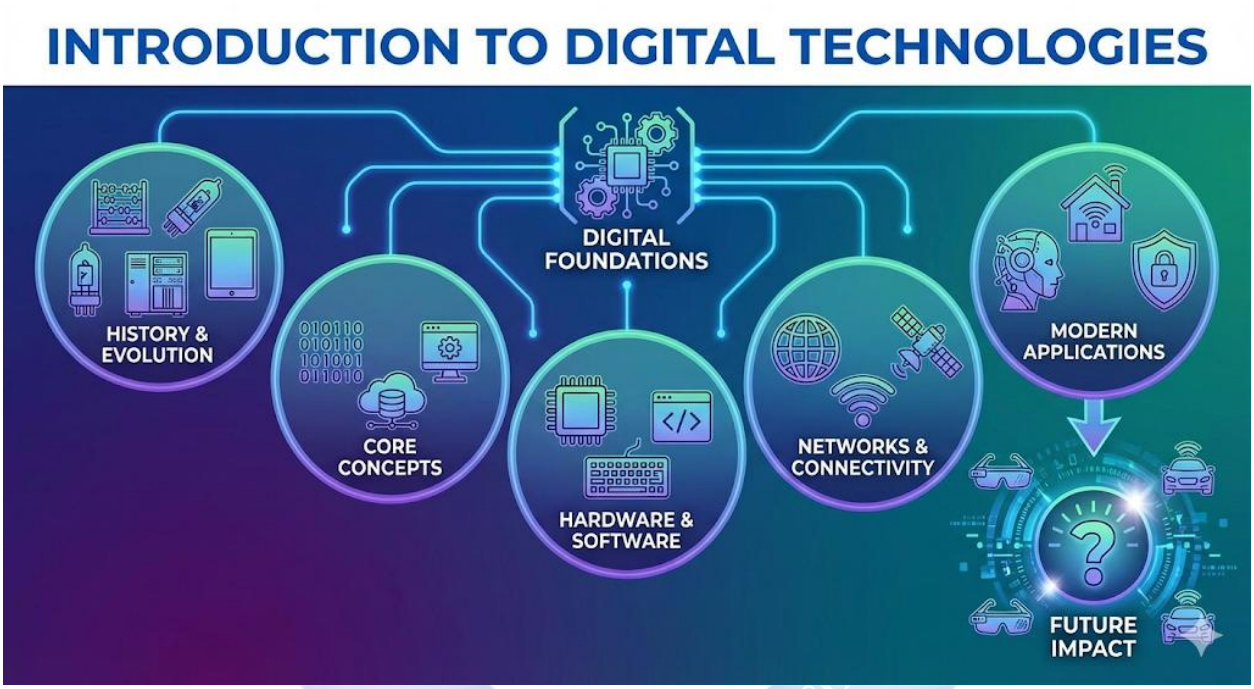
SS1 DIGITAL TECHNOLOGIES LESSON NOTES

FIRST TERM

WEEK 1: INTRODUCTION TO DIGITAL TECHNOLOGIES



1.1 Meaning of Digital Technologies

To understand "digital," we must first understand its opposite: **"analog."**

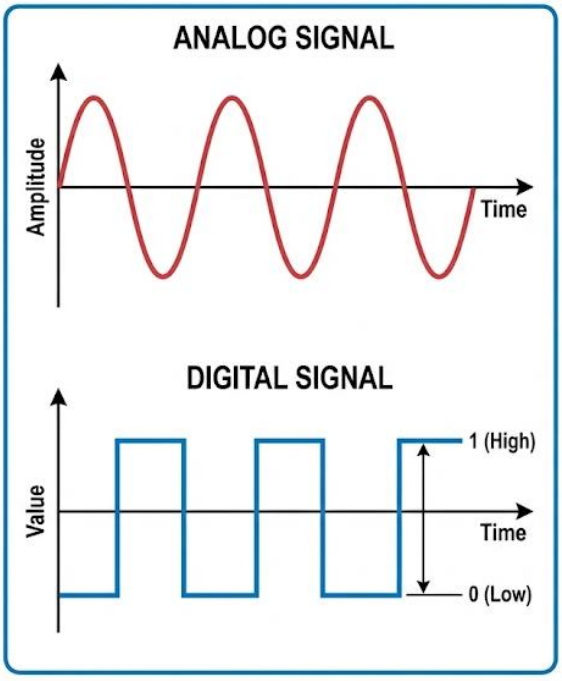
- **Analog:** Represents data in a continuous, flowing form. Think of a dimmer switch for a light, the groove on a vinyl record, or a mercury thermometer. The signal is infinitely variable.
- **Digital:** Represents data in a discrete, "on/off" form. It breaks information down into a binary code (0s and 1s). Think of a standard light switch (it's either ON or OFF) or a digital clock (it jumps from 08:01 to 08:02, with nothing in between).

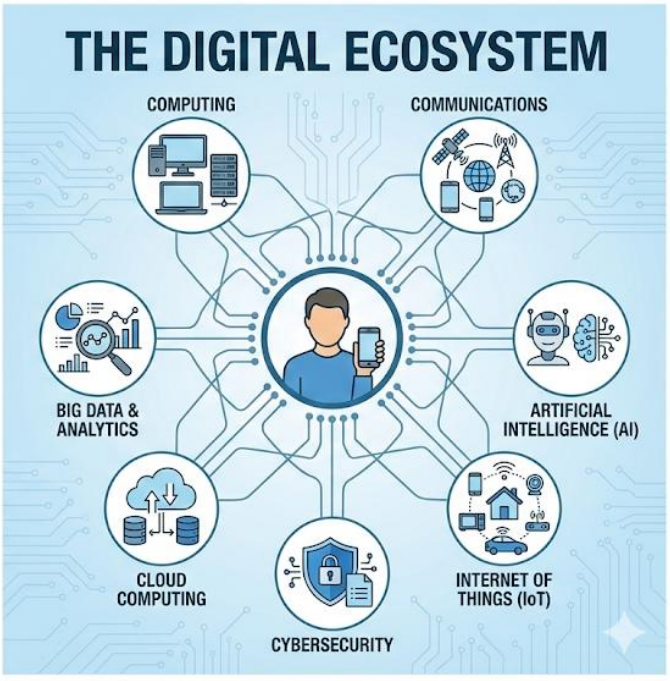
Definition: Digital Technologies are any electronic tools, systems, devices, and resources that generate, store, or process data in this "digital" (binary) form. At their core, they all "speak" the language of 0s and 1s.

1.2 Scope of Digital Technologies

Digital technology is not just "computers." It is a vast ecosystem that includes:

1. **Computing:** Laptops, desktops, servers, mobile phones, tablets.
2. **Communications:** The internet, Wi-Fi, 5G, Bluetooth, video conferencing (Zoom, Teams).
3. **Media & Entertainment:** Social media (TikTok, Instagram), streaming services (Netflix), digital photography, video games.
4. **Artificial Intelligence (AI):** Machine learning, robotics, and natural language processing (like the system you are talking to).
5. **Internet of Things (IoT):** "Smart" devices like smart watches, smart home speakers, and smart refrigerators that connect to the internet.
6. **Data Science:** Storing and analyzing "Big Data" to find patterns.
7. **Cloud Computing:** Storing files and running software on remote servers (e.g., Google Drive, iCloud).





1.3 Relevance in Modern Society

Digital technologies have fundamentally reshaped every aspect of human life.

1. **Economy:**
    - **E-commerce:** Buying and selling goods online (Jumia, Konga).
    - **FinTech:** Digital payments, online banking (OPay, Kuda).
    - **The "Gig Economy":** Platforms like Uber and Bolt creating new types of work.
2. **Education:**
    - **E-Learning:** Access to global courses (Coursera, edX).
    - **Research:** Instant access to information via the internet.
    - **Collaboration:** Using tools like Google Classroom.
3. **Health:**
    - **Telemedicine:** Consulting a doctor via video call.
    - **Digital Records:** Storing patient history securely.
    - **Medical AI:** Using AI to detect diseases like cancer from scans. 4R. **Communication:**
    - **Instant & Global:** Connecting with anyone, anywhere, instantly (WhatsApp, email).
    - **Social Connection:** Maintaining relationships and building communities online.
4. **Governance:**
    - **E-Government:** Applying for passports or paying taxes online (e.g., the NIN/BVN system).
    - **Civic Engagement:** Using social media to discuss politics and hold leaders accountable.

Evaluation Questions (Week 1)

1. Explain the core difference between an "analog" signal and a "digital" signal.
2. Give one example of an analog device and one example of a digital device.
3. Define "Digital Technologies" in your own words.
4. List four different areas that are part of the "scope" of digital technologies.

5. State one way digital technology has been relevant in **education** and one way it has been relevant in the **economy**.

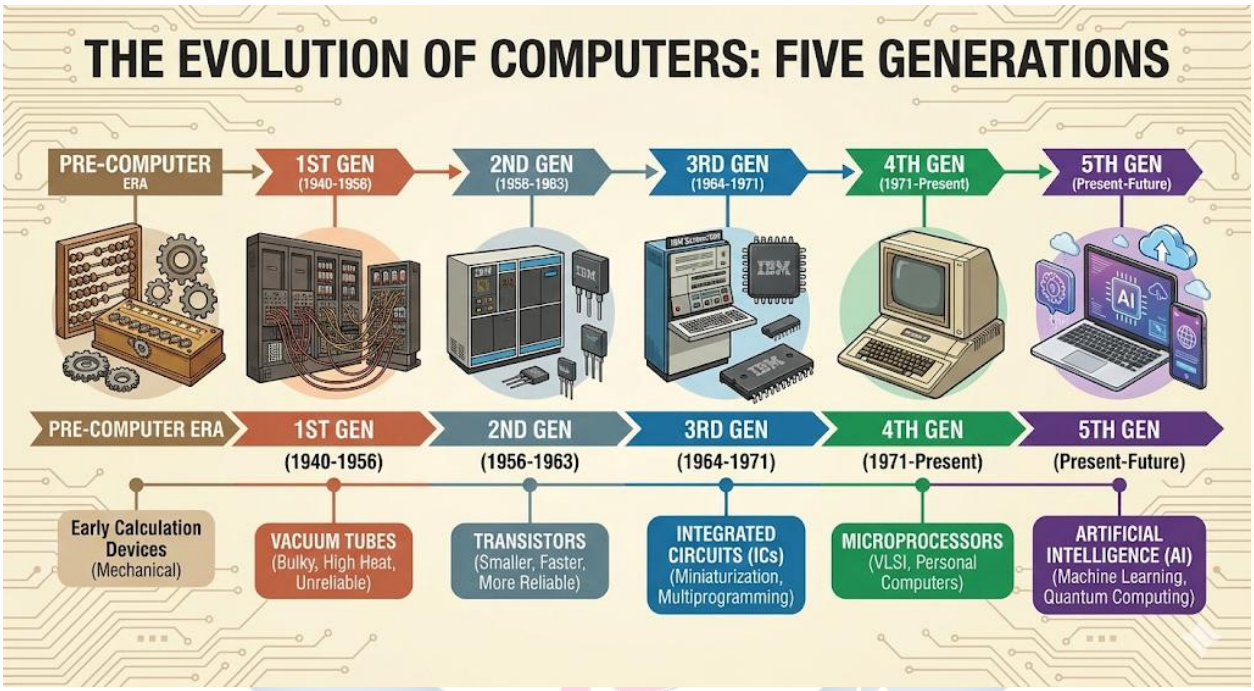
Assignment Questions (Week 1)

1. Write a 300-word essay on the topic: "The single most important impact of digital technologies on the life of a modern Nigerian teenager."
2. Interview a parent or guardian (someone from a different generation). Ask them how they performed three tasks *before* digital technology was common (e.g., listening to music, contacting a friend, finding information) and write a report on their answers.

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WEEK 2: HISTORY & EVOLUTION OF DIGITAL TECHNOLOGIES

Introduction: The computer you hold in your hand is the result of thousands of years of evolution. We trace this journey from simple counting aids to the dawn of artificial intelligence.



2.1 Pre-Mechanical Era (3000 BC – 1450 AD)

- **Abacus:** (c. 2700 BC, Sumeria/China). An early counting tool. It stores data by the position of beads.
- **Antikythera Mechanism:** (c. 100 BC, Greece). An astonishingly complex analog "computer" used to predict astronomical positions and eclipses.

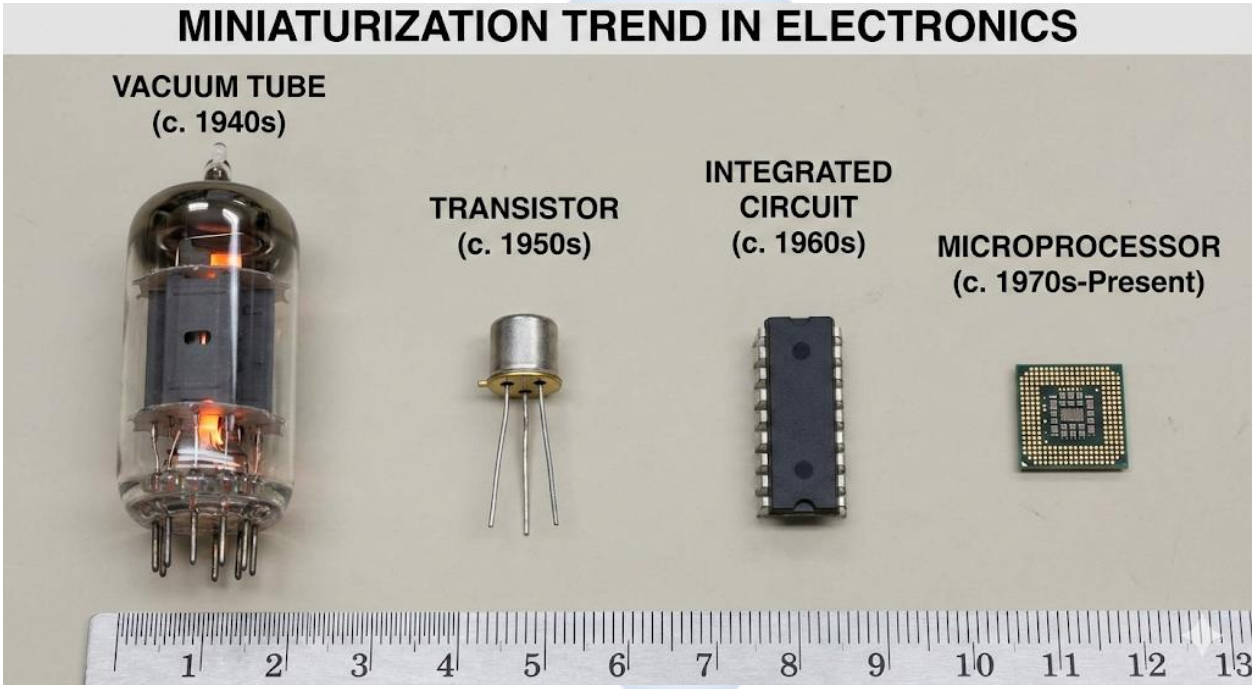
2.2 Mechanical Era (1450 – 1840)

- **Pascaline:** (1642, Blaise Pascal). The first mechanical calculator. It could perform addition and subtraction.
- **Babbage's Engines:** (Charles Babbage)
    - **Difference Engine** (1822, unbuilt): A "special-purpose" machine designed to calculate polynomial tables.

- **Analytical Engine** (1837, concept): The *blueprint for the modern computer*. It had all the key parts: a "Mill" (CPU), a "Store" (Memory), and "Input" (punch cards).

2.3 Electro-Mechanical Era (1840 – 1940)

- **Hollerith's Tabulating Machine:** (1890, Herman Hollerith). Used punch cards to process data for the 1890 US Census. This was so successful it led to the founding of a company that would eventually become **IBM**.



- **Z3:** (1941, Konrad Zuse). The first programmable, automatic, digital computer.

2.4 Electronic Era: The Generations of Computers

First Generation (1940s – 1950s): Vacuum Tubes

- **Key Technology: Vacuum Tubes.**

- **Characteristics:** Enormous (filled entire rooms), very hot, unreliable (tubes failed constantly), and very slow.
- **Examples: ENIAC** (Electronic Numerical Integrator and Computer), **UNIVAC I** (first commercial computer).
- **Input:** Punch cards and paper tape.

Second Generation (1950s – 1960s): Transistors

- **Key Technology: Transistors.** (Invented at Bell Labs).
- **Characteristics:** Replaced vacuum tubes. They were smaller, faster, cheaper, more reliable, and more energy-efficient.
- **Examples:** IBM 1401, CDC 1604.
- **Input:** Still punch cards, but also magnetic tape.

Third Generation (1960s – 1970s): Integrated Circuits (ICs)

- **Key Technology: Integrated Circuits (ICs).** Placing many transistors onto a tiny "silicon chip."
- **Characteristics:** Computers became smaller (minicomputers), faster, and cheaper. Keyboards and monitors were introduced.
- **Examples:** IBM System/360, DEC PDP-11.
- **Development:** This is when Operating Systems (see Week 8) began to appear.

Fourth Generation (1970s – Present): Microprocessors

- **Key Technology: The Microprocessor.** (e.g., Intel 4004). Placing the *entire CPU* (all the parts of the "Mill") onto a *single chip*.
- **Characteristics:** This led to the **Personal Computer (PC)** revolution.
- **Examples: Apple II** (1977), **IBM PC** (1981).
- **Development:** Birth of GUIs (Graphical User Interfaces), the Internet, and mobile devices.

Fifth Generation (Present & Future): AI & Quantum Computing

- **Key Technology: Artificial Intelligence (AI)** and **Parallel Processing**.
- **Characteristics:** This generation is less about hardware and more about *how* we compute. It includes voice recognition, machine learning, and "Big Data" analysis.
- **Future: Quantum Computing** promises to solve problems that are impossible for even the fastest modern supercomputers.

Evaluation Questions (Week 2)

1. What was the key conceptual breakthrough of Charles Babbage's "Analytical Engine"?
2. What company was founded based on Herman Hollerith's Tabulating Machine?
3. List the first four "generations" of computers and the *key technology* that defined each. (e.g., 1st Gen = ?)
4. Why were transistors an improvement over vacuum tubes? (List 3 reasons).
5. What 4th Generation invention led to the Personal Computer (PC) revolution?

Assignment Questions (Week 2)

1. The 3rd Generation was defined by the Integrated Circuit, and the 4th by the Microprocessor. Research and explain, in your own words, the difference between the two.
2. Write a 300-word essay on the topic: "If Charles Babbage had successfully built his Analytical Engine in 1837, how might the 20th century have been different?"

WEEK 3: NUMBER SYSTEMS

Introduction: Humans think in Base 10 (Decimal). Computers "think" in Base 2 (Binary). To be digital technologists, we must be able to translate between these languages. A **Number System** is a way of representing numbers. The **Base (or Radix)** is the total number of unique digits used.

NUMBER SYSTEM CONVERSION CHEAT SHEET

Decimal (Base 10)	4-bit Binary (Base 2)	Hexadecimal (Base 16)
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

3.1 Decimal (Base 10)

- **Digits:** 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 (10 total digits).
- **How it works:** We use place values (units, tens, hundreds) based on powers of 10.
- **Example:** $452 = (4 \times 10^2) + (5 \times 10^1) + (2 \times 10^0) = 400 + 50 + 2$.

3.2 Binary (Base 2)

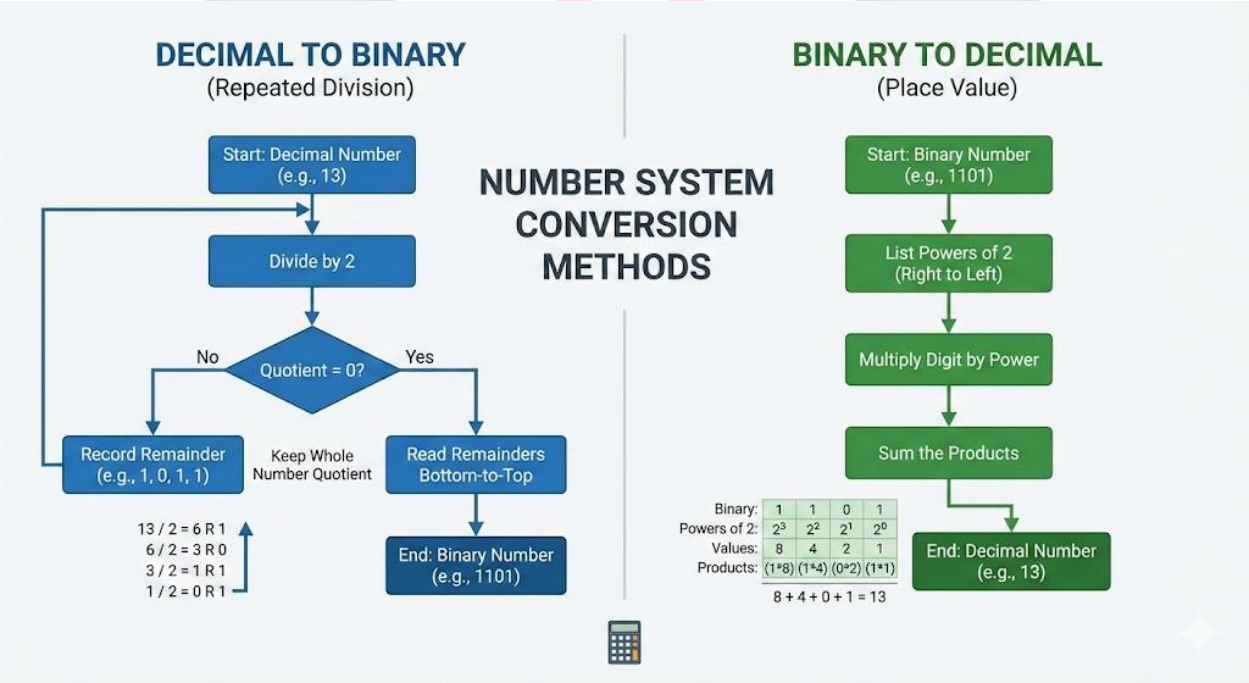
- **Digits:** 0, 1 (2 total digits).
- **Why it's used:** This is the native language of computers. A "1" is an "ON" electrical state; a "0" is an "OFF" state.
- **How it works:** Place values are based on powers of 2 (1, 2, 4, 8, 16, 32, 64, 128...).
- **Example:** $1011_2 = (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) = 8 + 0 + 2 + 1 = 11_{10}$.

3.3 Hexadecimal (Base 16)

- **Digits:** 0-9 and A, B, C, D, E, F (16 total digits).
    - (A=10, B=11, C=12, D=13, E=14, F=15).
- **Why it's used:** It's a human-friendly **shorthand for Binary.** Long binary strings are hard to read.
- **Uses:**
    - **Memory Addresses:** (e.g., 0x7FFF5FBFFC60).
    - **Web/CSS Color Codes:** (e.g., #FF0000 = Red).
    - **Error Messages.**

3.4 Octal (Base 8)

- **Digits:** 0, 1, 2, 3, 4, 5, 6, 7 (8 total digits).
- **Why it's used:** An older shorthand for binary (groups of 3 bits). Sometimes seen in file permissions on Linux/macOS.



3.5 Key Conversions

1. Decimal to Binary (e.g., 43_{10})

- **Method:** Repeatedly divide by 2 and record the remainders *from bottom to top*.
  - 43 / 2 = 21 R **1**
  - 21 / 2 = 10 R **1**
  - 10 / 2 = 5 R **0**
  - 5 / 2 = 2 R **1**
  - 2 / 2 = 1 R **0**
  - 1 / 2 = 0 R **1**
- **Answer:** 101011_2

2. Binary to Decimal (e.g., 11010_2)

- **Method:** Use place value summation.
  - 1 1 0 1 0
  - | | | | |
  - 16 8 4 2 1 (Powers of 2)
  - (1 x 16) + (1 x 8) + (0 x 4) + (1 x 2) + (0 x 1)
  - $16 + 8 + 0 + 2 + 0 = 26_{10}$

3. Binary to Hexadecimal (e.g., 11011010_2)

- **Method:** Group the binary string into sets of **four** (from right to left).
  - 1101 1010
  - 1101 = 8+4+0+1 = 13 = **D**
  - 1010 = 8+0+2+0 = 10 = **A**
- **Answer:** DA_{16}

4. Hexadecimal to Binary (e.g., $3F7_{16}$)

- **Method:** Convert each hex digit into its **four-bit** binary equivalent.
  - 3 = **0011**
  - F (15) = **1111**

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    - 7 = **0111**
- **Answer:** 001111110111_2 (or 1111110111_2).

Evaluation Questions (Week 3)

1. What is the "Base" (or "Radix") of a number system?
2. Why do computers use the Binary number system?
3. Why do humans use the Hexadecimal number system? Give one real-world example of its use.
4. Convert the decimal number 25 into Binary.
5. Convert the binary number 101101 into Decimal.

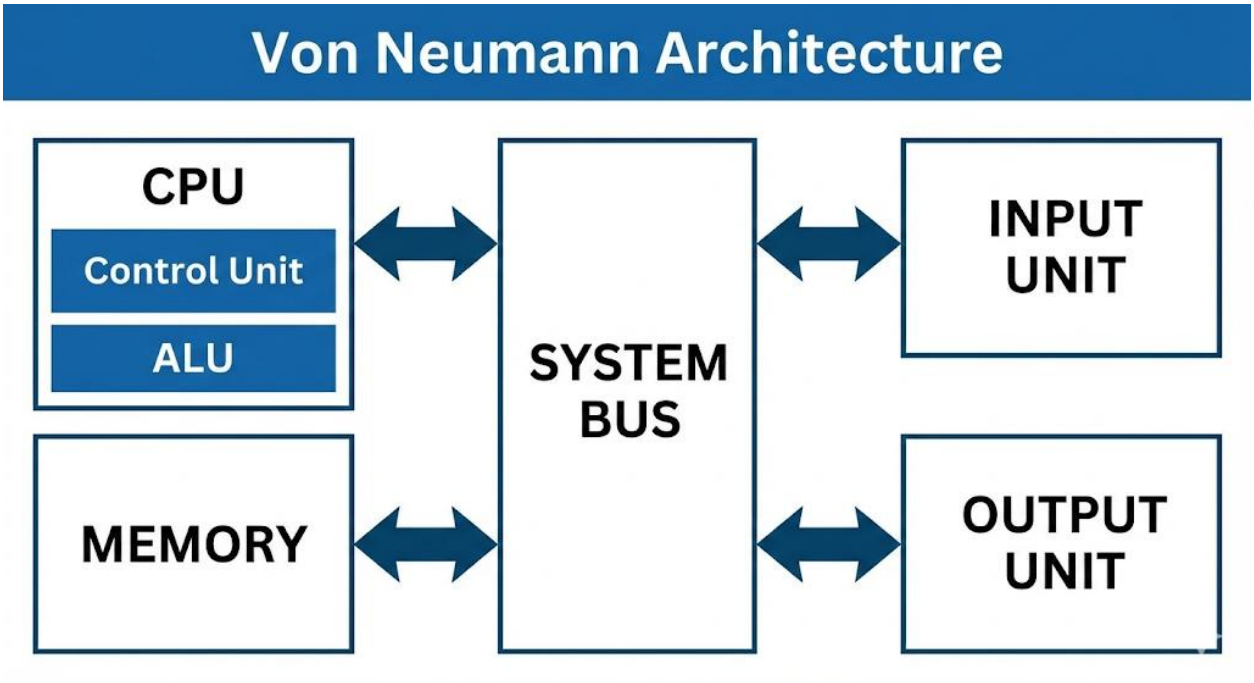
Assignment Questions (Week 3)

1. Convert the following:
    - (a) The decimal number 165 into Binary.
    - (b) The binary number 10011101 into Hexadecimal.
    - (c) The hexadecimal number 5C into Decimal.
2. The CSS color code for pure blue is #0000FF. Convert FF into Binary and Decimal.

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WEEK 4: COMPUTER HARDWARE

Introduction: Hardware refers to all the *physical* components of a computer system that you can see and touch. This week, we categorize these components based on their function.



4.1 The von Neumann Architecture

This is the basic model for all modern computers. It states that a computer has four main parts:

1. **CPU (Central Processing Unit):** The "brain" that performs calculations.
2. **Memory:** Stores data and instructions.
3. **Input Devices:** How we "talk" to the computer.
4. **Output Devices:** How the computer "talks" back to us.

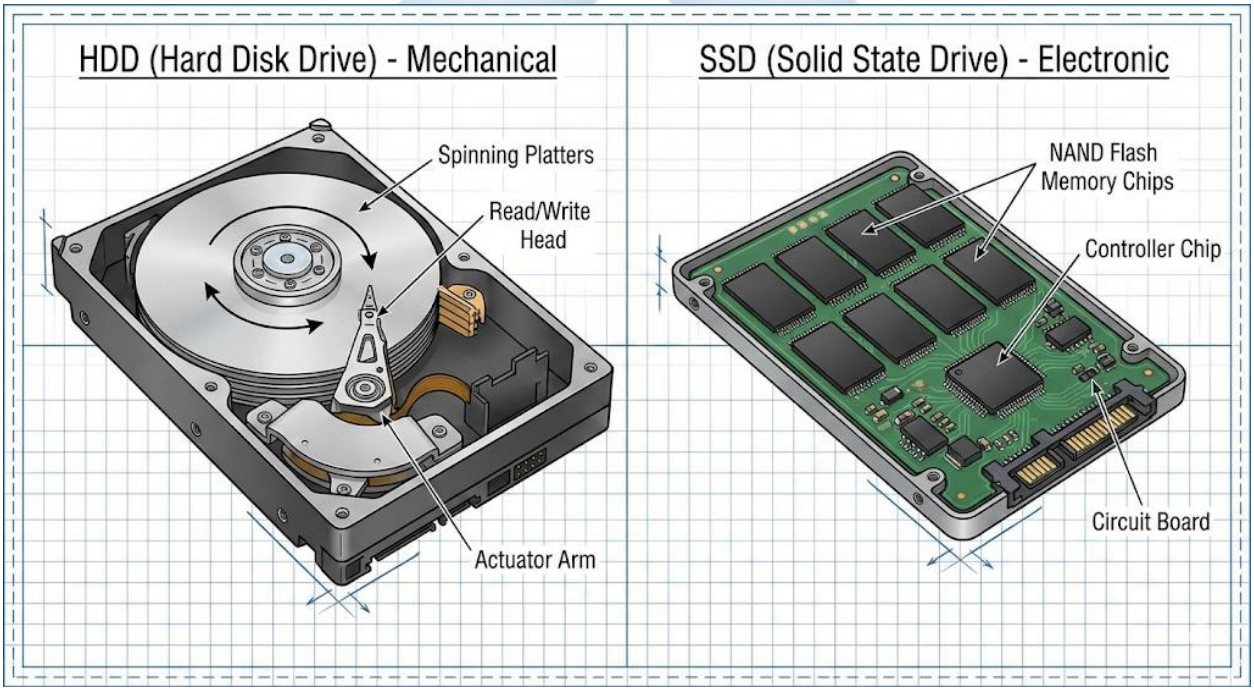
4.2 Input Devices

- **Definition:** Devices used to get data *into* the computer.
- **Examples:**
    - **Keyboard:** For typing text.
    - **Mouse / Touchpad:** For pointing and clicking (GUI interaction).

- **Microphone:** For inputting sound.
- **Webcam / Camera:** For inputting video.
- **Scanner:** For digitizing physical documents or photos.

4.3 Output Devices

- **Definition:** Devices used to get data *out* of the computer in a human-readable form.
- **Examples:**
  - **Monitor / Screen:** For visual output.
  - **Printer:** For hard-copy (paper) output.
  - **Speakers / Headphones:** For audio output.
  - **Projector:** For large-scale visual output.



4.4 Processing & Storage Devices

Processing:

- **CPU (Central Processing Unit):** The "brain." It fetches, decodes, and executes instructions. Its speed is measured in Gigahertz (GHz).

- **GPU (Graphics Processing Unit):** A specialized processor optimized for handling complex visual data (for gaming, video editing, AI).

Storage (Memory): We split storage into two types: Primary (fast, temporary) and Secondary (slower, permanent).

- **Primary Storage (Volatile Memory):**
    - **RAM (Random Access Memory):** The computer's "workbench" or "short-term memory." It holds all the data and programs you are *currently* using.
    - It is **Volatile:** When the power is turned off, everything in RAM is lost.
- **Secondary Storage (Non-Volatile Memory):**
    - The computer's "filing cabinet" or "long-term memory." It stores the OS, your files, and software.
    - It is **Non-Volatile:** The data remains even when the power is off.
    - **Examples:**
        - **HDD (Hard Disk Drive):** Older, mechanical (spinning platters).
        - **SSD (Solid State Drive):** Newer, faster, no moving parts.
        - **USB Flash Drive:** Portable storage.
        - **CD/DVD-ROM:** (Largely obsolete) Optical storage.

4.5 System vs. Peripheral Devices

- **System Devices:** These are the *core components* inside the computer case, essential for its basic operation.
    - **Motherboard:** The main circuit board that connects *everything*.
    - **CPU**
    - **RAM**
    - **PSU (Power Supply Unit):** Converts wall power to computer power.
- **Peripheral Devices:** These are "add-on" devices, usually external, that add functionality. They are *not* essential for the computer to boot.
    - **All Input Devices:** Keyboard, mouse, scanner.
    - **All Output Devices:** Printer, monitor, speakers.

- **External Storage:** USB drives.

Evaluation Questions (Week 4)

1. What is "hardware"?
2. List two input devices and two output devices.
3. What is the difference between RAM (Primary Storage) and an SSD (Secondary Storage)? (Hint: Talk about volatility and purpose).
4. What is the "CPU" and what is its main function?
5. What is the difference between a "system device" (like a PSU) and a "peripheral device" (like a printer)?

Assignment Questions (Week 4)

1. Open an advertisement (online or in a newspaper) for a new laptop. List all the hardware components mentioned in the ad. For each component (e.g., "16GB RAM," "1TB SSD," "Intel i7 CPU"), categorize it as Input, Output, Processing, or Storage.
2. Write a 300-word essay explaining this analogy: "If a computer were a kitchen, the CPU is the chef, RAM is the countertop, and the Hard Drive is the pantry."

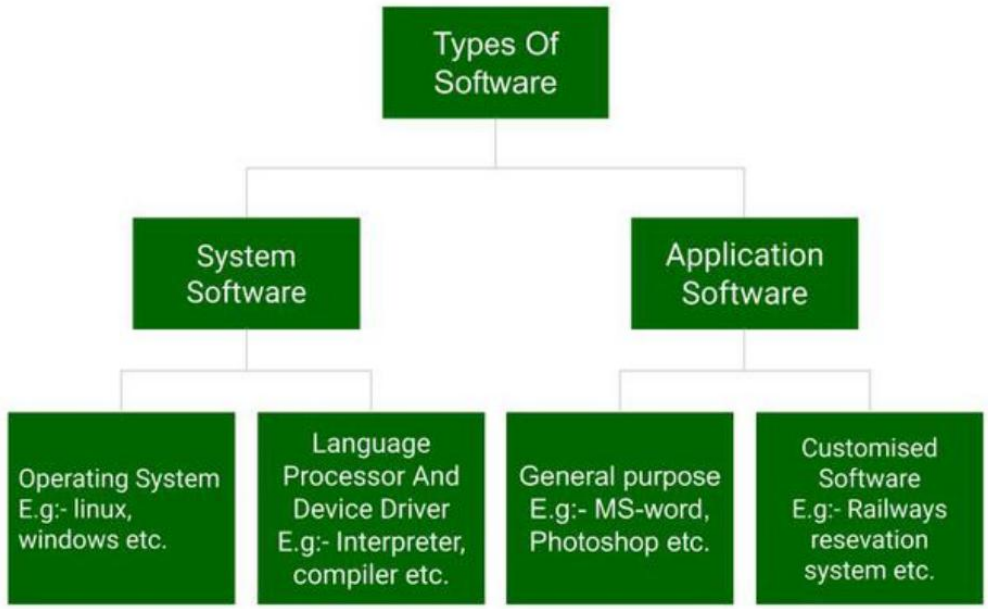
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WEEK 5: MIDTERM TEST

(This week is designated for assessments based on all topics and concepts covered in Weeks 1-4.)

WEEK 6: COMPUTER SOFTWARE

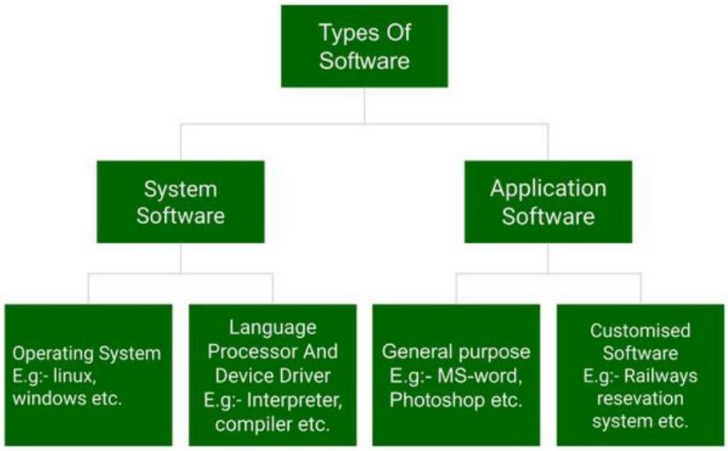
Introduction: If hardware is the *physical body* of the computer, software is the *mind*—the set of instructions (programs) that tells the hardware *what* to do.



6.1 System Software

- **Definition:** Software designed to run and manage the computer's hardware. It acts as the *platform* for all other software. The user does not usually interact with it directly.
- **Types of System Software:**
    1. **Operating System (OS):** (See Week 8) The *most important* software. It manages everything. (e.g., Windows, macOS, Android).
    2. **Utility Programs:** Software that performs "housekeeping" or maintenance tasks to keep the system running smoothly.
        - **Examples:** Antivirus (e.g., Windows Defender), Backup Software, Disk Cleanup, File Compression (e.t., WinRAR).

3. **Device Drivers:** A small piece of software that acts as a "translator" between the OS and a piece of hardware. (e.g., You need a printer *driver* for your OS to "speak" to your printer).



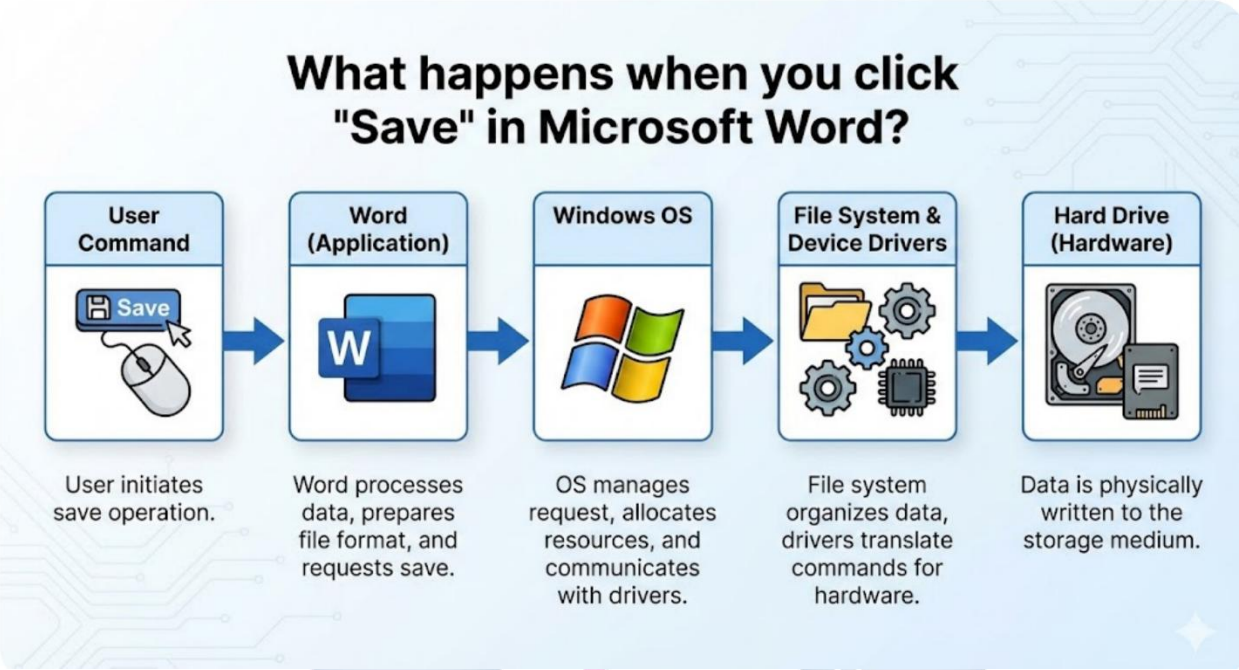
6.2 Application Software

- **Definition:** Software designed to help the *user* perform a specific task. This is the software you "use."
- **Categories of Application Software:**
    - **Word Processors:** For creating and editing text documents. (e.g., Microsoft Word, Google Docs).
    - **Spreadsheets:** For organizing and calculating data in tables. (e.g., Microsoft Excel, Google Sheets).
    - **Presentation Software:** For creating slide shows. (e.g., Microsoft PowerPoint, Google Slides).
    - **Web Browsers:** For accessing the internet. (e.g., Google Chrome, Firefox, Safari).
    - **Databases:** For storing and querying large amounts of data. (e.g., Microsoft Access, MySQL).
    - **Media Players/Editors:** (e.g., VLC Player, Adobe Photoshop).
    - **Games:** (e.g., FIFA, Call of Duty).

6.3 Relationship between Hardware, System Software, and Application Software

This is a 3-layer model:

1. **Hardware** (The physical machine)
2. **System Software (OS)** (Manages the hardware)



3. **Application Software** (Used by the user)

Analogy:

- **Hardware** = The human body (brain, hands, legs).
- **System Software (OS)** = The subconscious brain (controls breathing, heartbeat, walking).
- **Application Software** = The conscious brain (solving a math problem, writing a letter).

You (the **User**) use an **Application** (Word), which runs on the **OS** (Windows), which controls the **Hardware** (keyboard, screen, CPU).

Evaluation Questions (Week 6)

1. Define "Software."

2. What is the difference between "System Software" and "Application Software"?
3. Give two examples of System Software and two examples of Application Software.
4. What is the purpose of a "Device Driver"?
5. What is a "Utility Program"? Give one example.

Assignment Questions (Week 6)

1. List five (5) application programs you use on your phone or a computer. For each one, state its name and what *specific task* it helps you perform.
2. Using the "layer" analogy (User -> App -> OS -> Hardware), describe *exactly* what happens when you type the letter "H" on your keyboard in Microsoft Word and see it appear on the screen.

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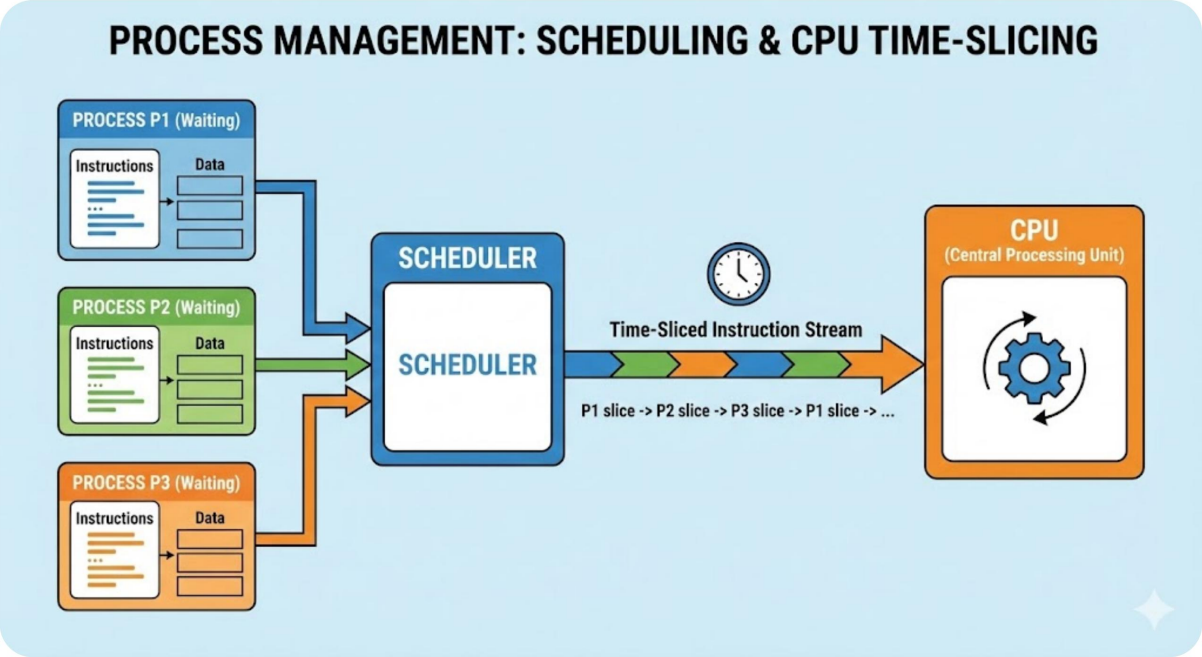
WEEK 7: MIDTERM BREAK

(No classes)

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WEEK 8: OPERATING SYSTEMS (OS)

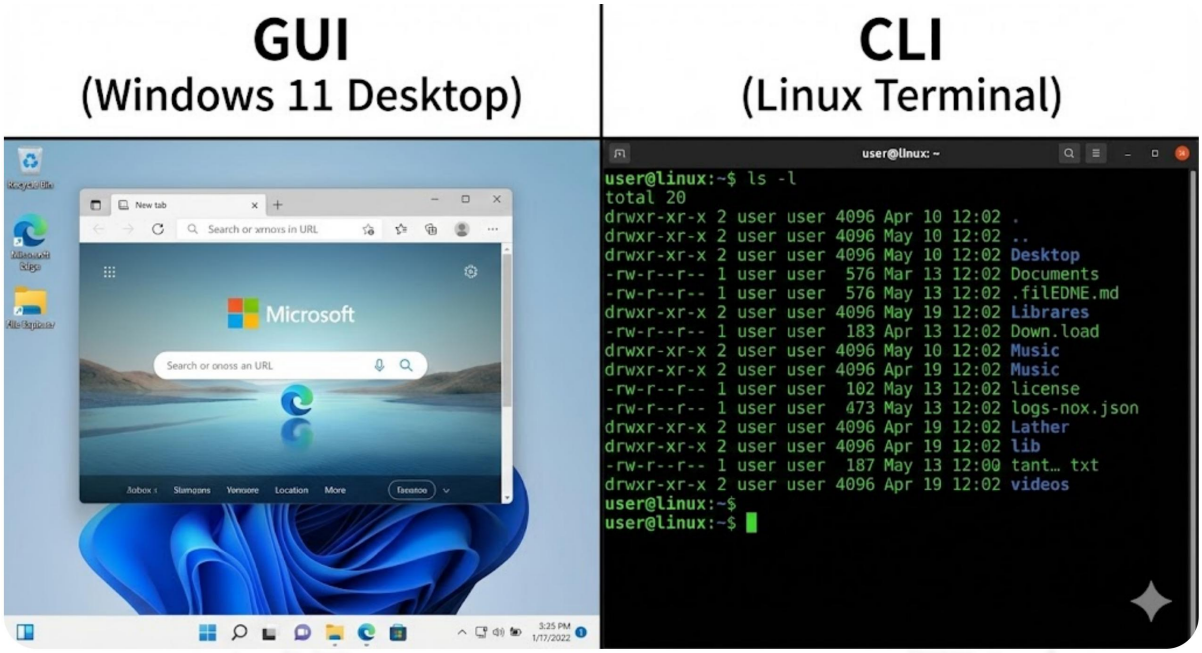
Introduction: As we learned in Week 6, the Operating System is the most important piece of system software. It is the "government" or "manager" of the entire computer.



8.1 Functions of an Operating System

1. **Process Management:** The CPU can only do one thing at a time. The OS *schedules* all the tasks (processes) that are running, so it *appears* you are multitasking (e.g., listening to music while browsing the web).
2. **Memory Management:** The OS allocates and manages the computer's **RAM** (primary memory). It ensures that two programs do not try to use the same memory space.
3. **File Management:** The OS is responsible for the file system (e.g., NTFS, FAT32). It controls how files are created, saved, named, organized into folders, and deleted.
4. **Hardware Management (I/O):** The OS communicates with all hardware devices (input/output) via their **drivers**.
5. **Security:** The OS provides basic security, such as requiring **passwords** and **usernames**, and managing file permissions.

6. **User Interface (UI):** The OS provides the "face" of the computer that the user interacts with.



8.2 Types of User Interfaces (UI)

- **GUI (Graphical User Interface):**
  - The modern standard. It uses **WIMP** (Windows, Icons, Menus, Pointers).
  - It is visual, intuitive, and easy for beginners.
  - **Examples:** Windows 11, macOS, Android, iOS.
- **CLI (Command-Line Interface):**
  - An older, text-based interface. The user types commands to interact with the OS.
  - It is much more powerful and faster for advanced users and programmers.
  - **Examples:** MS-DOS, Linux Terminal (Bash), Windows PowerShell.

8.3 Types of Operating Systems

- **Single-User, Single-Tasking:** One user, one program at a time. (e.g., MS-DOS).
- **Single-User, Multi-Tasking:** One user, many programs at a time. (e.g., Windows, macOS).

- **Multi-User, Multi-Tasking:** Many users, many programs at a time. (e.g., Linux servers, Mainframe OS).
- **Real-Time OS (RTOS):** Used when timing is *critical*. The OS must respond instantly. (e.g., in-car braking systems, medical equipment, industrial robots).
- **Mobile OS:** Optimized for touchscreen, low power, and wireless connectivity. (e.g., Android, iOS).

8.4 Examples of Popular Operating Systems

- **Desktop:** Microsoft Windows, Apple macOS, Linux (e.g., Ubuntu).
- **Mobile:** Google Android, Apple iOS.

Evaluation Questions (Week 8)

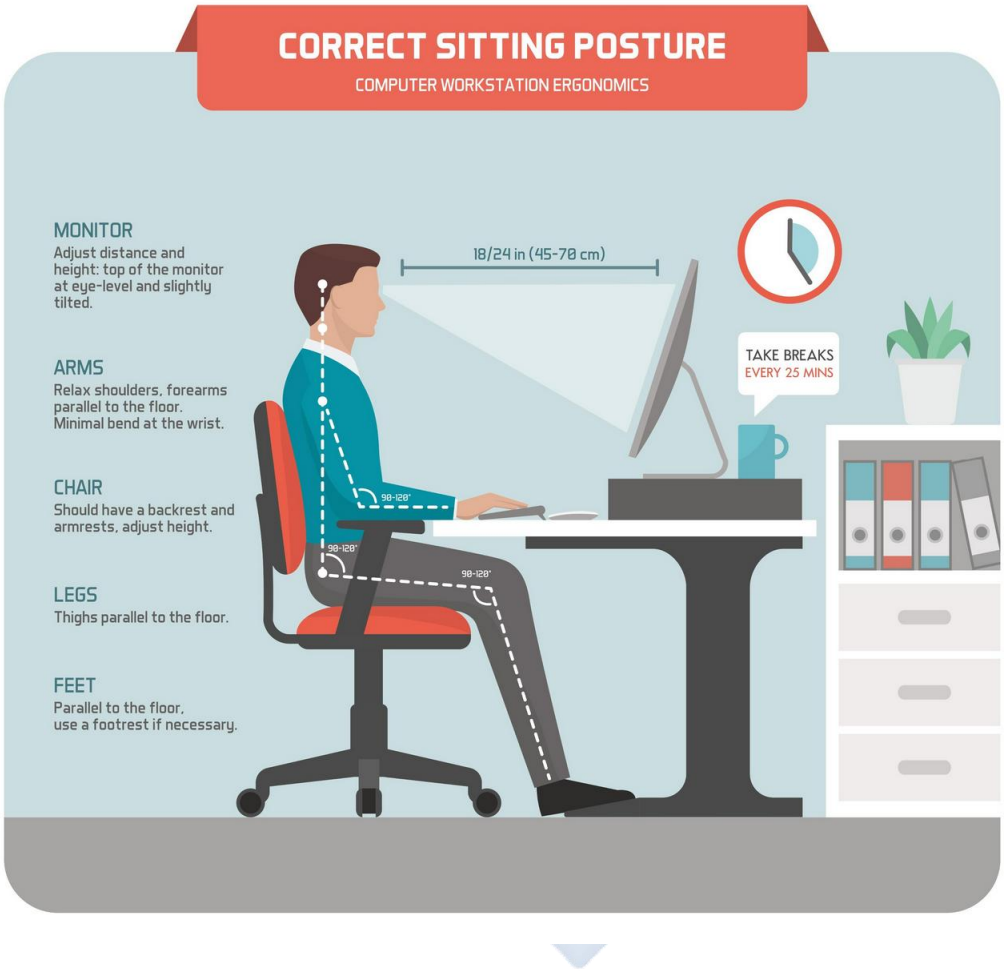
1. List five key functions of an Operating System.
2. What is the difference between a GUI and a CLI?
3. What does "WIMP" stand for in a GUI?
4. What is a "Real-Time OS (RTOS)" and where might one be used?
5. What is the function of the OS that allows you to listen to music and browse the web at the same time?

Assignment Questions (Week 8)

1. Microsoft Windows (GUI) and Linux (which often uses a CLI) are two major operating systems. Research and write a one-page report comparing their "pros" and "cons."
2. List all the "File Management" tasks you have performed in the last week (e.g., "created a folder," "renamed a file," "saved a document," "deleted a photo").

WEEK 9: COMPUTER MAINTENANCE & SAFETY

Introduction: A computer is a sensitive and expensive tool. This week, we learn how to protect the *hardware* (maintenance), protect the *software* (security), and protect the *user* (health & safety).



9.1 Preventive Maintenance (Hardware)

This is about stopping problems before they start.

1. **Keep it Clean:** Use compressed air to blow dust out of vents, fans, and keyboards. Dust traps heat, which is the #1 enemy of electronics.
2. **Keep it Cool:** Ensure proper ventilation. Don't block the vents on a laptop (e.g., by using it on a bed).

3. **Power Protection:** Use a **surge protector** (not just a basic power strip) to protect against spikes in electricity.
4. **Handle with Care:** Don't eat or drink near your computer. For laptops, don't pick them up by the screen.

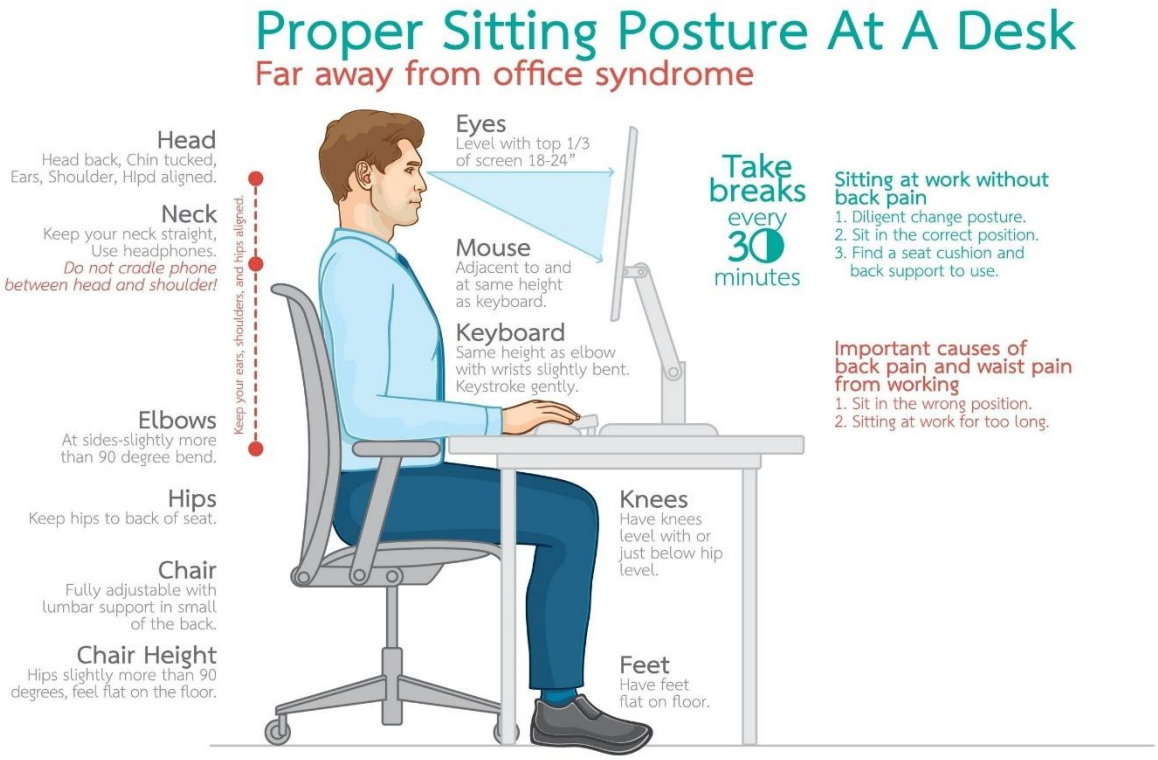
9.2 Preventive Maintenance (Software)

1. **Run Antivirus Software:** Keep it updated and run regular scans.
2. **Update Your Software:** Update your OS and applications. These updates often patch critical security holes.
3. **Back Up Your Data:** This is the *most important* rule.
    - **The 3-2-1 Rule:** Keep **3** copies of your data, on **2** different types of media, with **1** copy kept off-site (e.g., in the cloud or at a different location).
4. **Disk Cleanup:** Run utility programs to remove temporary files.

9.3 Health & Safety (Ergonomics)

Ergonomics is the science of designing a workspace to be safe, comfortable, and efficient.

1. **Good Posture:**
    - Sit with your feet flat on the floor.
    - Your monitor should be at or just below eye level.
    - Your wrists should be straight when typing.



2. **Repetitive Strain Injury (RSI):** This is damage to muscles and nerves from "small, repeated motions" (like typing or clicking). **Prevention:** Take regular breaks.
3. **Eye Strain (Computer Vision Syndrome):**
    - **The 20-20-20 Rule:** Every **20** minutes, look at something **20** feet away for **20** seconds.
    - Blink often to keep your eyes moist.

9.4 Electrical Safety

1. Do *not* use computers with frayed or damaged power cables.
2. Keep liquids far away from all electronics.
3. Do *not* plug too many devices into one power socket.

Evaluation Questions (Week 9)

1. What is the #1 physical enemy of electronics, and how can dust make it worse?
2. What is a "surge protector"?

3. What is the "3-2-1 Rule" for data backup?
4. What is "Ergonomics"?
5. Explain the "20-20-20 Rule" and what problem it helps prevent.

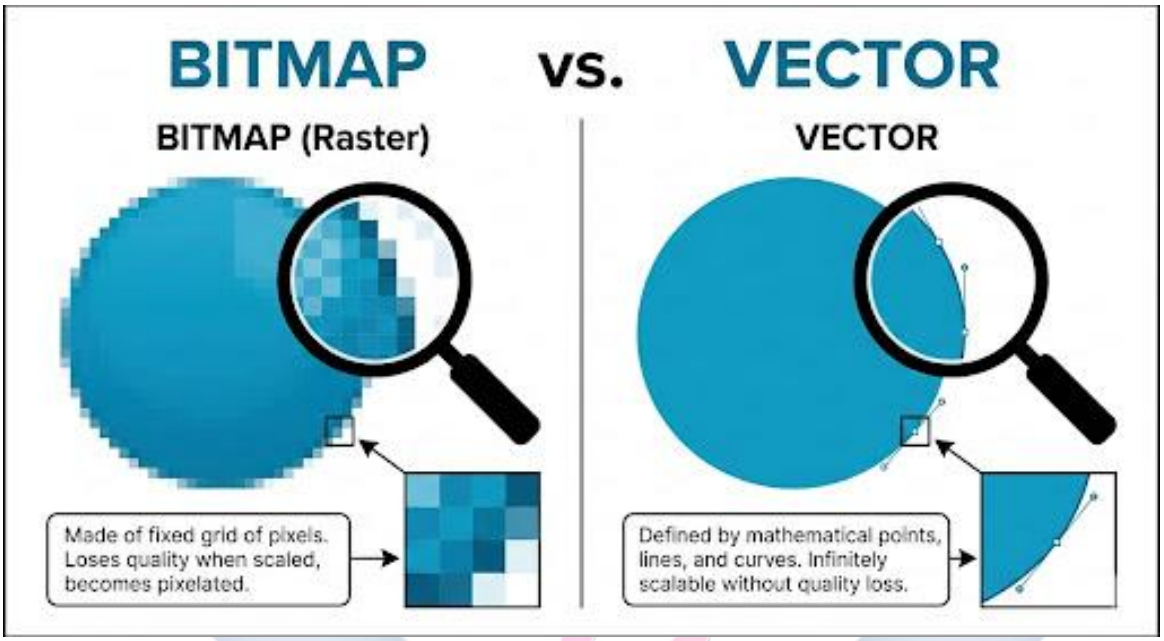
Assignment Questions (Week 9)

1. Draw a diagram of your computer workspace at home or school. Label the components (chair, desk, monitor, keyboard, mouse). Then, in a separate paragraph, critique your own workspace using the ergonomic principles we learned (posture, eye level) and state what you could *change* to improve it.
2. Create a "Top 10" checklist for "Computer Maintenance & Safety" for a new SS1 student.

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WEEK 10: DATA REPRESENTATION

Introduction: We know computers use 0s and 1s (Binary). But how do those 0s and 1s represent complex things like text, pictures, and music?



10.1 Bits and Bytes

- **Bit (Binary Digit):** The smallest unit of data. A single 0 or 1.
- **Byte:** A group of **8 bits**. A byte is the standard "chunk" of data. (e.g., 10110101 is one byte).
- **Why 8?** An 8-bit chunk can represent 2^8 (or 256) different values (from 0 to 255). This is enough to represent all the characters on a keyboard.

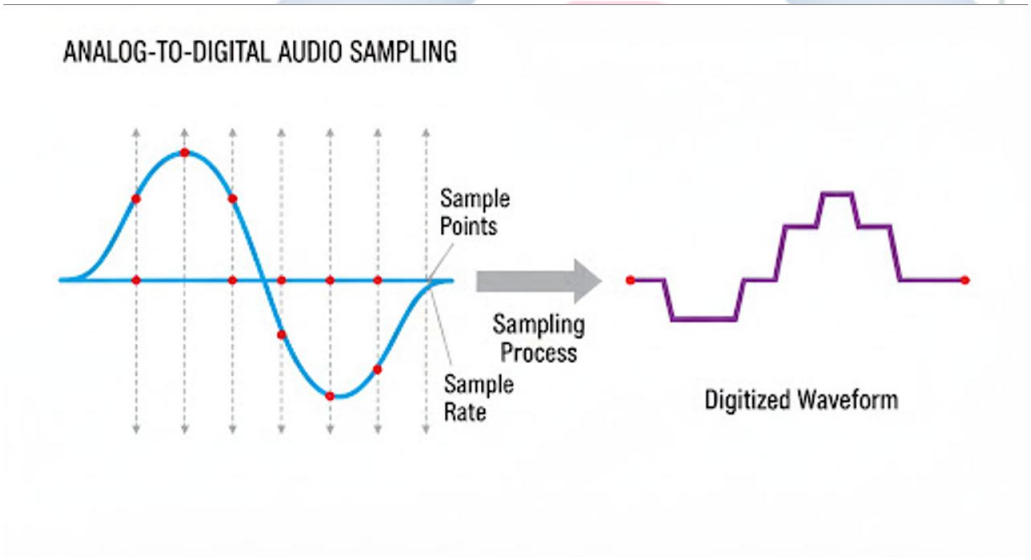
10.2 Units of Storage

- **Byte:** 1 character.
- **Kilobyte (KB):** ~1,000 (1024) bytes. (A short email).
- **Megabyte (MB):** ~1,000 KB. (An MP3 song).
- **Gigabyte (GB):** ~1,000 MB. (A high-def movie).
- **Terabyte (TB):** ~1,000 GB. (A modern hard drive). *(Note: Technically, 1 KiB = 1024 bytes, but manufacturers often use 1 KB = 1000 bytes).*

10.3 Representing Text (Character Encoding)

A computer stores text by mapping each character to a number.

- **ASCII (American Standard Code for Information Interchange):**
  - An early, 7-bit code (128 values).
  - It contains all English letters (A-Z, a-z), numbers (0-9), and punctuation.
  - **Example:** A = 65, B = 66, a = 97.
- **Unicode (e.g., UTF-8):**
  - ASCII was too small for global languages.
  - Unicode is a modern standard that aims to represent *every character from every language* (e.g., Yoruba, Igbo, Chinese, Arabic) and all **emojis** (😂).
  - UTF-8 is the most common form of Unicode and is backward-compatible with ASCII.



10.4 Representing Images

- **Bitmap (or Raster) Images:**
  - The image is a grid of tiny dots called **pixels** (picture elements).
  - The computer stores the binary value for the *color* of each pixel.
  - **File types:** JPEG (for photos), PNG (for graphics), GIF.

- **Vector Images:**
    - The image is stored as a set of *mathematical instructions* (e.g., "draw a red line from point A to point B").
    - They can be scaled infinitely large *without losing quality*.
    - **File types:** SVG, AI (Adobe Illustrator).

10.5 Representing Sound

- An analog sound wave is converted into digital data through a process called **sampling**.

1. **Sampling:** The computer takes "snapshots" (samples) of the analog sound wave's amplitude at thousands of fixed intervals per second.
2. **Quantization:** Each sample is "rounded" to the nearest binary value.

- **Sample Rate:** The number of samples taken per second (e.g., 44,100 Hz for a CD). A higher sample rate means a higher quality, larger file.

Evaluation Questions (Week 10)

1. What is a "bit"? What is a "byte"?
2. How many bits are in a byte?
3. What was the main *problem* with ASCII that "Unicode" was created to solve?
4. Explain the difference between a "Bitmap" image and a "Vector" image.
5. What is "sampling" in the context of representing sound?

Assignment Questions (Week 10)

1. The ASCII value for the letter 'A' is 65.
    - (a) Convert 65 to 8-bit binary. (This is how the computer stores 'A').
    - (b) The ASCII value for 'B' is 66. Convert 66 to 8-bit binary.
2. A digital photo has a resolution of 1000 x 1000 pixels. Each pixel's color is stored using 3 bytes (for Red, Green, and Blue). Calculate the total file size in Megabytes (MB).

WEEKS 11-13: REVISION & EXAMS

Key Concepts for Revision:

- **Analog vs. Digital:** Continuous vs. Discrete (0/1).
- **Generations of Computers:** 1st (Vacuum Tube), 2nd (Transistor), 3rd (IC), 4th (Microprocessor).
- **Number Systems:** Binary (Base 2), Decimal (Base 10), Hexadecimal (Base 16).
- **Conversions:** Dec-Bin, Bin-Dec, Bin-Hex, Hex-Bin.
- **Hardware:** Input (mouse), Output (monitor), Processing (CPU), Storage (RAM vs. SSD).
- **Volatile (RAM)** vs. **Non-Volatile (HDD/SSD)**.
- **System (Motherboard)** vs. **Peripheral (Printer)**.
- **Software:** System (OS, Drivers, Utilities) vs. Application (Word, Chrome).
- **OS Functions:** Memory/Process/File Management, Security, UI.
- **UI Types:** GUI (WIMP) vs. CLI (Text).
- **Maintenance:** Backups (3-2-1), Surge Protectors, Updates, Cleaning.
- **Ergonomics:** Posture, RSI, 20-20-20 Rule.
- **Data Rep:** Bit, Byte, KB/MB/GB. ASCII vs. Unicode. Bitmap vs. Vector.

Sample Exam Structure

- **Section A: Multiple Choice (40 marks)**
    - (e.g., "Which computer generation used transistors?", "A keyboard is an example of...?", "What is the binary for the number 10?")
- **Section B: Short Answer Questions (30 marks)**
    - (Answer 5 out of 7. e.g., "List 3 functions of an OS," "Explain the difference between RAM and ROM," "What is the 20-20-20 rule?")
- **Section C: Essay Questions (30 marks)**
    - (Answer 2 out of 4. e.g., "Describe the 3-layer relationship between Hardware, System Software, and Application Software. Use a real-world example," "Explain the difference between ASCII and Unicode and why Unicode is the modern

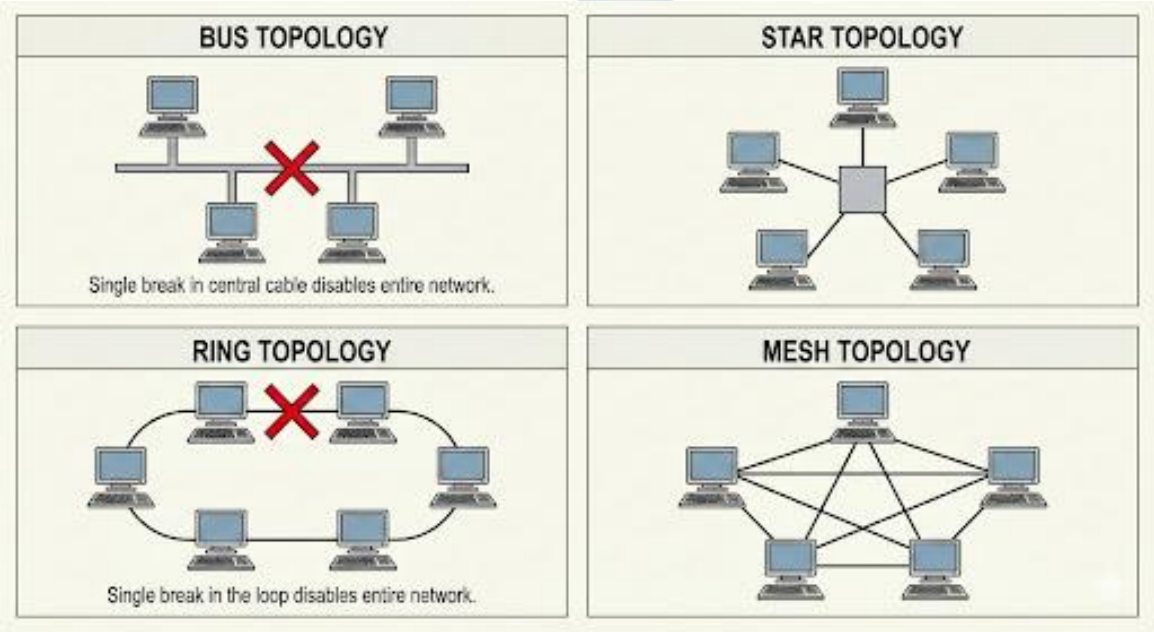
standard," "Convert 150 (Base 10) to Binary and 11010101 (Base 2) to Hexadecimal.")

SS1 DIGITAL TECHNOLOGIES LESSON NOTES

SECOND TERM

WEEK 1: COMPUTER NETWORKS

Introduction: A computer network is a collection of two or more computers and other hardware devices (like printers, phones) that are interconnected by communication channels (cables or wireless signals) for the purpose of sharing resources and data.



1.1 Types of Networks (by Geographical Scope)

1. **PAN (Personal Area Network):**
    - **Scope:** Very small, centered around an individual (approx. 10 meters).
    - **Purpose:** Connects personal devices.
    - **Example:** Connecting your phone to a Bluetooth earpiece, connecting a laptop to a wireless mouse.
2. **LAN (Local Area Network):**
    - **Scope:** A single, limited geographical area like one building, one school campus, or one home.

- **Purpose:** Resource sharing (e.g., one printer for 10 office computers).
- **Example:** Your school's computer lab, your home Wi-Fi network.

3. **MAN (Metropolitan Area Network):**
   - **Scope:** Spans a city or a large town. It's a "bigger" version of a LAN.
   - **Purpose:** Connects multiple LANs across a city (e.g., a university connecting its main campus LAN with its teaching hospital LAN downtown).
   - **Example:** A city-wide government network, a cable TV network.
4. **WAN (Wide Area Network):**
   - **Scope:** A very large geographical area, such as a country, a continent, or the entire globe.
   - **Purpose:** Connects multiple LANs and MANs over long distances, often using leased telecommunication lines or satellites.
   - **Example: The Internet** is the largest WAN. A company like a bank connecting its Lagos HQ LAN to its Abuja branch LAN.

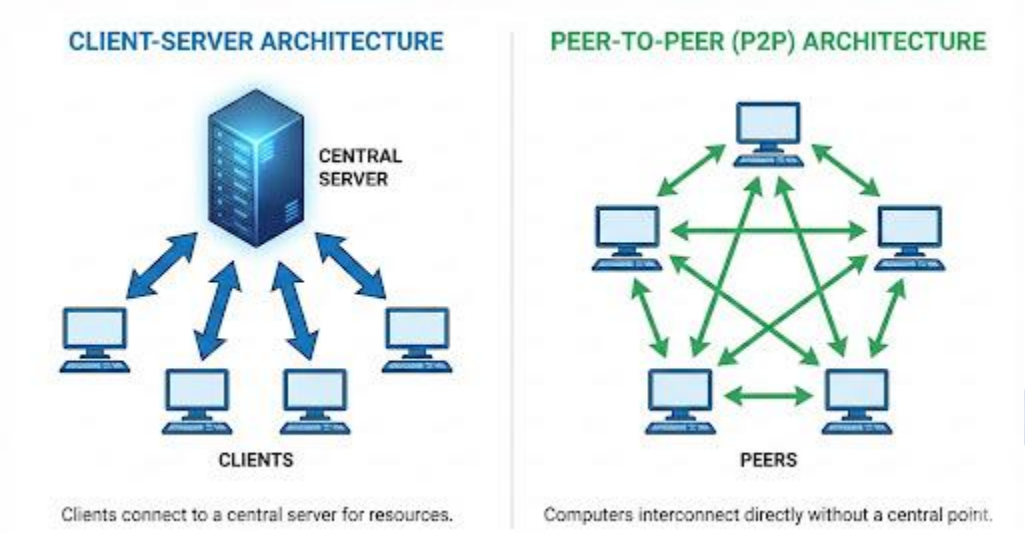
1.2 Network Architectures (How Devices Behave)

1. **Client-Server Architecture:**
   - **Concept:** A centralized model where one or more **Servers** (powerful computers) provide resources, and many **Clients** (your PC, phone) request them.
   - **Analogy:** A restaurant. You (the client) order from a waiter, who gets the food from the kitchen (the server).
   - **Examples:** A web server (serves websites), a file server (stores shared files), an email server.
2. **Peer-to-Peer (P2P) Architecture:**
   - **Concept:** A decentralized model where every computer (a "peer") is equal. Each device can act as *both* a client and a server.
   - **Analogy:** A potluck dinner. Everyone brings a dish (server) and everyone eats from other dishes (client).
   - **Examples:** Torrent file-sharing (e.g., BitTorrent), some older versions of Windows for home networking.

1.3 Network Topologies (The "Map" of the Network)

Topology refers to the *physical or logical layout* of a network.

1. **Bus Topology:** All devices share a single common cable (the "bus").
    - **Pro:** Cheap, easy to set up.
    - **Con:** If the main cable breaks, the *entire network fails*.
2. **Star Topology:** All devices connect to a *central hub* or *switch*.



    - **Pro:** Reliable (if one device's cable breaks, only that device fails; the rest of the network is fine).
    - **Con:** If the central hub/switch fails, the *entire network fails*. (This is the most common topology used in modern LANs).
3. **Ring Topology:** All devices are connected in a circle, with data passing from one to the next.
    - **Pro:** Orderly data transfer.
    - **Con:** If one device or cable breaks, the *entire network fails*.
4. **Mesh Topology:** Every device is connected to every other device.
    - **Pro:** Extremely reliable (many paths for data).
    - **Con:** Insanely expensive and complex to cable. (Used in the core of the Internet).

1.4 Components of a Network

- **NIC (Network Interface Card):** A piece of hardware (see Term 1, Week 4) inside a computer that allows it to physically connect to the network (via an Ethernet cable or Wi-Fi).
- **Switch:** A "smart" central device used in a **Star** topology. It receives data and sends it *only* to the specific device that is supposed to get it. (Used in LANs).
- **Router:** A device that connects *different* networks together and directs traffic between them. Your home Wi-Fi "router" is actually a router, switch, and wireless access point in one box. It connects your *home LAN* to the *Internet WAN*.
- **Modem (Modulator/Demodulator):** A device that converts the *digital* signal from your computer into an *analog* signal to travel over phone lines (DSL) or cable lines, and vice-versa.
- **Transmission Media:** The physical "channel" for data:
    - **Wired:** Ethernet Cables (Twisted Pair), Coaxial Cables, Fibre-Optic Cables (fastest, uses light).
    - **Wireless:** Radio waves (Wi-Fi, Bluetooth), Microwaves, Infrared.

Evaluation Questions (Week 1)

1. What is the main difference in scope between a LAN and a WAN?
2. Give a real-world example of a PAN.
3. Explain the difference between a "Client-Server" and a "Peer-to-Peer" network model.
4. What is the most common network topology used today, and why is it more reliable than a Bus topology?
5. What is the specific job of a **Router**?

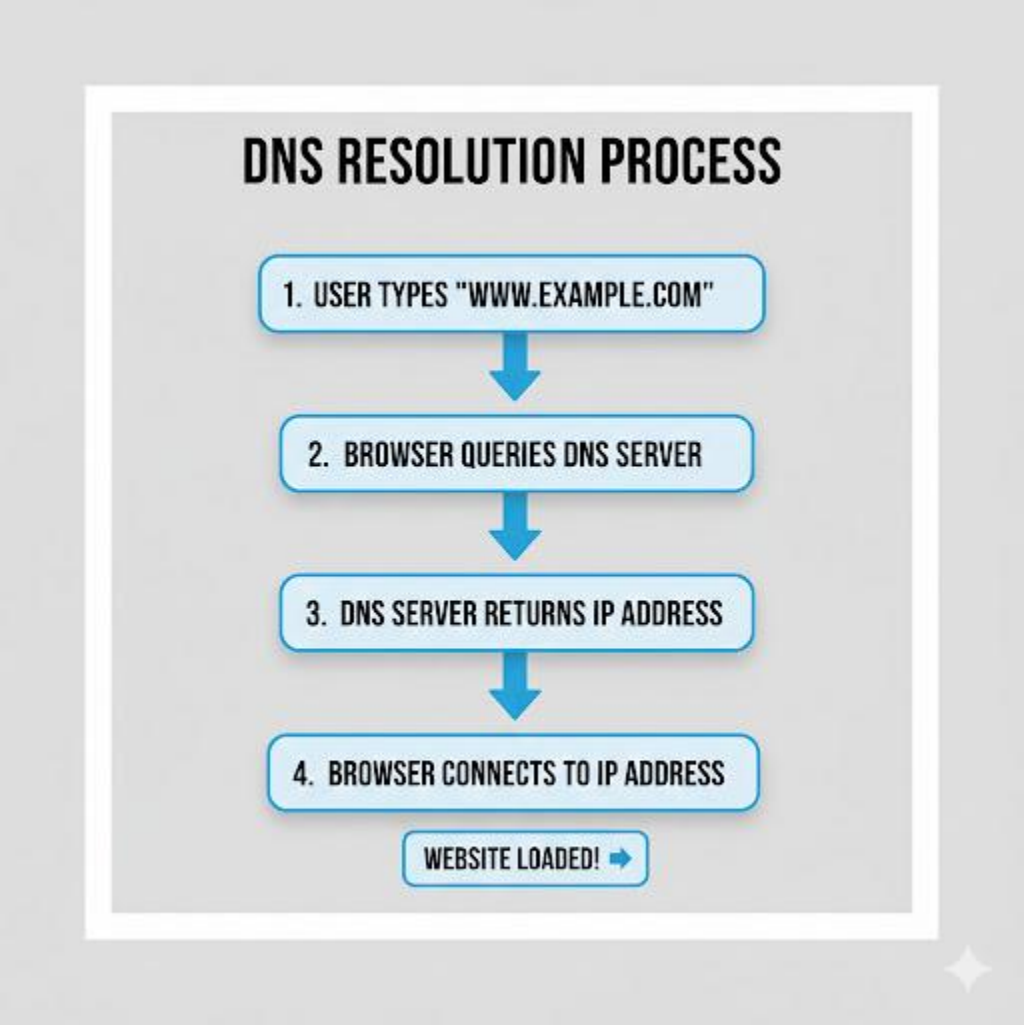
Assignment Questions (Week 1)

1. Draw diagrams for the following three network topologies: Bus, Star, and Ring. For each diagram, use an "X" to show where a single break would cause the *entire network* to fail.
2. You are setting up a network for a new 10-computer office. Write a one-page report explaining (a) what *type* of network you will build (LAN/WAN/MAN), (b) what

architecture you will use (Client-Server/P2P), (c) what *topology* you will use, and (d) list 3 key hardware components you will need.

WEEK 2: INTERNET TECHNOLOGIES

Introduction: The **Internet** (with a capital "I") is the single largest, global **WAN**. It is a "network of networks," connecting billions of devices. An **internet** (lowercase "i") is any network that uses the same protocols, but is private (an "intranet"). This week, we focus on the public Internet.



2.1 Core Protocols: The "Language" of the Internet

A **protocol** is a set of rules that governs communication.

- **TCP/IP (Transmission Control Protocol / Internet Protocol):** This is the *foundational suite* of protocols for the internet.
    - **IP's Job (The "Address"):** IP is responsible for *addressing*. Every device on the internet has a unique **IP Address** (e.g., 172.217.14.228). The IP protocol puts this "address label" on data packets to route them to the correct destination.
    - **TCP's Job (The "Delivery"):** TCP is responsible for *reliability*. It breaks a large file (like a picture) into small **packets**, numbers them, sends them, and *checks* that they all arrived safely at the other end. If a packet is lost, TCP re-sends it. It then reassembles the packets in the correct order.
- **HTTP (HyperText Transfer Protocol):** The protocol used for viewing web pages. When you type a web address, your browser is sending an HTTP GET request to a web server.
- **HTTPS (HTTP Secure):** A secure, *encrypted* version of HTTP. The "S" means your communication with the website (e.g., your bank) is private. **Always look for the padlock icon.**
- **DNS (Domain Name System):** The "phonebook" of the internet. Humans can't remember IP addresses. We remember *domain names* (e.g., google.com). When you type google.com into your browser, your computer first asks a DNS server, "What is the IP address for https://www.google.com/search?q=google.com?" The DNS server replies with the IP address, and *then* your browser can connect.

2.2 Internet Services

The Internet is the *road*. These are the *cars* and *services* that use the road.

1. **World Wide Web (WWW):** The *most popular* service. It is a collection of all public websites (which are just files, like HTML) stored on web servers. (Note: The **Internet** and the **WWW** are *not* the same thing. The WWW *runs on* the Internet).
2. **Email (Electronic Mail):** See Week 3.
3. **File Transfer Protocol (FTP):** A service for transferring large files (less common for users now, but still used by developers).

4. **Voice over IP (VoIP):** A service that lets you make phone calls over the internet (e.g., WhatsApp Calls, Skype).



2.3 Web Browsers

- **Definition:** A piece of **application software** (Term 1, Week 6) that is used to *request, retrieve, and display* web pages.
- **Job:** It sends an HTTP GET request, receives the HTML/CSS/JavaScript files from the server, and *renders* them into the visual website you see.
- **Examples:** Google Chrome, Mozilla Firefox, Apple Safari, Microsoft Edge.

2.4 Search Engines

- **Definition:** A *website* (a service) that helps you find *other websites* on the WWW.
- **How they work (The 3 Steps):**
    1. **Crawling (or "Spidering"):** The search engine sends out automated programs called "crawlers" or "spiders" that follow links from one website to the next, 24/7, to discover all the public pages on the web.
    2. **Indexing:** The crawler sends a copy of all these pages back to the search engine, which analyzes them and stores the information in a massive database called an **Index**.
    3. **Ranking (The "Secret Sauce"):** When you type a search query, the search engine searches its *Index* (not the live web) and uses a complex **algorithm** (like Google's PageRank) to decide which pages are the most *relevant* and *authoritative* and lists them in that order.
- **Examples:** Google, Bing, DuckDuckGo (focuses on privacy).

Evaluation Questions (Week 2)

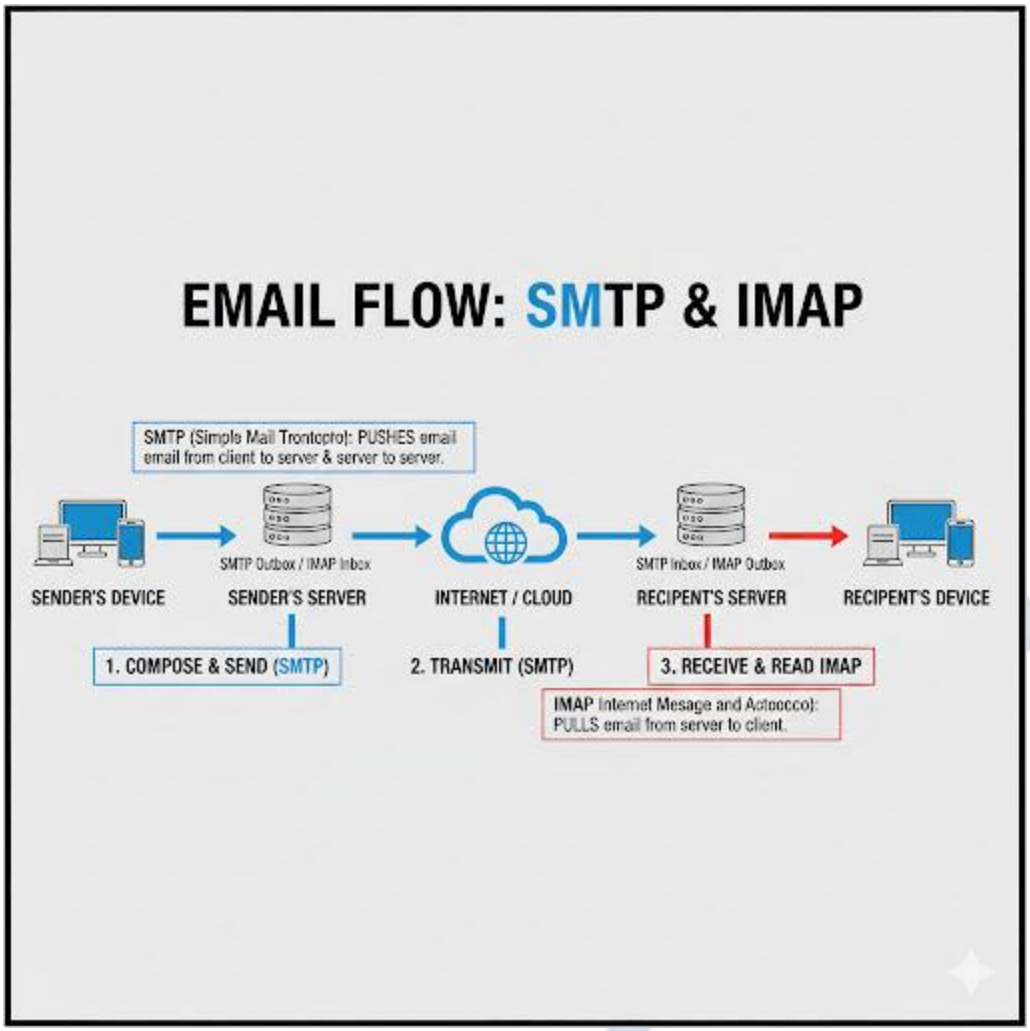
1. What is the difference between the **Internet** and the **World Wide Web**?
2. In the TCP/IP suite, what is the job of **IP** and what is the job of **TCP**?
3. What is the purpose of the **DNS (Domain Name System)**?
4. Explain the 3 steps a search engine (like Google) uses to find and list websites.
5. What is the difference between **HTTP** and **HTTPS**? Why is HTTPS important?

Assignment Questions (Week 2)

1. Write a 300-word essay using an analogy to explain how all these parts work together. (e.g., "If the Internet is a global road system... then a Router is a... a DNS server is a... an IP address is a... TCP is a... a browser is a...").
2. Use a search engine to research "IP Address". Find out what your *own* public IP address is (search "what is my IP"). Then, find out the difference between a **public IP** and a **private IP** and write a one-page summary.

WEEK 3: EMAIL & ONLINE COMMUNICATION

Introduction: Beyond the web, the most common use of the internet is communication. This ranges from formal (email) to real-time (instant messaging).



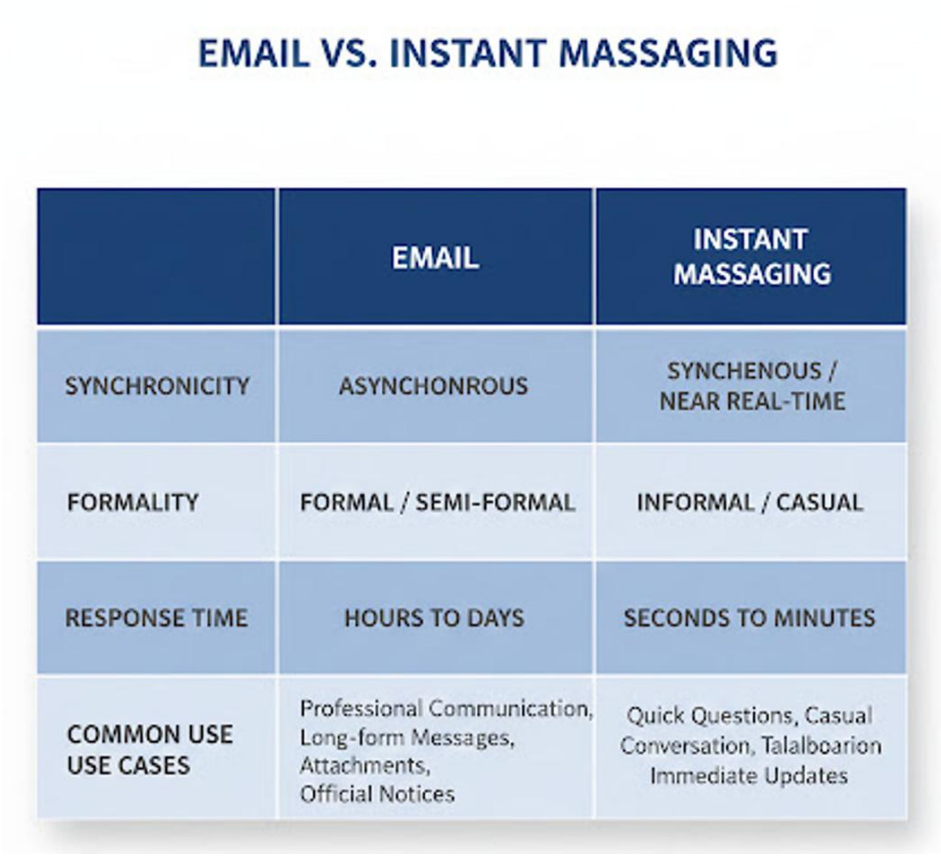
3.1 Email (Electronic Mail)

Email is an **asynchronous** communication tool, meaning the recipient does *not* have to be online at the same time as the sender.

- **Anatomy of an Email Address:** username@domain.com
    - username: The unique identifier for your mailbox (e.g., student.name).
    - @: The "at" symbol, which separates the user from the domain.

- domain.com: The **domain name** of the server that *hosts* your email (e.g., gmail.com, yahoo.com, myschool.edu.ng).

- **Email Protocols (The "Post Office" Rules):**
  - **SMTP (Simple Mail Transfer Protocol):** The protocol used for *sending* email. When you hit "Send," your email client uses SMTP to send the message to your mail server, which then uses SMTP to send it to the recipient's mail server.
  - **POP3 (Post Office Protocol 3):** An older protocol for *receiving* email. It *downloads* the email from the server to your device and then *deletes* it from the server. (Problem: If your device breaks, your email is gone. You also can't see it on other devices).
  - **IMAP (Internet Message Access Protocol):** A modern protocol for *receiving* email. It *syncs* your email with the server. The email *stays on the server*. (Pro: You can access, send, and read your email from any device—phone, laptop—and



it all stays in sync).

3.2 Email Etiquette (The "Unwritten Rules" of Professionalism)

1. **Use a Clear, Professional Subject Line:** (e.g., "Question about SS1 Digital Tech Assignment"). Never leave it blank.
2. **Use a Professional Salutation:** (e.g., "Dear Mr. Adebayo,").
3. **Be Concise:** Keep the message clear and to the point.
4. **Do NOT use ALL CAPS:** It is considered "shouting."
5. **Use Attachments Correctly:** For large files, don't attach them; upload them to cloud storage (Week 4) and send a *link*.
6. **Proofread:** Check for spelling and grammar errors before sending.
7. **Reply-All:** Do *not* use "Reply-All" unless *everyone* on the list *needs* to see your reply.

3.3 Instant Messaging (IM)

- **Definition:** A **synchronous** (or near-synchronous) communication tool for real-time text-based chat.
- **Characteristics:** Casual, fast-paced, uses "chats" instead of "messages."
- **Examples:** WhatsApp, Telegram, Facebook Messenger, Slack.

3.4 Video Conferencing

- **Definition:** A tool for real-time, visual, and audio communication between two or more people in different locations.
- **Characteristics:** Replicates face-to-face meetings. Requires a stable internet connection, webcam, and microphone.
- **Examples:** Zoom, Google Meet, Microsoft Teams.

Evaluation Questions (Week 3)

1. What does "asynchronous" mean in the context of email?
2. What is the difference between the **SMTP** protocol and the **IMAP** protocol?
3. Why is IMAP generally preferred over POP3 today?

4. List 3 rules of professional email etiquette.
5. What is the main difference between Instant Messaging and Email?

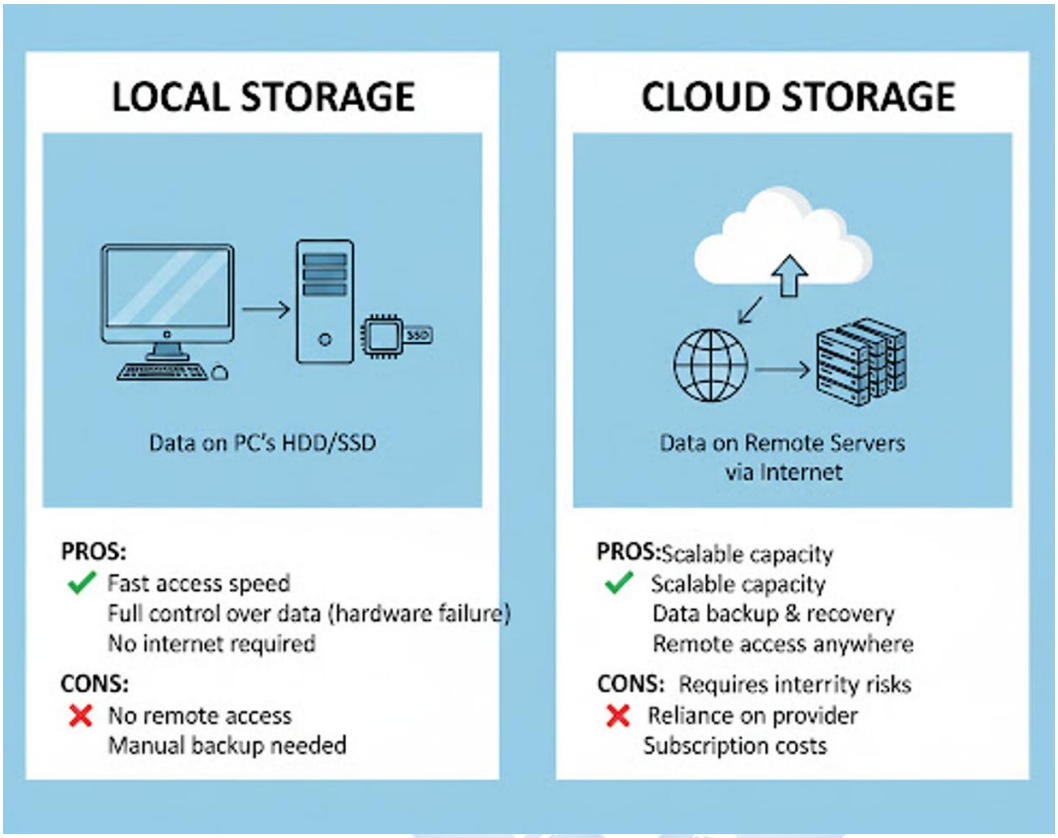
Assignment Questions (Week 3)

1. Write a *professional email* to your teacher (your_teacher@school.com). In the email, you must (a) use a clear subject line, (b) use a polite greeting, (c) ask a question about the Week 2 assignment, and (d) finish with a polite closing.
2. Your school wants to choose a new communication tool for teachers and students. Write a 300-word essay comparing the "pros" and "cons" of using **Email** vs. **WhatsApp** for school business.

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WEEK 4: DIGITAL STORAGE & CLOUD COMPUTING

Introduction: This week, we revisit digital storage (Term 1, Week 4) in more depth and introduce the concept of "Cloud Computing," which combines storage and networking.



4.1 Review: Types of Digital Storage

1. **Magnetic Storage:** Stores data by magnetizing tiny particles on a spinning disk.
    - **Example: HDD (Hard Disk Drive).**
    - **Pro:** Very cheap, large capacity.
    - **Con:** Slow, has moving parts, can be damaged by dropping.
2. **Optical Storage:** Stores data as microscopic "pits" and "lands" on a disk, read by a laser.
    - **Example:** CD-ROM, DVD-ROM, Blu-ray.
    - **Pro:** Cheap to manufacture.
    - **Con:** Very slow, small capacity, easily scratched, (mostly obsolete).
3. **Solid-State Storage:** Stores data electronically in flash memory chips (transistors).

- **Example: SSD (Solid State Drive),** USB Flash Drive, SD Card (in your phone/camera).
- **Pro:** Extremely fast, no moving parts, durable.
- **Con:** More expensive than HDDs (but prices are dropping).

4.2 What is Cloud Computing?

- **Definition:** Cloud Computing is the on-demand delivery of IT resources (like storage, processing power, databases, software) *over the Internet*, with "pay-as-you-go" pricing.
- **Core Idea:** Instead of owning and maintaining your *own* computer hardware (a "server"), you *rent* it from another company (a "cloud provider").
- **The "Cloud" is just someone else's computer.** The "cloud provider" is the company that owns the massive, air-conditioned warehouses (Data Centers) full of servers.
- **Examples of Providers:** Amazon Web Services (AWS), Microsoft Azure, Google Cloud.

4.3 Cloud Service Models (The "Types" of Cloud)

1. **IaaS (Infrastructure as a Service):**
   - **What you rent:** The *basic building blocks*—virtual computers (servers), storage, and networking.
   - **Analogy:** You are renting an empty kitchen. You have to bring your *own* ingredients (data) and *all* your own pots and pans (OS, software) and do the cooking (run the app).
   - **Used by:** System Administrators.
2. **PaaS (Platform as a Service):**
   - **What you rent:** A *platform* to build and run your own applications. The provider manages the server, OS, and database for you.
   - **Analogy:** You are renting a "pizza-as-a-service" kitchen. The oven (server) and ingredients (database) are provided. You just have to *make the pizza* (your code).
   - **Used by:** Software Developers.
3. **SaaS (Software as a Service):**
   - **What you rent:** A *finished* application. You just log in and use it.

- **Analogy:** You are ordering a finished, hot pizza. You just eat it (use the software).
- **This is the most common model for normal users.**
- **Examples: Gmail, Google Docs, Netflix, Zoom.** You don't own the software; you just use it through your browser or app.

4.4 Advantages of Cloud Computing & Data Backup

- **Cost:** Cheaper than buying your own server (no upfront cost).
- **Accessibility:** Access your files and apps from any device, anywhere (e.g., Google Drive).
- **Scalability:** You can "scale up" (get more power) or "scale down" (get less) instantly.
- **Data Backup:** The cloud is the *perfect* solution for the "1" in the **3-2-1 Backup Rule** (Term 1, Week 9). By saving your files to Google Drive or iCloud, you have an **off-site** copy that is safe from local disasters (fire, theft, laptop breaking).

Evaluation Questions (Week 4)

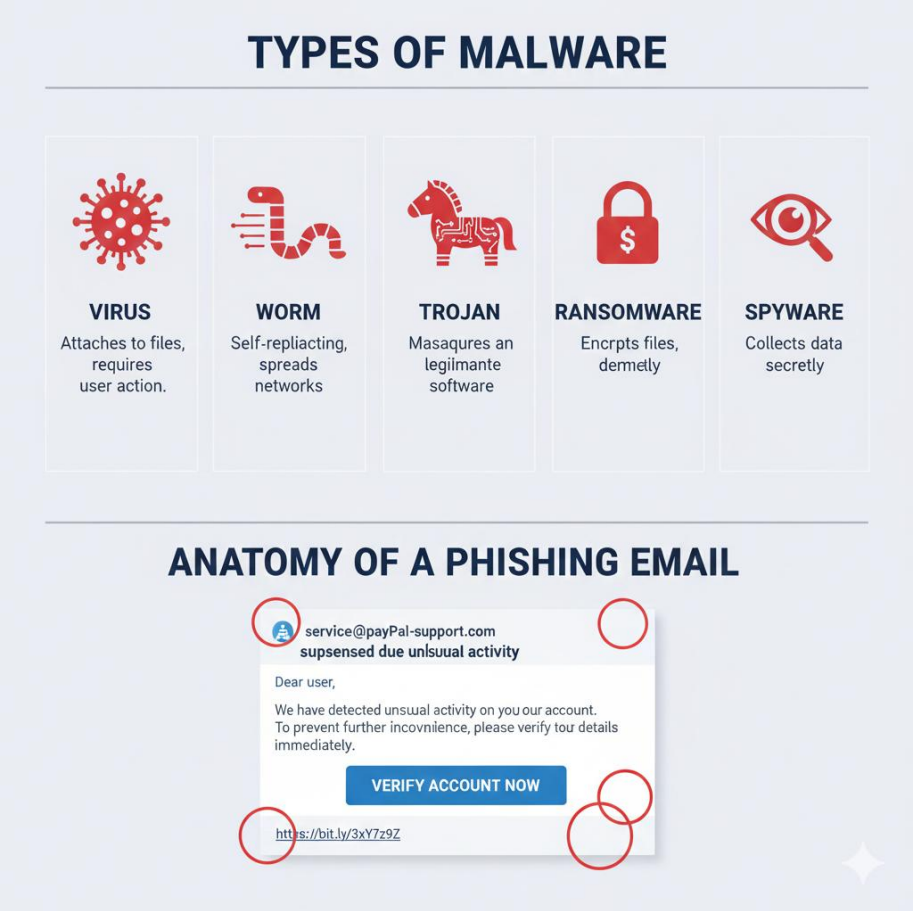
1. List the three main types of storage and give one example of each.
2. Define "Cloud Computing" in your own words.
3. What is the most common cloud service model that you use every day? Give two examples.
4. Explain the "SaaS" model using an analogy.
5. How does cloud storage help you fulfill the "3-2-1 Backup Rule"?

Assignment Questions (Week 4)

1. Many people confuse "Cloud Storage" (like Google Drive) with "Cloud Backup" (like Backblaze). Research the difference and write a one-page report explaining it. (Hint: One is for syncing files, the other is for disaster recovery).
2. Write a 300-word essay: "In 10 years, will local storage (like HDDs and SSDs) be completely replaced by the cloud? Why or why not?"

WEEK 6: CYBERSECURITY I - THREATS

Introduction: Cybersecurity is the practice of protecting computer systems, networks, and data from digital attacks, theft, or damage. This week, we focus on the *threats*.



6.1 The "CIA Triad" (The Goal of Cybersecurity)

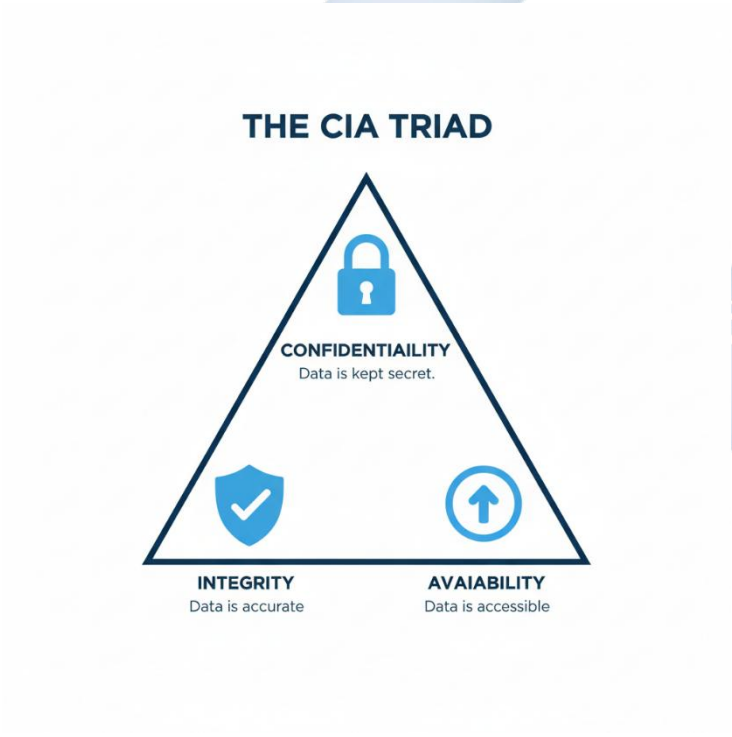
Cybersecurity aims to protect three things:

1. **Confidentiality:** Keeping data *secret* (e.g., only you can see your bank balance).
2. **Integrity:** Keeping data *accurate* (e.g., a hacker cannot change your bank balance from N100 to N10).
3. **Availability:** Ensuring data is *accessible* when you need it (e.g., a hacker cannot shut down your bank's website).

6.2 Threat 1: Malware (Malicious Software)

Malware is any software *intentionally* designed to cause damage.

- **Virus:** A piece of code that *attaches* itself to a clean program (like word.exe). It requires a human to *run* that program to spread.
- **Worm:** A *standalone* program that replicates itself and spreads *automatically* over a network, without human help. Worms are what cause massive, fast-moving outbreaks.
- **Trojan (or "Trojan Horse"):** Software that *disguises* itself as something useful (e.g., a "free game" or "antivirus"). When you run it, it opens a "backdoor" for attackers to steal your data or install other malware.
- **Ransomware:** The most dangerous threat today. It *encrypts* all of your files (making them unreadable) and demands a *ransom* (payment, usually in Bitcoin) to unlock them.
- **Spyware:** Malware that secretly *spies* on you. It can record your keystrokes (**Keylogger**) to steal passwords, or turn on your webcam without your knowledge.



6.3 Threat 2: Social Engineering (Hacking the Human)

This is the art of *manipulating* people to give up confidential information (like a password). It's a psychological trick, not a technical hack.

- **Phishing:** The most common form.
    - **What it is:** A fraudulent email, text (SMS, called **Smishing**), or WhatsApp message that *pretends* to be from a legitimate company (e.g., "Your bank account has been locked! Click here to verify").
    - **The Goal:** To trick you into clicking a link that either (a) installs malware or (b) leads to a *fake website* that looks real, where you *enter your own password*.
- **Baiting:** Leaving an infected USB drive labeled "Confidential Salaries" on the floor. Curiosity (the human weakness) leads someone to plug it in, infecting the computer.

6.4 Threat 3: Hacking & Direct Attacks

- **Hacking:** Gaining unauthorized access to a computer system or network.
- **Denial of Service (DoS) Attack:** An attacker floods a server or website with so much "junk" traffic that it gets overwhelmed and crashes, becoming "unavailable" (violating the "A" in the CIA Triad).
- **Man-in-the-Middle (MITM) Attack:** An attacker secretly places themself between *you* and a website (e.g., on an unsecured public Wi-Fi). They can read and even change everything you send and receive.

Evaluation Questions (Week 6)

1. What is Cybersecurity?
2. What are the three components of the "CIA Triad"?
3. What is the main difference between a **Virus** and a **Worm**?
4. Explain what a **Trojan** does.
5. What is **Phishing**?

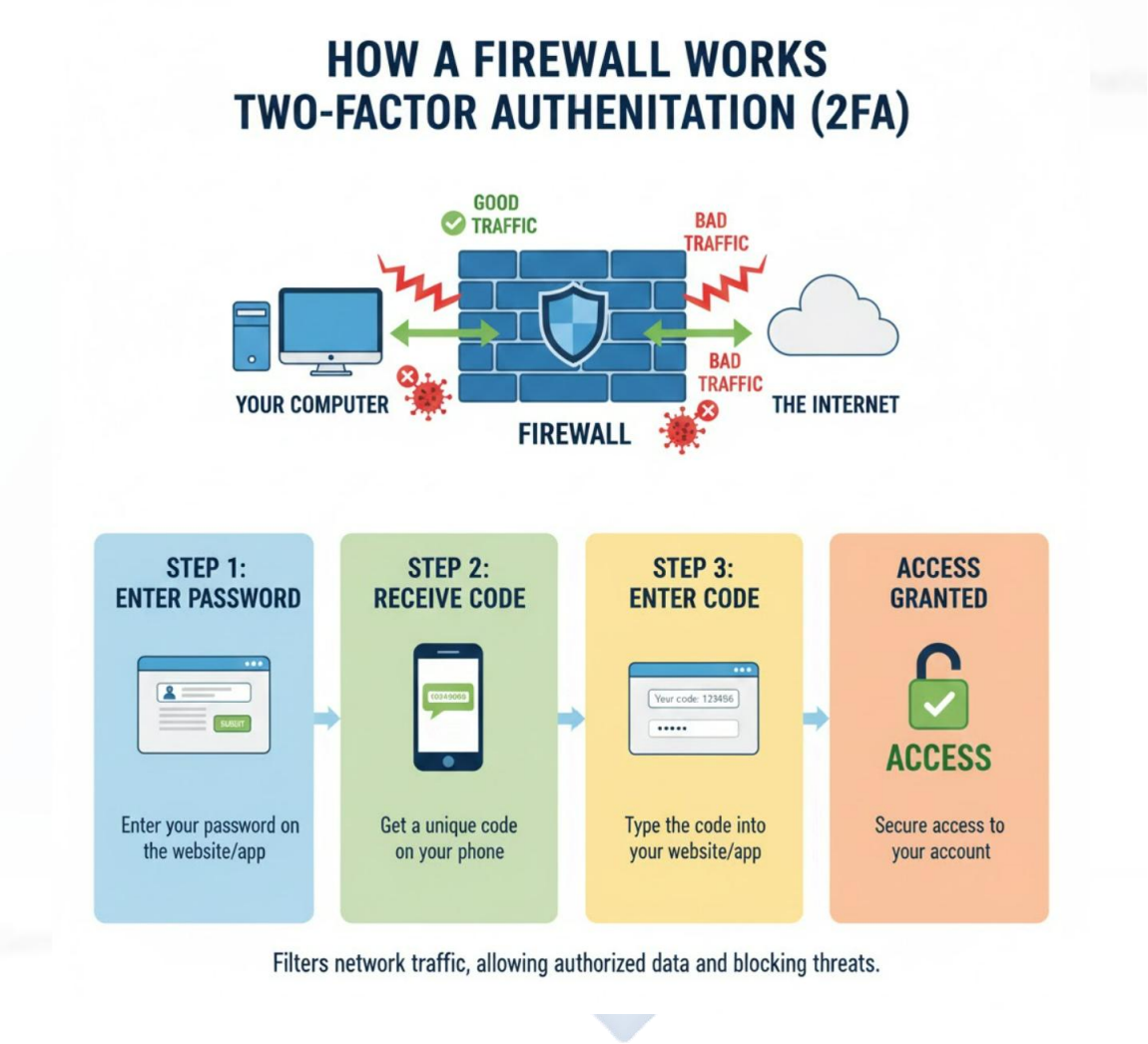
Assignment Questions (Week 6)

1. Go into your email (or ask a parent to help). Find an example of a "spam" or "phishing" email. Write a one-page report *analyzing* it. What are the "red flags" that tell you it's fake? (e.g., bad grammar, a sense of urgency, a suspicious sender address). **DO NOT CLICK ANY LINKS IN THE EMAIL.**

2. A company's server is hit with **Ransomware**. The hackers demand $1 million. Write a 300-word essay on the "pros" and "cons" of *paying* the ransom.

WEEK 8: CYBERSECURITY II - DEFENSE

Introduction: Now that we know the threats, we can learn how to defend against them. Cybersecurity defense is about creating *layers* of protection.



8.1 Protection 1: Antivirus & Anti-malware

- **What it is:** A **utility program** (Term 1, Week 6) that is designed to detect, prevent, and remove malware.
- **How it works:**
    - **Signature-Based Detection:** It keeps a "database" of known malware "fingerprints" (signatures). It scans files and compares them to this database. (This is why it *must* be updated daily).

- **Heuristic-Based Detection:** It looks for *suspicious behavior* (e.g., "Why is this program trying to encrypt all my files?"). This can catch *new* malware that isn't in the database yet.

8.2 Protection 2: Firewalls

- **What it is:** A network security device (either hardware or software) that acts as a "gatekeeper" for your network. It monitors incoming and outgoing network traffic.
- **How it works (Packet Filtering):** It inspects every **packet** (see Week 2) of data and decides whether to *allow* it or *block* it based on a set of security rules.
- **Analogy:** It is like a bouncer at a club. It checks the "guest list" (the rules) and only lets approved traffic (packets) in or out. Your Windows OS has a built-in software firewall.

8.3 Protection 3: Passwords & Authentication

- **Authentication** is the process of *proving you are who you say you are*.

1. **Strong Passwords:**
   - A *weak* password is "12345" or "password".
   - A *strong* password is based on **length** and **complexity (entropy)**.
   - **Rules:** At least 12 characters, and a *mix* of uppercase, lowercase, numbers, and symbols. (e.g., Tr0ub4dour&3).
   - **Best Practice:** Use a **Passphrase** (e.g., Correct!Horse!Battery!Staple!). It's long, easy to remember, and very hard to crack.
2. **Multi-Factor Authentication (MFA) / 2FA:**
   - This is the *most important* way to protect your accounts.
   - It requires *more than one* "factor" to log in:
     - **Factor 1: Something you KNOW** (your password).
     - **Factor 2: Something you HAVE** (your phone, which receives a one-time code).
     - **Factor 3: Something you ARE** (your fingerprint or face scan).
   - Even if a hacker steals your password, they *cannot* log in without *also* having your phone.

8.4 Protection 4: Encryption

- **What it is:** The process of converting plain text (data you can read) into scrambled *ciphertext* (data you cannot read) using a "key." The only way to read it is to *decrypt* it with the correct key.
- **Why it's important:**
    - It is the "S" in **HTTPS** (Week 2). It scrambles your data as it travels over the internet.
    - It protects your data if your laptop is stolen (e.g., using BitLocker or FileVault to encrypt the hard drive).
    - It is what makes **WhatsApp** secure (End-to-End Encryption).

Evaluation Questions (Week 8)

1. Explain the two ways an Antivirus program detects malware.
2. What is the main job of a **Firewall**?
3. What are the two key components of a *strong* password?
4. What is "2FA" (Two-Factor Authentication)?
5. Why is 2FA so much more secure than just a password?

Assignment Questions (Week 8)

1. Go to howsecureismypassword.net.
    - (a) Test three *bad* passwords (e.g., "password", "yourname", "123456"). Write down how long it would take to crack them.
    - (b) Create one strong *passphrase* (e.g., RedLorryYellowLorry1!) and test it. Write down how long it would take.
    - Write a summary of what you learned.
2. Research the difference between **Symmetric Encryption** and **Asymmetric (Public-Key) Encryption**. Write a one-page report explaining the concept.

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WEEK 9: DATA PRIVACY & DIGITAL ETHICS

Introduction: Just because something is *possible* with technology, it does not mean it is *right*. Ethics is the study of "what is right and wrong." Data privacy is one of the most important ethical issues today.



9.1 Data Privacy

- **Data Privacy** is the right of an individual to control what information (data) is collected about them, and how it is used, stored, and shared.
- **Your "Digital Footprint":** This is the trail of data you leave behind online.
    - **Active Footprint:** Data you *intentionally* share (e.g., your posts on Instagram, your tweets, your public profile).

- **Passive Footprint:** Data you leave *unintentionally* (e.g., your IP address, your search history, websites that track you with "cookies," your location data from your phone).

9.2 Data Protection Laws

Because data is so valuable, governments have created laws to protect citizens.

- **NDPR (Nigeria Data Protection Regulation):**
  - Nigeria's main data privacy law (based on GDPR).
  - It gives you the **Right to Consent** (a company must clearly *ask* for your permission to collect your data) and the **Right to be Forgotten** (you can ask a company to delete your data).
- **GDPR (General Data Protection Regulation):**
  - Europe's very strict privacy law. It is the global "gold standard" and affects any company (even in Nigeria) that offers services to people in Europe.

9.3 Digital Ethics: Responsible Use

- **Intellectual Property & Copyright:** Is it ethical to pirate (illegally download) software, movies, or music? This is theft of the creator's "intellectual property."
- **"Fake News" & Disinformation:** (See Term 3, Citizenship). It is *unethical* to knowingly share false information that could cause panic, harm someone's reputation, or incite violence.

9.4 Cyberbullying

- **Definition:** The use of digital technology (social media, IM, text) to repeatedly and intentionally harass, threaten, or humiliate someone.
- **Forms:** Spreading rumours, posting embarrassing photos, sending threats, or intentionally excluding someone.
- **Why it's worse than regular bullying:**
  1. **It's 24/7:** The victim cannot escape it, even at home.

2. **It's Permanent:** What goes online can stay online forever.
3. **It's (semi-)Anonymous:** Bullies can hide behind fake profiles.

- **What to do:**
  1. **DON'T respond.**
  2. **BLOCK** the bully.
  3. **SCREENSHOT** the evidence.
  4. **REPORT** the bully (to the platform, your parents, or a teacher).

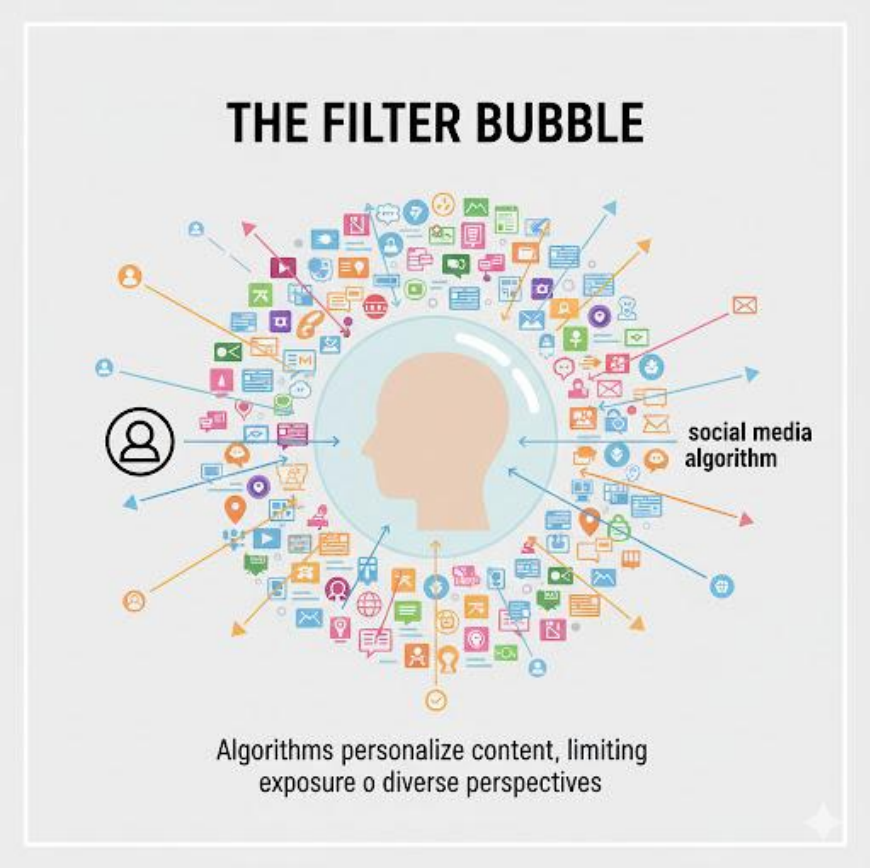
Evaluation Questions (Week 9)

1. What is "Data Privacy"?
2. What is the difference between an "Active" and a "Passive" digital footprint?
3. What is the "NDPR"?
4. Define "Cyberbullying" in your own words.
5. List three reasons why cyberbullying can be worse than in-person bullying.

Assignment Questions (Week 9)

1. Go to the "Settings" of a social media app you use (e.g., Instagram, TikTok, Facebook). Find the "Privacy and Security" section. Write a one-page report on 3 privacy settings you can control (e.g., "who can see your posts," "location sharing," "ad preferences").
2. Write a 300-word ethical argument: "You find a USB drive on the floor. Is it ethical to plug it in to find out who the owner is?" (Hint: Consider the security risks from Week 6).

WEEK 10: SOCIAL MEDIA TECHNOLOGIES



Introduction: Social media platforms are powerful digital technologies that have changed how we socialize, get news, and view the world. They are a key part of "digital citizenship."

10.1 The Benefits of Social Media

1. **Connection:** Stay in touch with friends and family, especially those far away.
2. **Information & News:** A fast way to get real-time, breaking news.
3. **Community:** Find and connect with people who share your niche hobbies or interests.
4. **Advocacy & Activism:** A powerful tool for raising awareness and organizing for social change.
5. **Opportunity:** A platform for business, art, and personal branding.

10.2 The Risks & Challenges of Social Media

1. **Mental Health:** Can lead to anxiety, depression, and low self-esteem due to *constant social comparison* and the pressure to look "perfect."
2. **Addiction:** These apps are *designed* to be addictive, using "infinite scroll" and "likes" (dopamine hits) to keep you online.
3. **"Filter Bubbles" & "Echo Chambers":**
    - The **algorithm** (the code that decides what you see) learns what you like and *only* shows you content it thinks you'll agree with.
    - **Filter Bubble:** Your own, unique "bubble" of information.
    - **Echo Chamber:** You are only "hearing" your own beliefs "echoed" back at you. This makes it harder to understand other people and can lead to extremism.
4. **Disinformation ("Fake News"):** False information spreads *faster* on social media than true information because it is often more shocking or emotional.
5. **Privacy:** Social media is *not free*. You "pay" for it with your **data** (your clicks, likes, location, friends). This data is the *product* that the company sells to advertisers.

10.3 Responsible Digital Citizenship

A responsible digital citizen is a patriot of the *online world* (links to Citizenship, Term 3). They practice:

1. **Critical Thinking: THINK before you share.** (Is this true? Is this kind? Is this helpful?).
2. **Empathy:** Remembering there is a real human being behind the other screen.
3. **Media Literacy:** Understanding the *business model* of social media. Knowing that algorithms create "filter bubbles" and actively seeking out different points of view.
4. **Digital Well-being:** Knowing when to *log off*. Curating your feed to follow accounts that make you feel good or teach you something, not ones that make you feel bad.

Evaluation Questions (Week 10)

1. List two benefits and two risks of social media.
2. What is a "filter bubble" or "echo chamber"?
3. Explain the *business model* of most social media companies. (If the product is free, what is being sold?)

4. What is "Media Literacy"?
5. List 3 qualities of a "Responsible Digital Citizen."

Assignment Questions (Week 10)

1. For 24 hours, track *all* your social media and screen time. (Most phones have this built-in: "Digital Wellbeing" or "Screen Time"). Write a one-page, *private* reflection on your results. Were you surprised? How much time was "productive" vs. "unproductive"? What one change could you make?
2. Write a 300-word essay: "Do the social and mental health risks of social media for teenagers outweigh its benefits?"

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WEEKS 11-13: REVISION & EXAMS

Key Concepts for Revision:

- **Networks:** PAN, LAN, MAN, WAN. Client-Server vs. P2P. Topologies (Bus, Star, Ring, Mesh). Components (Switch, Router, Modem).
- **Internet:** TCP/IP (addressing & reliability). DNS (phonebook). HTTP vs. HTTPS (secure). WWW vs. Internet. Browsers vs. Search Engines (Crawling, Indexing, Ranking).
- **Communication:** Email (SMTP, POP3, IMAP). Etiquette. IM (synchronous) vs. Email (asynchronous).
- **Storage:** Magnetic (HDD), Optical (CD), Solid-State (SSD).
- **Cloud:** Definition (renting servers). Models: IaaS (kitchen), PaaS (pizza kitchen), SaaS (Gmail, Netflix).
- **Cybersecurity Threats (CIA Triad):**
    - **Malware:** Virus (attaches), Worm (spreads), Trojan (disguise), Ransomware (encrypts), Spyware (spies).
    - **Social Engineering:** Phishing (fake email), Smishing (fake text).
- **Cybersecurity Defense:**
    - **Antivirus** (Signatures, Heuristics).
    - **Firewall** (Packet filtering).
    - **Passwords** (Strong = long + complex).
    - **2FA** (Know + Have).
    - **Encryption** (scrambling data).
- **Ethics & Privacy:** Active vs. Passive Footprint. NDPR. Cyberbullying (what to do).
- **Social Media:** Risks (Filter Bubbles, Echo Chambers) vs. Benefits. Business Model (data for ads). Digital Citizenship (THINK).

Sample Exam Structure

- **Section A: Multiple Choice (40 marks)**

    - (e.g., "Which network protocol is responsible for *reliability* and *reassembling packets*?", "A piece of malware that disguises itself as a useful game is a...?", "What is the name of Nigeria's data protection law?")
- **Section B: Short Answer Questions (30 marks)**
    - (Answer 5 out of 7. e.g., "Explain the 3 steps a search engine uses," "What is the difference between IMAP and POP3?", "What is 2FA and why is it secure?")
- **Section C: Essay Questions (30 marks)**
    - (Answer 2 out of 4. e.g., "A company's server was infected with a worm. Describe the difference between a worm, a virus, and a trojan. Then, explain 3 defense methods (e.g., firewall, antivirus) that could have prevented this," "Explain the three cloud service models (IaaS, PaaS, SaaS) using a clear analogy for each. Why is 'SaaS' the most common model for end-users?", "What is a 'Filter Bubble'? Discuss the major risks and benefits of social media in modern society.")

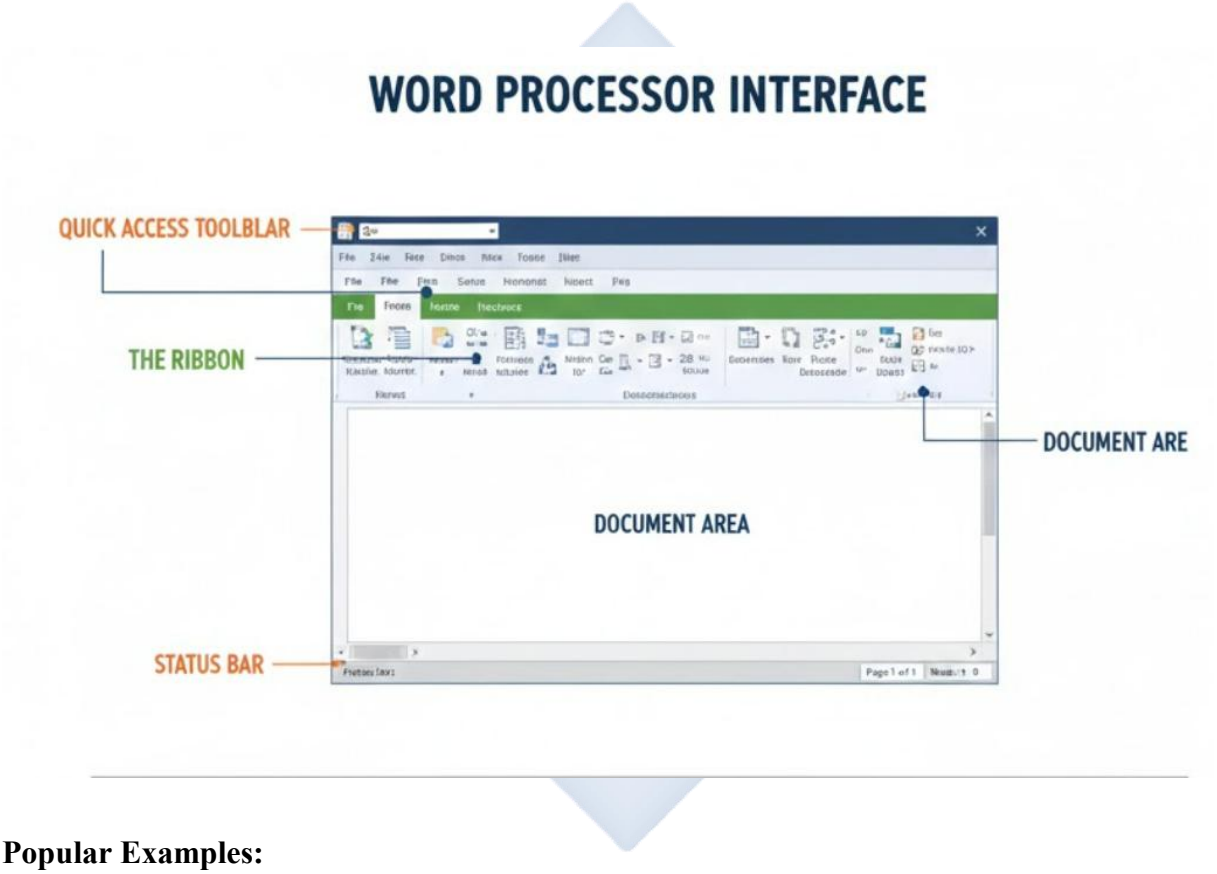
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SS1 DIGITAL TECHNOLOGIES LESSON NOTES

THIRD TERM

WEEK 1: WORD PROCESSING APPLICATIONS

Introduction: A **Word Processor** is an **application software** (Term 1, Week 6) specifically designed for creating, editing, formatting, and printing text-based documents. It is the digital evolution of the typewriter, but far more powerful.



Popular Examples:

- **Microsoft Word:** The industry-standard desktop application (part of Microsoft Office).
- **Google Docs:** A free, web-based (SaaS - Term 2, Week 4) word processor that excels at collaboration.

1.1 Core Interface & Features

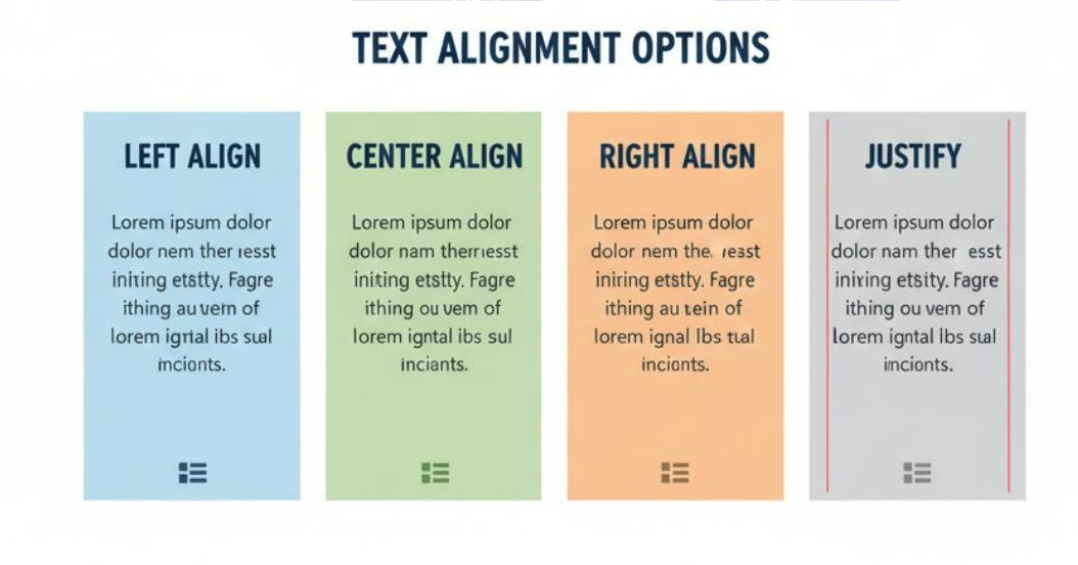
- **The Ribbon:** (In MS Word) The toolbar at the top, organized into **Tabs** (e.g., Home, Insert, Page Layout) that contain groups of related commands.
- **The Document Area:** The blank white "page" where you type.
- **The Cursor:** The blinking vertical line that indicates where your text will appear.

1.2 Character Formatting (Formatting individual letters)

This involves changing the appearance of the text itself.

- **Font:** The *design* of the text (e.g., Times New Roman, Arial, Calibri).
- **Font Size:** How large the text is (measured in "points," e.g., 12pt).
- **Font Style:**
    - **Bold: Makes text heavier.**
    - *Italic: Slants the text.*
    - <u>Underline:</u> <u>Puts a line under the text.</u>
- **Font Color:** Changes the color of the text.
- **Case:** UPPERCASE, lowercase, Sentence case.

1.3 Paragraph Formatting (Formatting blocks of text)



This involves changing how a whole paragraph is structured.

- **Alignment:** How the text lines up.
    - **Left Align:** Standard for English text.
    - **Center Align:** For headings and titles.
    - **Right Align:** Used for some date formats.
    - **Justify:** Aligns text to *both* the left and right margins (like a newspaper).
- **Line Spacing:** The amount of vertical space between lines of text (e.g., single-spaced, double-spaced).
- **Indentation:** Pushing the first line of a paragraph inward.
- **Lists:**
    - **Bulleted List:** (•) For items without a specific order.
    - **Numbered List:** (1., 2.) For items in a sequence.

1.4 Page Layout & Document Features

- **Page Margins:** The blank white space around the edge of your document.
- **Page Orientation:**
    - **Portrait:** Taller than it is wide (standard).
    - **Landscape:** Wider than it is tall.
- **Headers & Footers:** Small sections at the very top (Header) or bottom (Footer) of every page. Used for page numbers, author name, or document title.
- **Spell Check:** A built-in dictionary that checks for spelling (red underline) and grammar (blue/green underline) errors.
- **Mail Merge:** A powerful feature that allows you to create many *personalized* documents from a single template and a data source (like a list of names and addresses). Used for sending out mass invitations or letters.

Evaluation Questions (Week 1)

1. What is a Word Processor?
2. What is the difference between Character Formatting (e.g., Bold) and Paragraph Formatting (e.g., Alignment)?
3. List the four types of text alignment. Which one is used in newspapers?

4. What is the difference between a "Header" and a "Footer"?
5. What is "Mail Merge" used for?

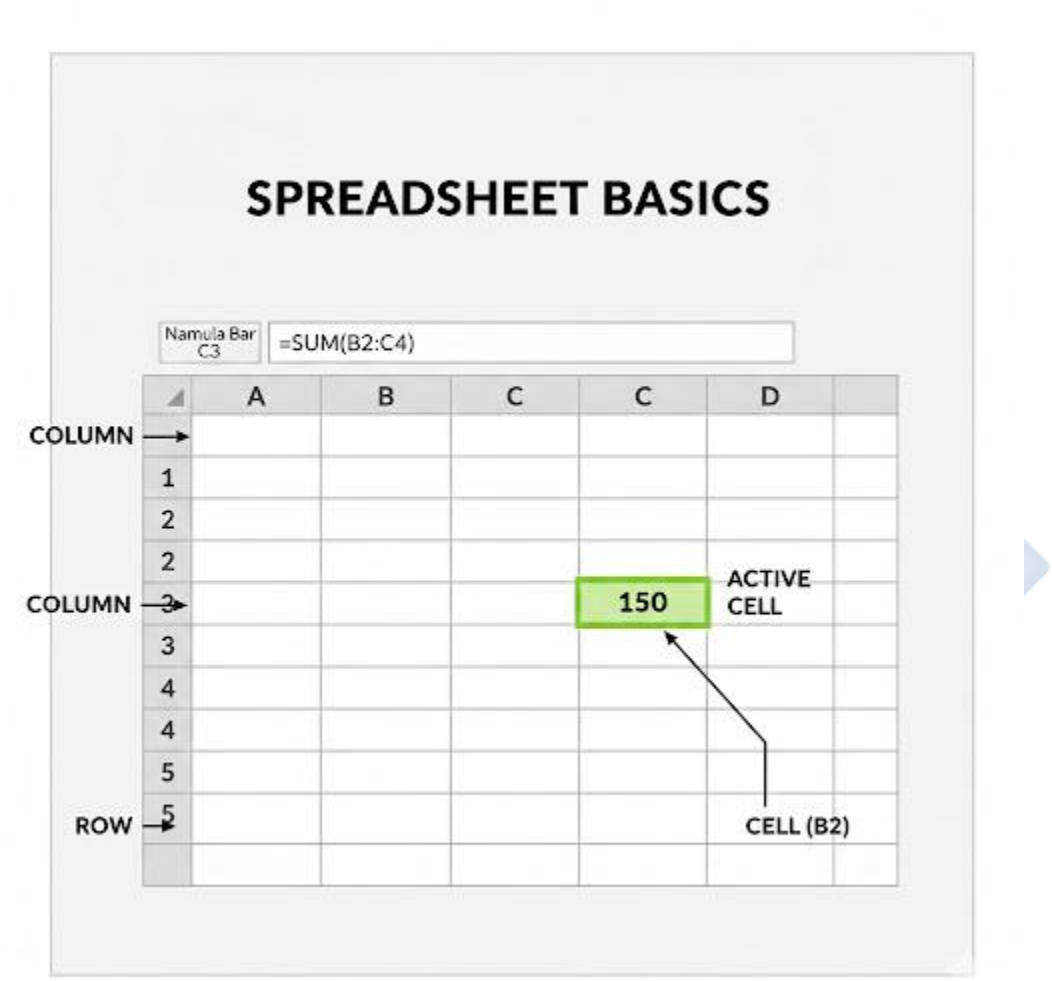
Assignment Questions (Week 1)

1. Open a word processor (MS Word or Google Docs). Type a 300-word essay on "The History of Computers" (from Term 1, Week 2).
    - The **Title** must be **Center Aligned**, **Size 16**, and **Bold**.
    - The **body text** must be **Justified**, **Size 12**, and **double-spaced**.
    - Add a **Header** with your Name and a **Footer** with the Page Number.
2. Research the difference between "Portrait" and "Landscape" orientation. Draw a simple diagram of each and list one type of document that is perfect for each layout.

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WEEK 2: SPREADSHEET APPLICATIONS I

Introduction: A **Spreadsheet** is an application software designed for organizing, analyzing, and storing data in a **tabular form** (rows and columns). It is essentially a powerful digital calculator and data management tool.

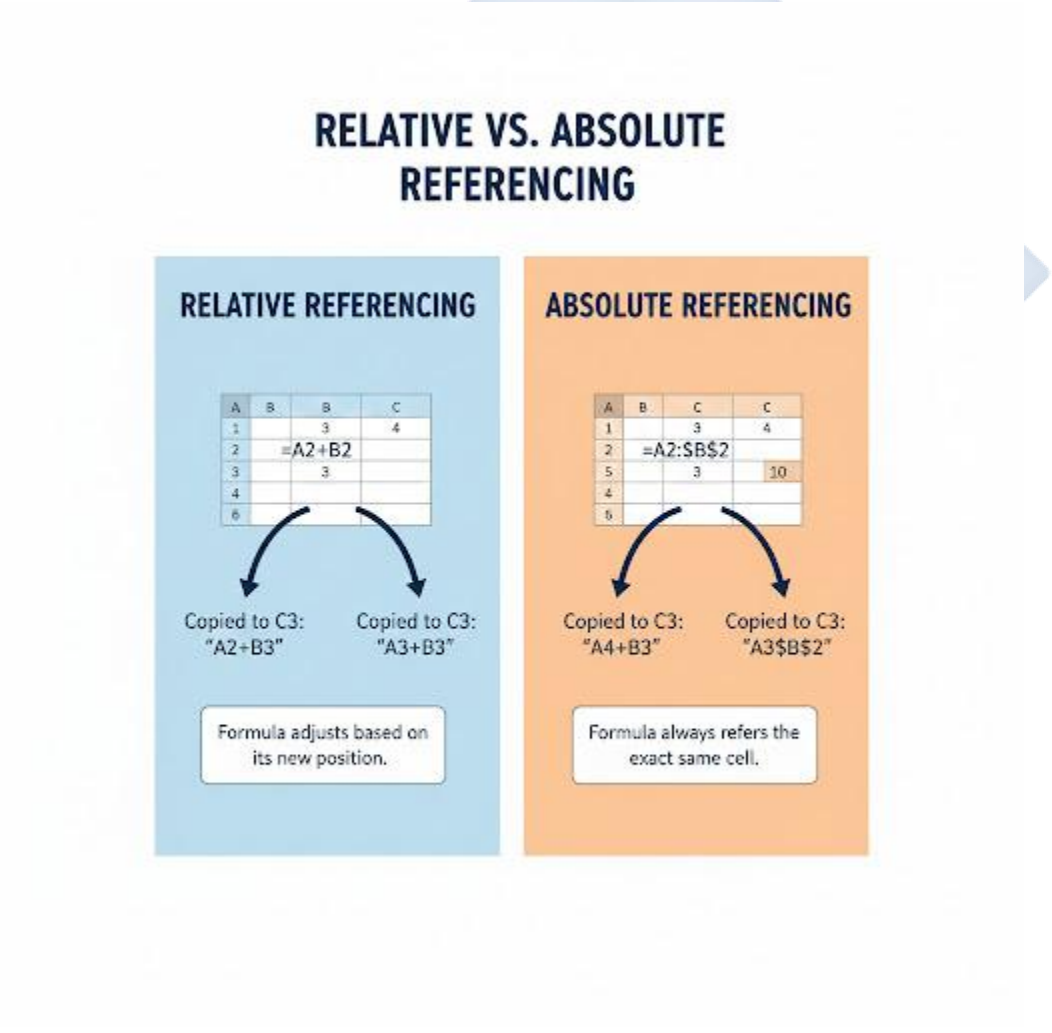


Popular Examples:

- **Microsoft Excel:** The industry-standard desktop application.
- **Google Sheets:** A free, web-based (SaaS) alternative.

2.1 Core Concepts & Terminology

- **Workbook:** The entire file (e.g., Budget.xlsx).
- **Worksheet (or Sheet):** A single "page" or "tab" within the workbook.
- **Cell:** The intersection of a row and a column. It is the basic box where you enter data.
- **Row:** A horizontal line of cells, identified by **Numbers** (1, 2, 3...).
- **Column:** A vertical line of cells, identified by **Letters** (A, B, C...).
- **Cell Address (or Cell Reference):** The unique name of a cell, formed by its Column letter and Row number (e.g., **B4**, **C10**).
- **Active Cell:** The currently selected cell, indicated by a dark border.
- **Formula Bar:** The bar at the top where you can see and edit the *contents* of the active cell.



2.2 Basic Formulas

Formulas are what make spreadsheets powerful. They are mathematical equations that perform calculations on your data.

- **The Golden Rule:** All formulas MUST begin with an **equals sign (=)**. This tells the spreadsheet to "calculate" rather than just "display" the text.
- **Basic Operators:**
    - + (Addition)
    - - (Subtraction)
    - * (Multiplication)
    - / (Division)

Example:

- If you type 5+10 in cell A1, the cell will just show the text 5+10.
- If you type **=5+10** in cell A1, the cell will perform the calculation and display the result **15**.
- If cell B2 contains 100 and cell C2 contains 50, you could type **=B2*C2** in cell D2. Cell D2 would then display 5000.

2.3 Cell Referencing (Crucial Concept)

Cell referencing is how you tell a formula *which cells* to use. The type of reference determines what happens when you *copy* that formula to another cell.

1. **Relative Referencing (Default):**
    - **What it is:** A reference that is "relative" to its position. (e.g., **=A1+B1**).
    - **How it works:** When you copy this formula *down* one row (to cell C2), it automatically changes to **=A2+B2**. It "knows" you want to add the cells in the *new* row.
    - **Use Case:** 90% of the time, this is what you want.
2. **Absolute Referencing:**

- **What it is:** A reference that is "locked" and **does not change** when copied. You use the **dollar sign ($)** to lock it. (e.g., **=$A$1+$B$1**).
- **How it works:** When you copy =$A$1 to *any other cell*, it will *always* refer to cell A1.
- **Use Case:** Used when you have a single, constant value (like a VAT rate or a commission percentage) that you want to use in many different formulas.

3. **Mixed Referencing:**
   - **What it is:** A reference where *either* the column *or* the row is locked, but not both.
   - **Examples:**
     - **=$A1** (Column is locked, row is relative).
     - **=A$1** (Column is relative, row is locked).
   - **Use Case:** Advanced use, such as in creating multiplication tables.

Evaluation Questions (Week 2)

1. What is a Spreadsheet?
2. What is the difference between a "Worksheet" and a "Workbook"?
3. What is the "Active Cell"?
4. What is the "Golden Rule" for starting any formula in a spreadsheet?
5. Explain the difference between a Relative (A1) and an Absolute ($A$1) cell reference.

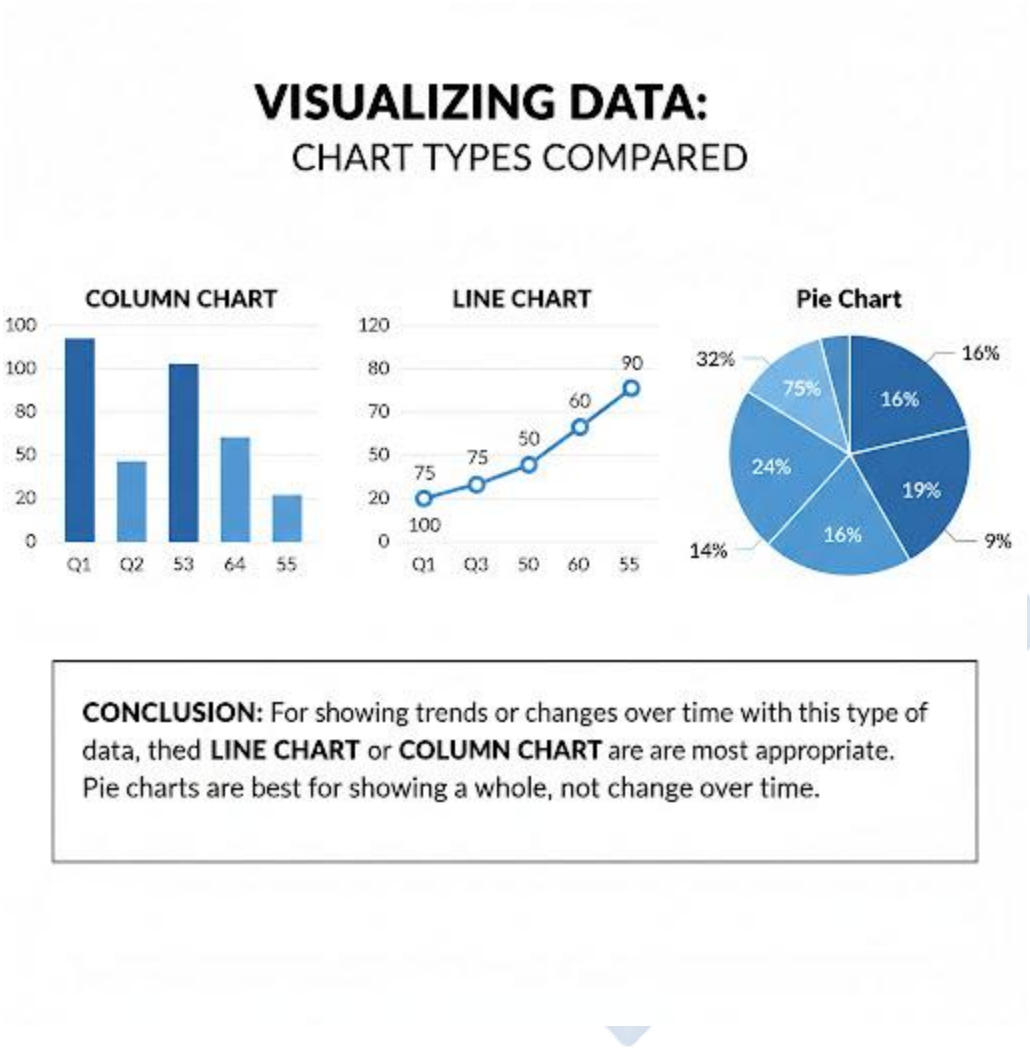
Assignment Questions (Week 2)

1. Create a simple "Shopping List" in a spreadsheet.
   - Column A: Item (e.g., Rice, Beans, Milk)
   - Column B: Price (e.g., 500, 300, 200)
   - Column C: Quantity (e.g., 3, 2, 1)
   - Column D: Total Cost
   - In cell D2, write a **formula** that multiplies the Price (B2) by the Quantity (C2).
   - Copy this formula down for all your items.

2. A company has a sales commission rate of 15% which is stored in cell H1. In Column A, you have Salesperson Names. In Column B, you have Sales Amount. In Column C, you need to calculate their commission.
    - Write the *exact formula* you would put in cell C2 to calculate the commission for the salesperson in B2. (Hint: You must use an **Absolute Reference** for the commission rate in H1).

WEEK 3: SPREADSHEET APPLICATIONS II

Introduction: Last week, we used simple formulas (=A1+B1). This week, we explore **Functions**—pre-built, named formulas that perform complex calculations quickly.



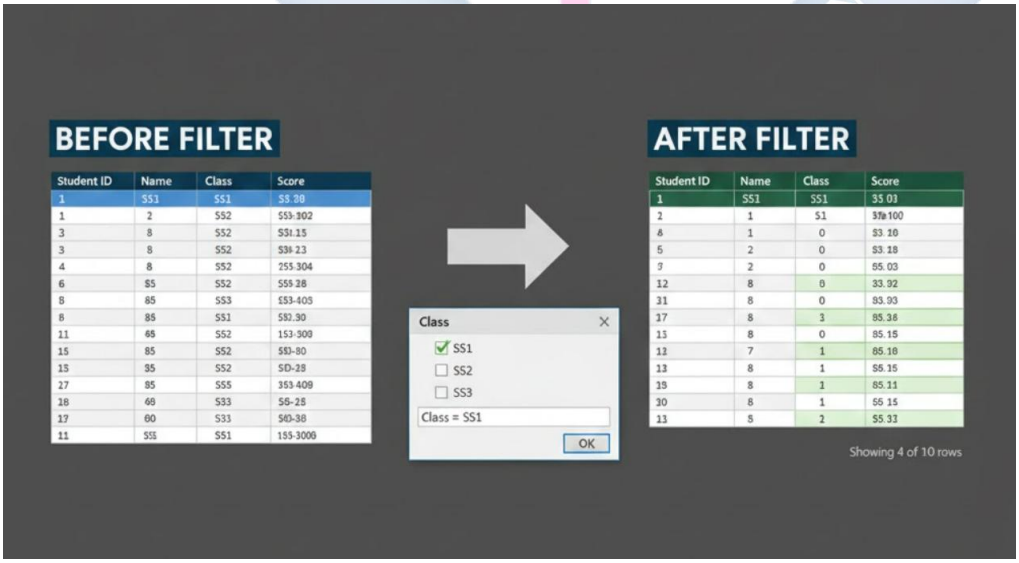
3.1 Understanding Functions

- **Formula vs. Function:**
  - **Formula:** =A1+A2+A3+A4+A5 (tiring to type).
  - **Function: =SUM(A1:A5)** (fast and efficient).
- **Anatomy of a Function:**
  - = (The equals sign).
  - SUM (The **Function Name**).

- ( ) (Parentheses that hold the inputs).
- A1:A5 (The **Argument** or **Range**. The colon : means "through," so A1:A5 means "cells A1, A2, A3, A4, and A5").

3.2 Common & Essential Functions

- **=SUM(range):** Adds all the numbers in a range of cells.
- **=AVERAGE(range):** Calculates the average (the mean) of the numbers in a range.
- **=MAX(range):** Finds the *highest* (maximum) value in a range.
- **=MIN(range):** Finds the *lowest* (minimum) value in a range.
- **=COUNT(range):** *Counts* how many cells in the range contain *numbers*.
- **=COUNTA(range):** *Counts* how many cells in the range are *not empty* (counts numbers *and* text).
- **=IF(condition, value_if_true, value_if_false):** A logical function.
  - **Example:** =IF(B2 >= 50, "Pass", "Fail")
  - **Translation:** "If the value in cell B2 is greater than or equal to 50, then display the word 'Pass', otherwise, display the word 'Fail'."



3.3 Charts (Data Visualization)

Charts are a visual way to represent your data, making it much easier to understand patterns and trends.

- **Column or Bar Chart:**
    - **Use:** Comparing values across different categories. (e.g., "Sales per Salesperson," "Population of different cities").
- **Line Chart:**
    - **Use:** Showing a *trend over time*. (e.g., "Company profit per month," "Patient temperature over 3 days").
- **Pie Chart:**
    - **Use:** Showing *parts of a whole* (percentages). The data MUST add up to 100%. (e.g., "Market share of different brands," "Percentage of votes for each candidate").

3.4 Data Analysis: Sorting & Filtering

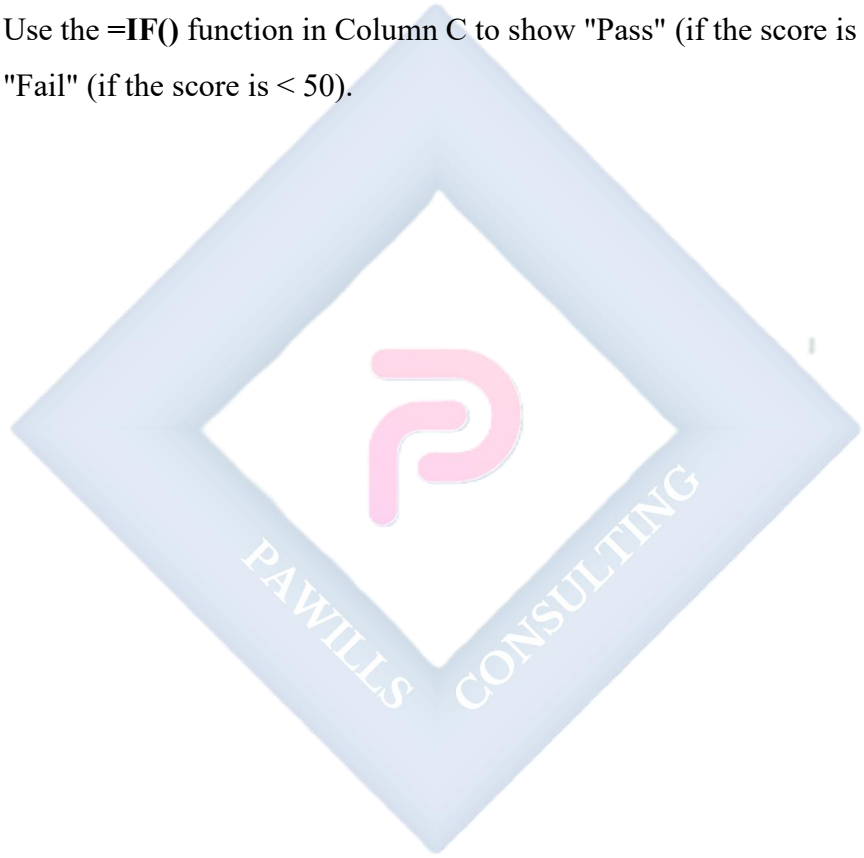
- **Sorting:** Re-arranging your rows of data based on the values in a column.
    - **Examples:** Sorting a list of students alphabetically (A-Z) by Name, or sorting them numerically (Highest to Lowest) by Test Score.
- **Filtering:** *Hiding* rows that don't match your criteria, allowing you to "zoom in" on the data you care about.
    - **Example:** In a giant list of all students, you could apply a filter to the Class column to *only* show students who are in "SS1".

Evaluation Questions (Week 3)

1. What is the difference between a Formula and a Function?
2. What does the : (colon) mean in a function like =SUM(B1:B10)?
3. You want to find the highest test score in column C. What function would you use?
4. What is the one major rule for using a Pie Chart?
5. What is the difference between "Sorting" and "Filtering"?

Assignment Questions (Week 3)

1. Using your "Shopping List" spreadsheet from last week's assignment:
    - In a cell at the bottom of the Total Cost column (Column D), use the **=SUM()** function to calculate the total cost of all items.
    - In a separate cell, use the **=AVERAGE()** function to find the *average price* of an item (using Column B).
2. Create a new sheet. In Column A, list 5 subjects. In Column B, list your (imaginary) scores for them.
    - Create a **Bar Chart** that visually compares your scores.
    - Use the **=IF()** function in Column C to show "Pass" (if the score is >= 50) or "Fail" (if the score is < 50).



WEEK 4: PRESENTATION SOFTWARE

Introduction: Presentation Software is an application designed to display information in the form of a **slide show**. It combines text, images, and charts to create a visual aid for a speaker.



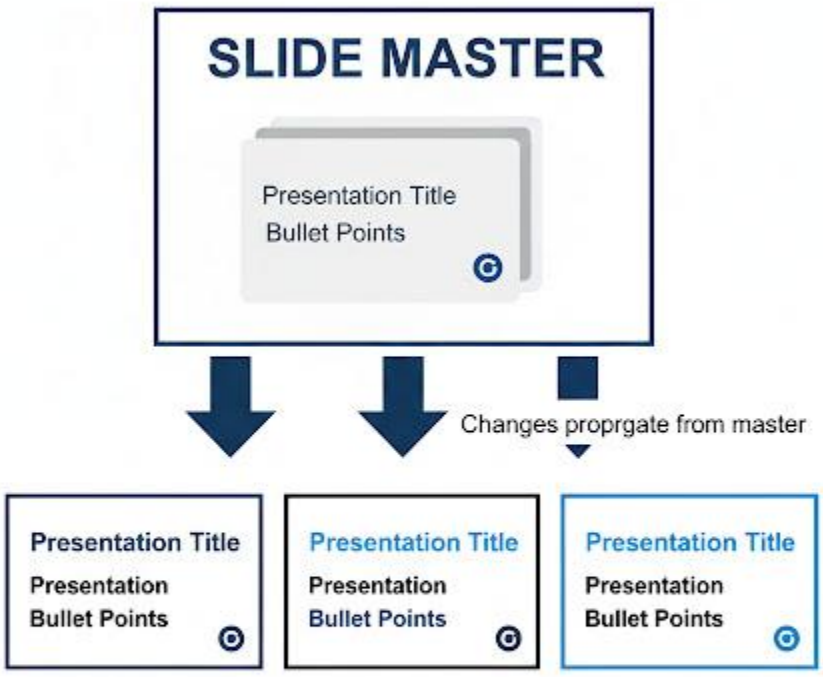
Popular Examples:

- **Microsoft PowerPoint:** The most widely used presentation software.
- **Google Slides:** A free, web-based (SaaS) alternative.

4.1 Core Concepts & Terminology

- **Slide:** A single "page" of your presentation.
- **Slideshow (or Presentation):** The sequence of all your slides, played one after another.

- **Layout:** A pre-defined template for a slide that arranges placeholders for content (e.g., a "Title and Content" layout, a "Title Only" layout).
- **Placeholders:** The "click to add text" or "click to add image" boxes on a layout.
- **Slide Master:** An advanced feature. It's the "master template" that controls the font, colors, and background for *all* slides in your presentation. If you want your company logo on every slide, you put it on the Slide Master.



Relationship: Slide Master & Individual Slides

4.2 Key Features

1. **Adding Content:** You can add text, images, charts (from Excel), and even videos.
2. **Themes:** Pre-designed sets of colors, fonts, and backgrounds to make your presentation look professional.
3. **Transitions:**

    - **Definition:** The *visual effect* used when moving from **one slide to the next** (e.g., Fade, Wipe, Dissolve).
    - **Analogy:** The "scene change" in a movie.
4. **Animations:**
    - **Definition:** The *visual effect* applied to **individual items *on* a slide** (e.g., making a line of text "Fly In" or an image "Fade In").
    - **Types:** Entrance (how it appears), Emphasis (e.g., spin), Exit (how it leaves).

4.3 Tips for an Effective Presentation

The software is a *tool*. The *presenter* is the focus.

- **Rule 1: Don't read your slides.** Your audience can read. Your slides are just *cues* for you and *summaries* for them.
- **Rule 2: Less is More.** Use keywords, not full sentences. A common (bad) example is a slide full of text.
- **Rule 3: Use High-Quality Visuals.** Use charts and images to *explain* your point, not just to decorate.
- **Rule 4: Be Consistent.** Use the same font and color scheme throughout (use a Theme or Slide Master).
- **Rule 5: Use Transitions/Animations Sparingly.** Too many spinning and flying objects are distracting, not professional.

Evaluation Questions (Week 4)

1. What is Presentation Software?
2. What is the difference between a "Transition" and an "Animation"?
3. What is a "Slide Master" and why would you use it?
4. What is a "Layout" in PowerPoint?
5. List three "tips" for giving a good presentation.

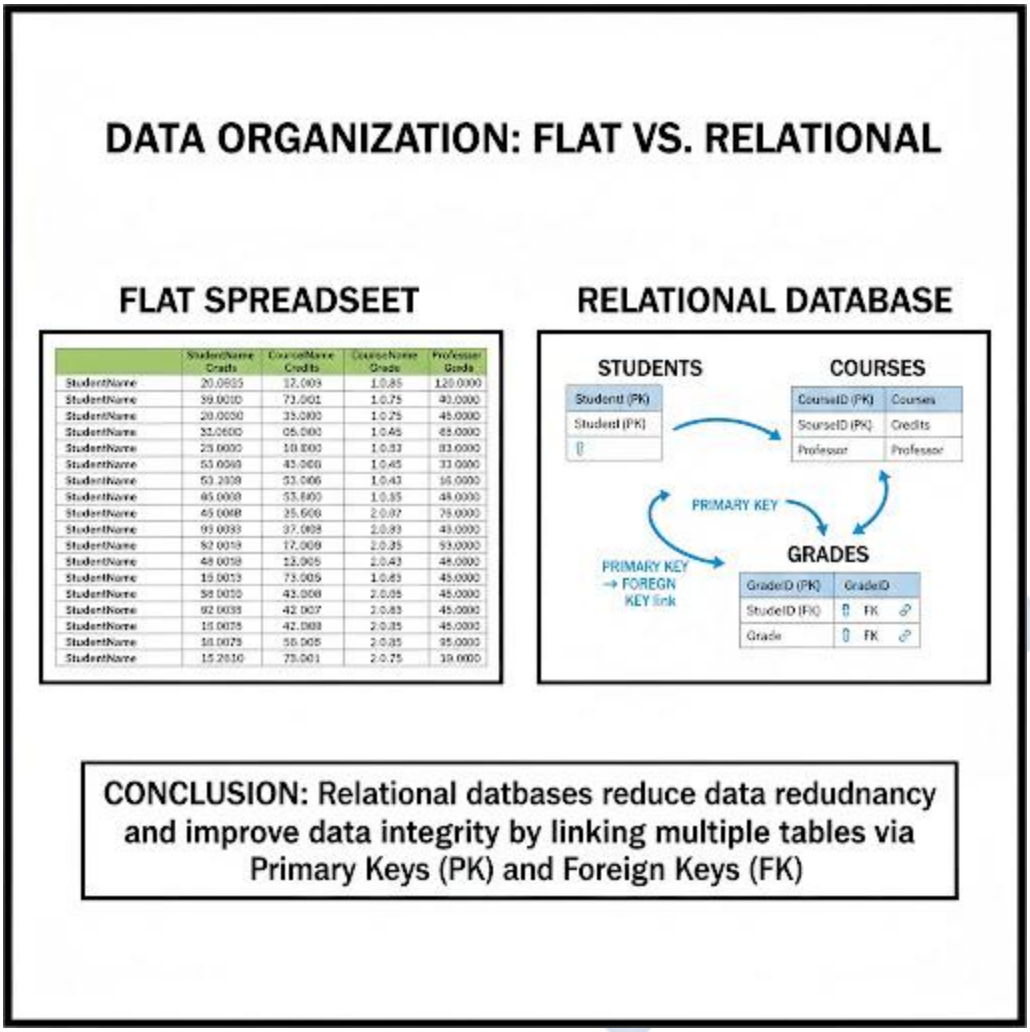
Assignment Questions (Week 4)

1. Create a 5-slide presentation on "Cybersecurity Threats" (from Term 2, Week 6).
    - **Slide 1:** Title ("Cybersecurity Threats") and Your Name.
    - **Slide 2:** "What is Malware?" (Use a bulleted list: Virus, Worm, Trojan, Ransomware).
    - **Slide 3:** "What is Phishing?" (Explain the concept).
    - **Slide 4:** How to Stay Safe (Use a bulleted list: Antivirus, Strong Passwords, 2FA).
    - **Slide 5:** Thank You.
    - Apply a simple "Fade" **transition** between all slides.
    - Make the bullet points on each slide "Appear" using an **animation**.
2. Research the "10/20/30 Rule of PowerPoint" (created by Guy Kawasaki). Write a one-page summary of what this rule means.

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WEEK 6: DATABASE INTRODUCTION

Introduction: We have learned about Spreadsheets (like Excel), which are good for numbers and lists. But when you have large amounts of *structured, related* data, you need a **Database**.



6.1 Concept of a Database

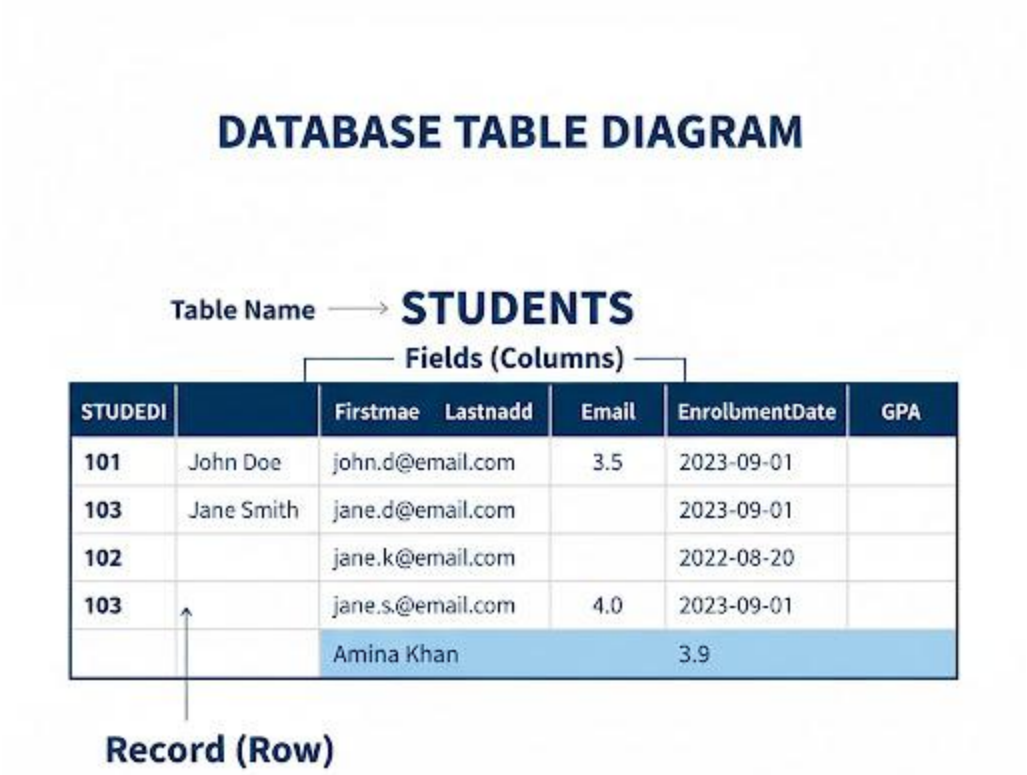
- **Definition:** A **Database** is an organized, structured collection of data, stored electronically in a computer system.
- **Spreadsheet vs. Database:**
    - A **Spreadsheet** (like an Excel sheet) is a single, flat file. It's good for a single list (e.g., your class register).

- A **Database** is a *collection of related tables*. It's designed to handle complex relationships.
- **Example:** Your school doesn't just have *one* list. It has a Students list, a Teachers list, a Subjects list, and a Grades list. A database links all these tables together.

6.2 DBMS (Database Management System)

- **Definition:** A **DBMS** is the *software* that is used to create, manage, and interact with a database. It's the "application" for databases, just as "Word" is the application for documents.
- **Examples:**
  - **Desktop:** Microsoft Access
  - **Server (Advanced):** MySQL, PostgreSQL, Microsoft SQL Server

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6.3 Core Concepts: The Building Blocks

A database is made of tables, and tables are made of fields and records.

1. **Table (or "Entity"):**
    - **Definition:** A container for data, organized in rows and columns. Each table stores data about *one specific thing*.
    - **Examples:** Students Table, Teachers Table.
2. **Field (or "Attribute"):**
    - **Definition:** A **column** in a table. It defines a single piece of information about the entity.

- **Examples:** In the Students table, the fields would be StudentID, FirstName, LastName, DateOfBirth.

3. **Record (or "Instance"):**
    - **Definition:** A **row** in a table. It represents one complete entry for a single item.
    - **Example:** The row for "Bayo Adewale, StudentID 1001..." is one record.
4. **Primary Key (Crucial Concept):**
    - **Definition:** A field that **uniquely identifies** every single record in a table. No two records can have the same primary key.
    - **Example:** In the Students table, FirstName is a *bad* primary key (you can have two "Bayo"s). StudentID or MatriculationNumber is a *perfect* primary key because it is 100% unique to each student.

Evaluation Questions (Week 6)

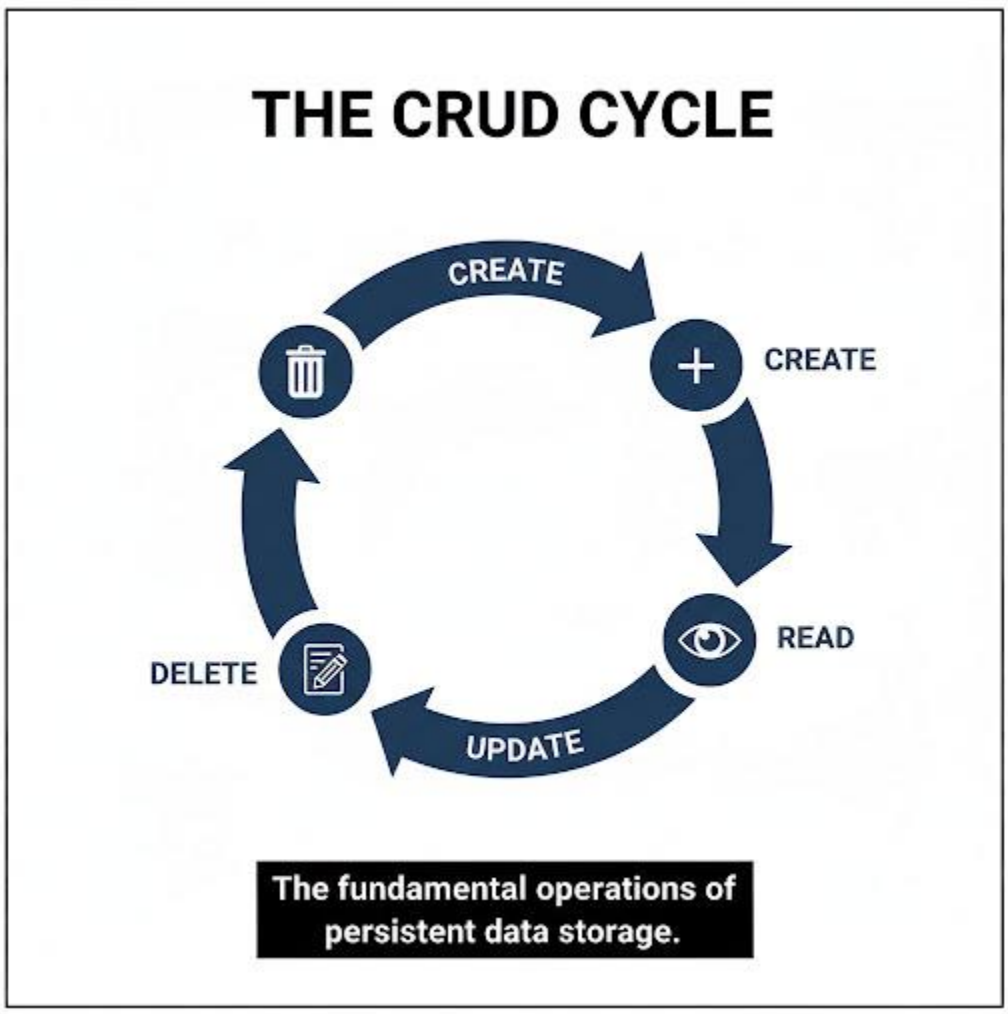
1. What is a Database?
2. Explain the main difference between a Spreadsheet and a Database.
3. What is a "DBMS"? Give one example.
4. In a database table, what is a "Field" and what is a "Record"?
5. What is a "Primary Key"? Give an example of a good primary key for a table of all citizens in Nigeria.

Assignment Questions (Week 6)

1. You are asked to design a database for a hospital. List three (3) tables you would create. For *each* table, list at least four (4) fields you would include, and circle the field you would use as the **Primary Key**.
    - (e.g., **Table:** Patients, **Fields:** PatientID (PK), Name, Address, BloodType).
2. Write a 300-word essay explaining why EmailAddress is a good Primary Key for a Users table on a website, but LastName is a very bad one.

WEEK 8: PRACTICAL DATABASE MANAGEMENT

Introduction: Last week, we learned the *theory* of databases. This week, we look at the four *practical operations* (known as **CRUD**) that we use to manage data, often using a DBMS like MS Access.



CRUD stands for:

- **C**reate (Adding new records)
- **R**ead (Retrieving data)
- **U**pdate (Editing existing records)
- **D**elete (Removing records)

8.1 Creating Tables & Data Types

Before you can add data, you must *design the table*. This means defining the **Fields** (columns) and their **Data Types**.

- **Data Type:** A rule that specifies what *kind* of data can be stored in a field.
    - **Text (or "Short Text"):** For names, addresses (e.g., "Bayo").
    - **Number:** For values used in calculations (e.g., 50, 1000).
    - **Date/Time:** For storing dates (e.g., 14-Oct-2025).
    - **Yes/No (or "Boolean"):** For true/false values (e.g., "IsPaid?").
    - **AutoNumber:** A number that automatically increments (1, 2, 3...) for each new record. Often used as a Primary Key.

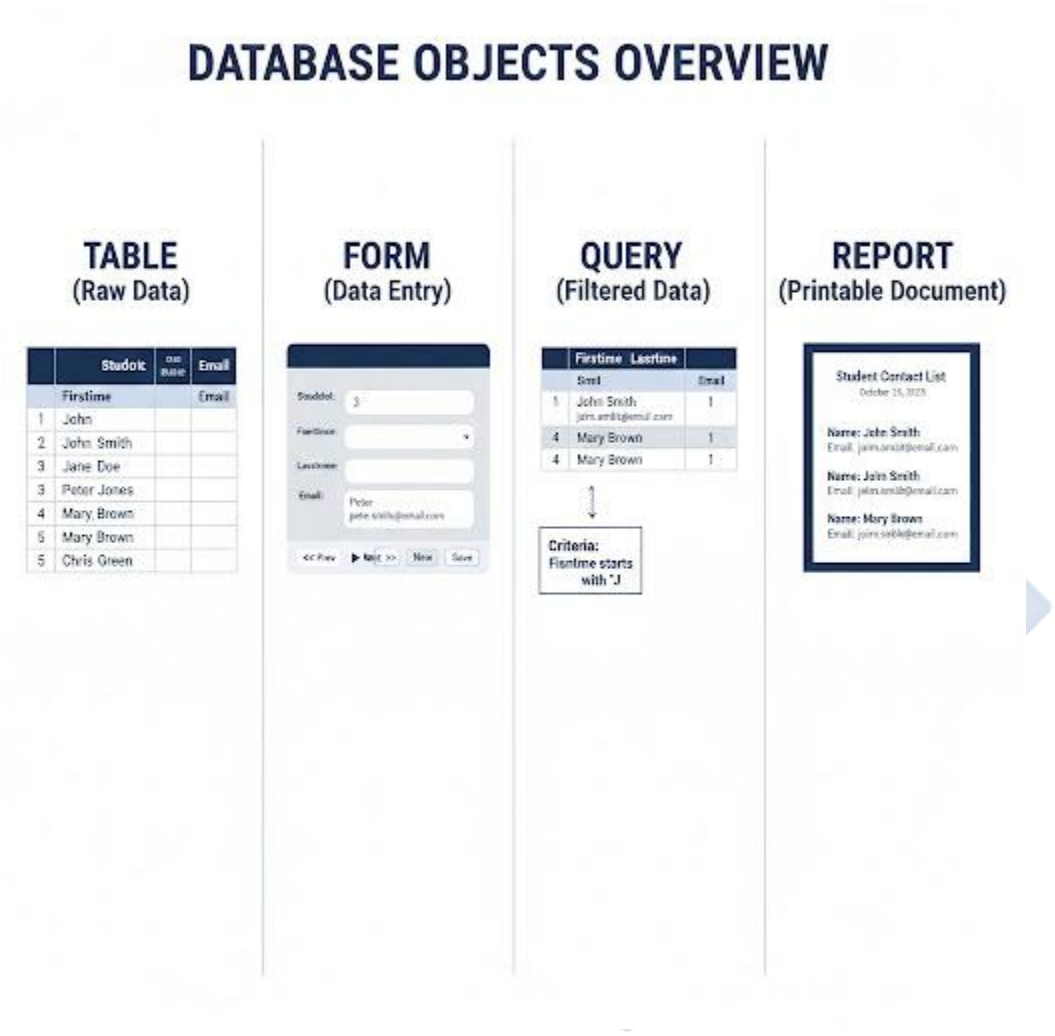
8.2 Forms (To Create & Update Data)

- **Problem:** Entering data directly into a table (like an Excel sheet) is messy and can lead to errors.
- **Solution:** A **Form** is a user-friendly, graphical interface for *entering* or *editing* a single record.
- **Analogy:** When you fill out a form online (to register for a site), you are using a form to **CREATE** a new record in that site's Users table.

8.3 Queries (To Read Data)

- **Definition:** A **Query** is a formal *question* you ask the database to *retrieve* specific data.
- **How it works:** You use a query language, most commonly **SQL (Structured Query Language)**.
- **SQL Example:**
    - **Database Table:** Students
    - **Your Question:** "I want to see the first and last names of all students who are in SS1."
    - **The SQL Query:**
    - SELECT FirstName, LastName

    - FROM Students
    - WHERE Class = 'SS1';
- A query *reads* and *filters* the data from one or more tables to give you just the answer you need.



8.4 Reports (To Present Data)

- **Problem:** A query gives you raw data. It's not pretty.
- **Solution:** A **Report** is a formatted, polished, and printable summary of your data.
- **Example:** An end-of-term "Report Card" is a *report* that pulls data from the Students, Subjects, and Grades tables to create a professional document for your parents.

Evaluation Questions (Week 8)

1. What does the acronym **CRUD** stand for?
2. What is a "Data Type" in a database? Give two examples.
3. What is the purpose of a "Form"?
4. What is a "Query"?
5. What is the difference between a "Query" and a "Report"?

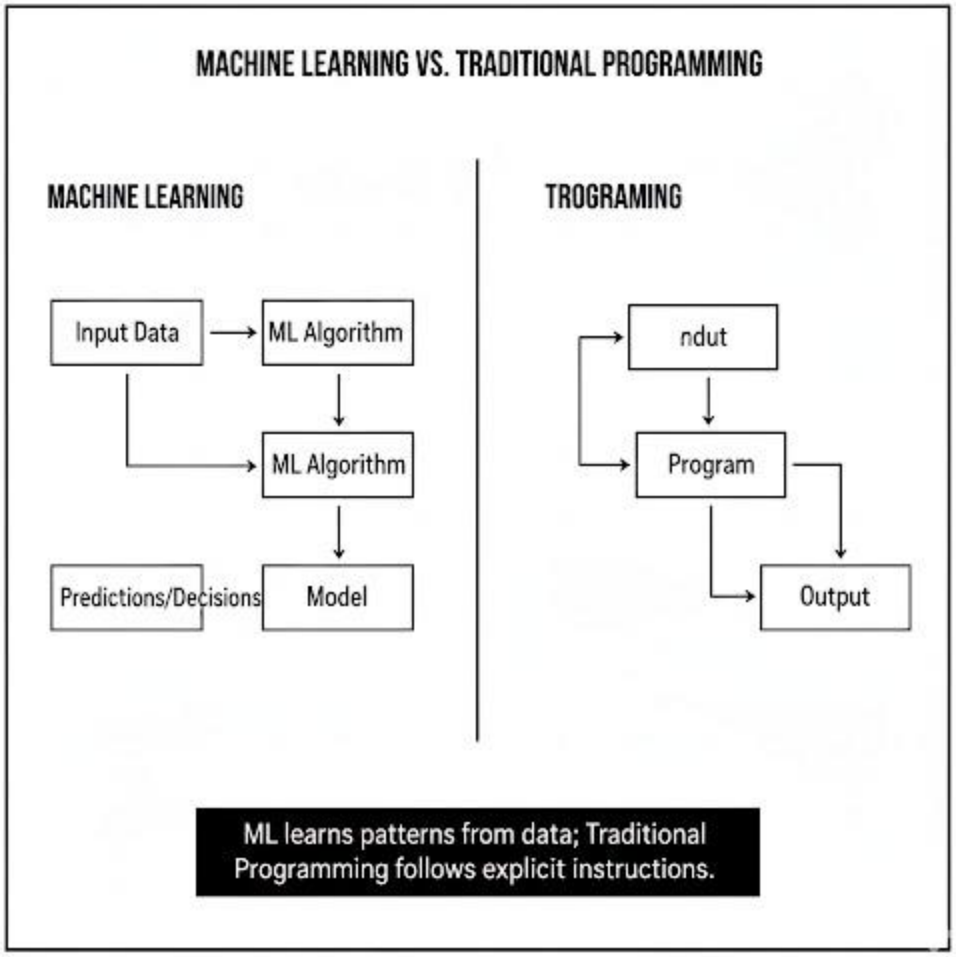
Assignment Questions (Week 8)

1. You have a table called Products with fields ProductID, ProductName, Price, and StockQuantity. Write the **SQL Query** for the following requests:
    - (a) "Show me the names and prices of ALL products."
    - (b) "Show me ALL information about products that cost more than N5000."
2. Describe the "flow" of data in a school's database system. Start with a *new student arriving*. Mention the **Form** used to register them, the **Table** their data is CREATED in, the **Query** used to find all students who haven't paid fees, and the **Report** (debit note) that is printed.

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WEEK 9: EMERGING TECHNOLOGIES I

Introduction: "Emerging Technologies" are new technologies that are currently developing or are expected to have a significant impact on society in the near future.



9.1 Artificial Intelligence (AI)

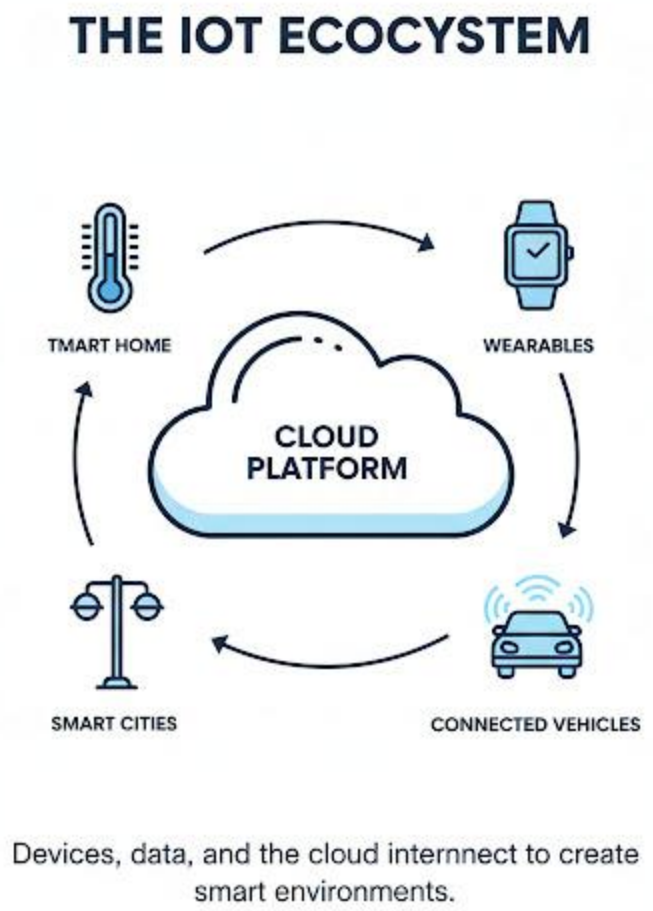
- **Definition:** AI is a broad branch of computer science focused on building *smart machines* capable of performing tasks that typically require human intelligence.
- **Human Intelligence vs. AI:** Humans can learn, reason, perceive, solve problems, and understand language. AI attempts to *simulate* these abilities.
- **Types of AI:**

1. **ANI (Artificial Narrow Intelligence):** (This is *all* AI that exists today). It is designed and trained to perform *one specific, narrow task.*
    - **Examples:** Google Search, Siri/Alexa, spam filters, Netflix recommendations, AI for playing chess.
2. **AGI (Artificial General Intelligence):** (This is *hypothetical* / *future*). An AI with the ability to understand, learn, and apply intelligence across a *wide range of tasks* at a human level.

- **Key Sub-Field: Machine Learning (ML)**
    - This is the *main technique* used to create AI today.
    - **Traditional Programming:** A human writes *explicit rules* (like IF score >= 50, show "Pass").
    - **Machine Learning:** A human *shows the machine data* (e.g., 10,000 photos labeled "cat" and 10,000 labeled "dog"). The machine then "learns" its *own rules* for telling them apart.

9.2 Internet of Things (IoT)

- **Definition:** The "Internet of Things" is the network of *physical, everyday objects* (not just computers) that have been embedded with sensors, software, and internet connectivity, allowing them to send and receive data.
- **Core Idea:** It's about connecting "dumb" objects to the internet to make them "smart."
- **How it Works (3 Steps):**
    1. **Sensors:** The device (e.g., a "smart thermostat") has a *sensor* (a thermometer) that collects data.
    2. **Connectivity:** It uses Wi-Fi or Bluetooth to send this data *to the internet*.
    3. **Data Processing:** The data is processed (in the cloud), and a decision is made (e.g., "The house is too cold. Send a signal back to turn on the heater").



Devices, data, and the cloud internnect to create smart environments.

- **Examples:**
    - **Smart Watch:** Uses sensors to track your heart rate, sends data to your phone/internet.
    - **Smart Home:** Smart light bulbs, smart speakers (Alexa), smart refrigerators.
    - **Smart City:** IoT sensors used to monitor traffic flow, air pollution, or (in a "smart farm") soil moisture.

Evaluation Questions (Week 9)

1. What is "Artificial Intelligence"?
2. What is the difference between "Artificial Narrow Intelligence" (ANI) and "Artificial General Intelligence" (AGI)? Which one do we have today?

3. Explain "Machine Learning" in simple terms.
4. What is the "Internet of Things"?
5. List the 3 main components/steps of how an IoT system works.

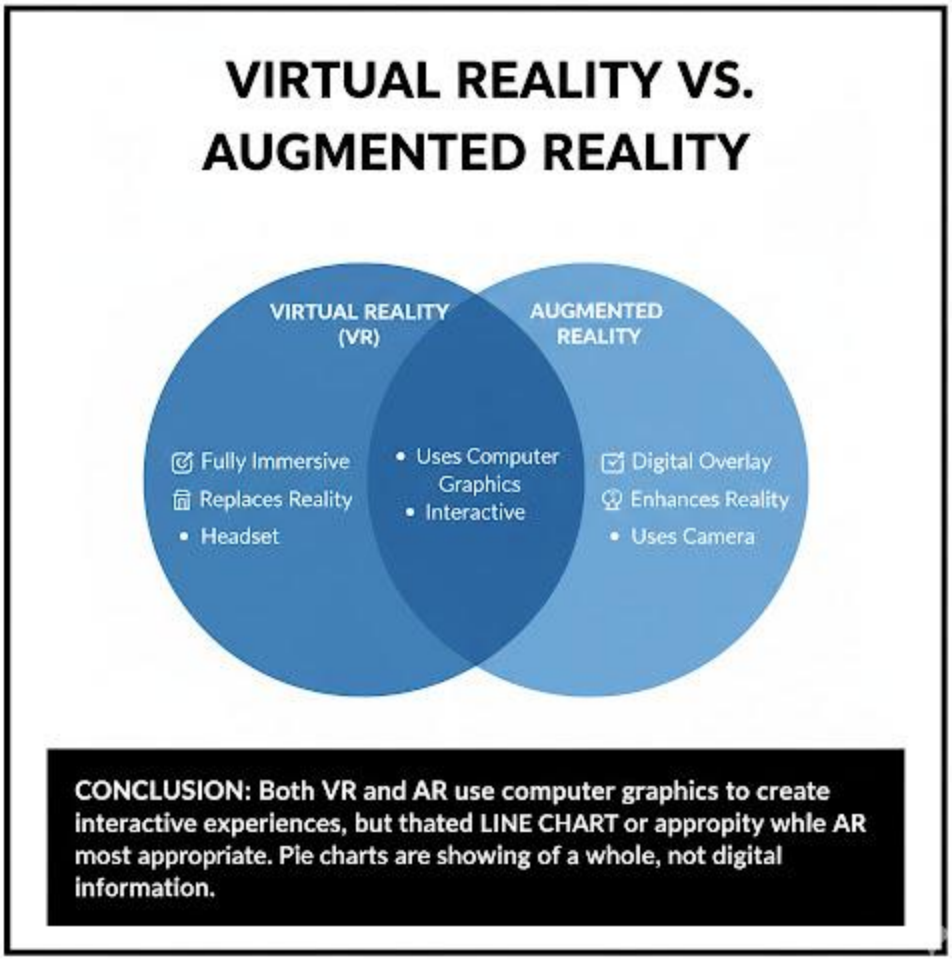
Assignment Questions (Week 9)

1. List 5 examples of "Narrow AI" (ANI) that you or your family interact with every week. (Hint: Think about your phone, social media, and Google).
2. A "smart refrigerator" is an IoT device. Write a 300-word essay describing 3-4 features it might have and how it would use sensors and internet connectivity.

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WEEK 10: EMERGING TECHNOLOGIES II

Introduction: This week, we continue our exploration of technologies that are changing how we interact with the physical and digital worlds.

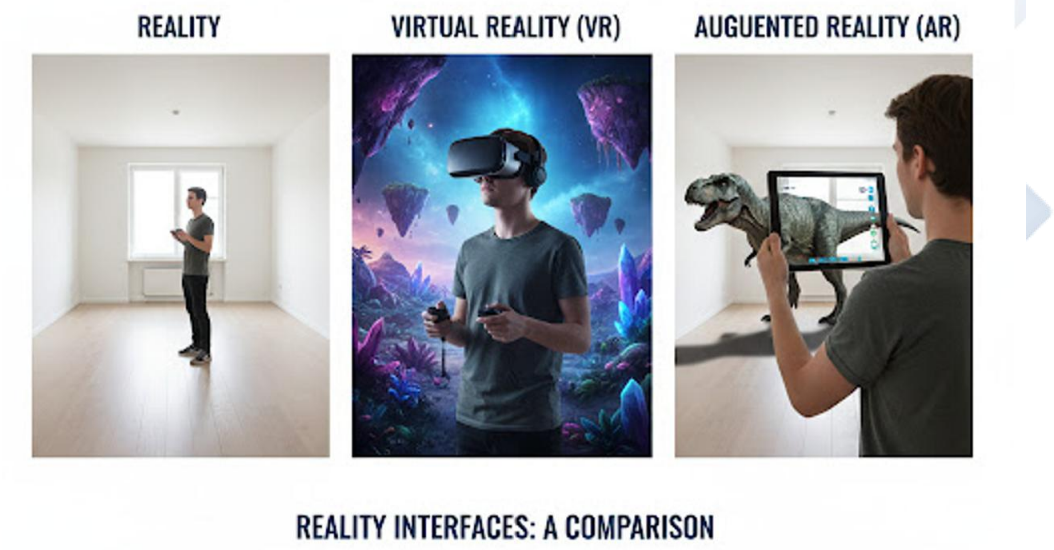


10.1 Robotics

- **Definition:** Robotics is a field of engineering and computer science that involves the design, construction, operation, and use of **robots**.
- **Robot:** A machine—especially one programmable by a computer— capable of carrying out a complex series of actions automatically.
- **AI vs. Robotics:**
    - **AI** is the "brain." It is the software and intelligence.

- **Robotics** is the "body." It is the physical machine, with motors, sensors, and actuators, that can *move and interact* with the world.
- You can have AI *without* a robot (e.g., Google Search).
- You can have a "dumb" robot *without* AI (e.g., a simple factory arm that just welds the same spot).
- The *goal* is to combine them: an AI "brain" in a robotic "body."

- **Examples:**
  - **Industrial Robots:** Assembly line arms that build cars.
  - **Drones (UAVs):** Flying robots used for delivery, agriculture, or photography.
  - **Surgical Robots:** Assist surgeons with high-precision operations.



10.2 Virtual Reality (VR)

- **Definition:** A computer-generated, 3D environment that can be explored and interacted with by a person.
- **Core Concept: Immersion.** VR *replaces* your real-world vision and hearing.

- **How it works:** You wear a **VR headset** (like the Meta Quest or PlayStation VR) that blocks out the outside world and shows you two slightly different images (one for each eye) to create a sense of 3D depth.
- **Examples:**
    - Immersive video games.
    - Training simulations (e.g., training a pilot in a virtual cockpit).
    - Virtual "tours" of a museum or a house for sale.

10.3 Augmented Reality (AR)

- **Definition:** A technology that *overlays* digital information (images, sounds, text) onto the *real world* as you see it.
- **Core Concept: Enhancement.** AR *adds to* your real-world view.
- **How it works:** You typically use a device *with a camera* (like your smartphone). The software recognizes the real-world view and "augments" it.
- **Examples:**
    - **Snapchat / Instagram Filters:** Overlays digital dog ears or glasses onto your face.
    - **Pokémon Go:** Overlays a digital character onto the real-world view from your camera.
    - **Google Maps AR:** Shows you a big virtual arrow on your screen, telling you which street to turn down.

Evaluation Questions (Week 10)

1. Explain the difference between "AI" and "Robotics."
2. What is a "robot"?
3. What is the core concept of "Virtual Reality (VR)"?
4. What is the core concept of "Augmented Reality (AR)"?
5. Give one example of VR and one example of AR.

Assignment Questions (Week 10)

1. **Venn Diagram:** Draw a Venn Diagram with two overlapping circles. Label one "Virtual Reality (VR)" and the other "Augmented Reality (AR)". List their unique features in the outer circles and any shared features (e.g., "uses a screen," "digital") in the overlapping center.
2. Write a 300-word essay on which technology—Robotics or AI—you believe will have a bigger impact on Nigeria's job market in the next 20 years.

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WEEKS 11-13: REVISION & EXAMS

Key Concepts for Revision:

- **Word Processing (Word, Docs):** Character vs. Paragraph formatting. Headers/Footers. Mail Merge.
- **Spreadsheets I (Excel, Sheets):** Workbook, Worksheet, Cell (B4). Formulas (=). Cell Referencing (Relative A1 vs. Absolute $A$1).
- **Spreadsheets II:** Functions (=SUM(), =AVERAGE(), =IF()). Charts (Bar, Line, Pie). Sorting vs. Filtering.
- **Presentation (PowerPoint, Slides):** Slides, Layouts, Slide Master. Transitions (between slides) vs. Animations (on a slide).
- **Database Intro:** Definition. Spreadsheet vs. Database. DBMS (Access, MySQL). Table, Field, Record. **Primary Key** (unique ID).
- **Database Practical (CRUD):** Data Types (Text, Number, Date). Forms (Create/Update). Queries (Read, SELECT/WHERE). Reports (Present).
- **Emerging Tech I: AI** (simulating intelligence). ANI (narrow, today) vs. AGI (general, future). Machine Learning (learning from data). **IoT** (network of smart objects).
- **Emerging Tech II: Robotics** (the physical "body"). **VR** (*replaces* reality, headset). **AR** (*augments* reality, phone camera).