Course : Free Software (Open Source)

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2025-2026

Objectives :

- To familiarize with information technologies (IT) tools and the Internet basics.
- Introduce hardware, software, and communication technologies.
- Explore the philosophy, tools, and practices of open source.
- Provide hands-on experience with Linux, LibreOffice, and collaborative platforms.

Recommended Prior Knowledge

General knowledge in computer science.

Course Information

- Announcements: Email & Moodle in :
    - https://elearning.univ-annaba.dz/course/view.php?id=2284
- Resources:
    - **Section A:** 14:00 – 15:30
      🔗 *Join via Google Meet:* https://meet.google.com/gqc-eqwc-fxh
    - **Section B:** 15:45 – 17:15
      🔗 *Join via Google Meet:* https://meet.google.com/mor-dtcf-kbe
- Discussion & Questions: Email your teacher via bilal.dendani@univ-annaba.dz
- Evaluation 100% exam

Course content

Chapter 1. Information Technologies

1.1. Definitions

1.2. Tools

1.2.1. Hardware

1. Computers: desktop PCs, laptops, servers, workstations.
2. Communication networks: routers, switches, modems, fiber optics, WiFi.
3. Peripherals: printers, scanners, keyboards, mice, cameras, sensors.
4. Mobile devices: smartphones, tablets, personal digital assistants (PDA).
5. Smart chips: RFID, NFC, embedded processors, IoT (Internet of Things) sensors.

1.2.2. Software

1. Operating systems: Windows, Linux, macOS, Android, iOS.
2. Business applications: ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), HR management, accounting software, etc.
3. Office software: word processors (Word), spreadsheets (Excel), presentations (PowerPoint), collaboration tools (Google Workspace, Microsoft 365).

Contenu du cours

Chapter 1. Information Technologies

1.3. Applications

1. Communication spaces: Internet, Intranet, Extranet.
2. Multimedia: audioconferencing, videoconferencing.
3. Electronic Data Interchange (EDI).
4. Workflows.

Chapter 2: Open Source Tools

1. Introduction (history, advantages/disadvantages, and licenses).
2. Development environment (Introduction to Linux, Introduction to code editors).
3. Office software (LibreOffice suite).
4. Collaboration (storage and sharing).
5. Contributing to an open source project.

Roadmap of Open Source course

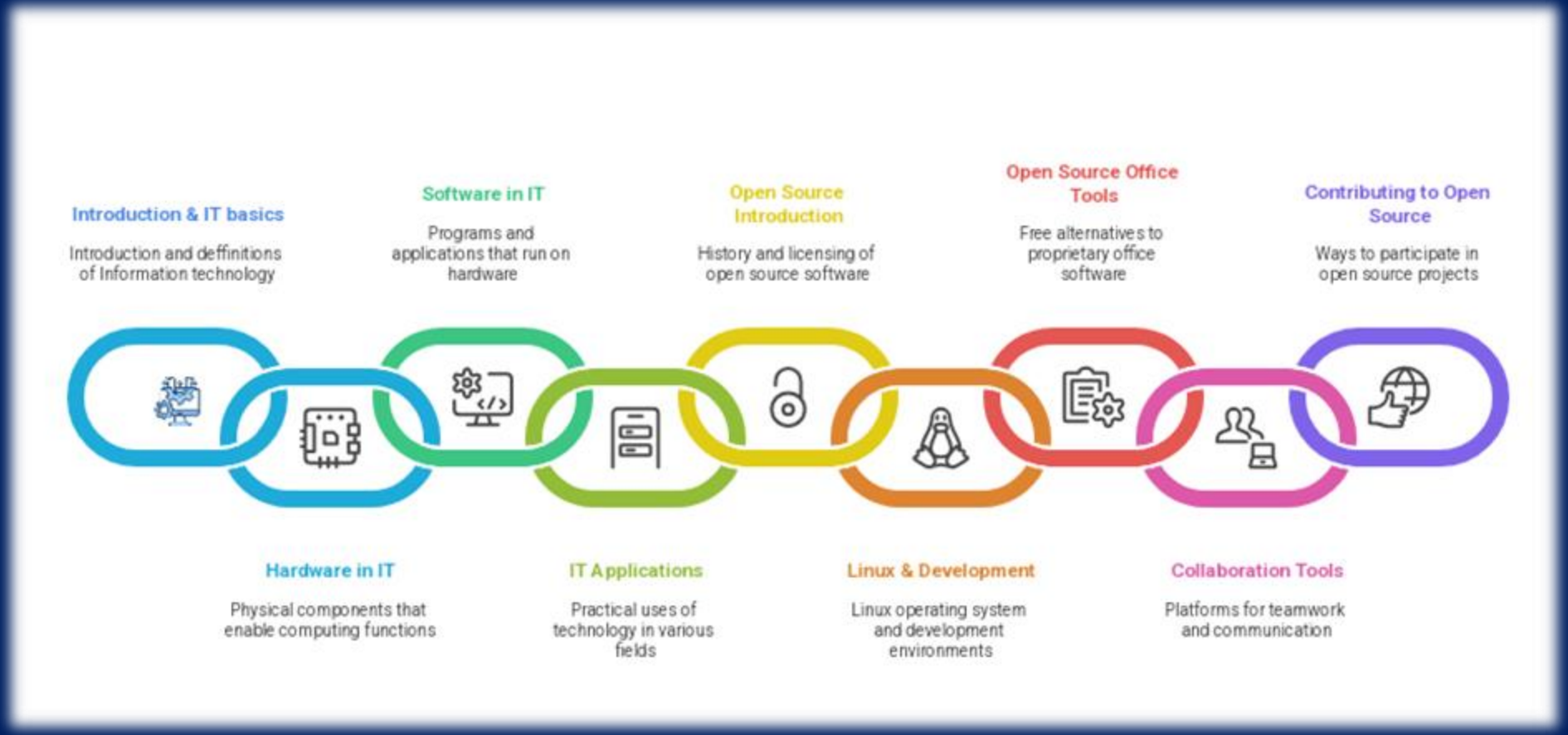
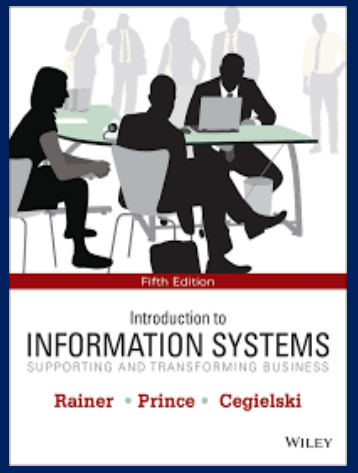


Figure 1. Foundations of IT and Open Source

References



Introduction to information systems

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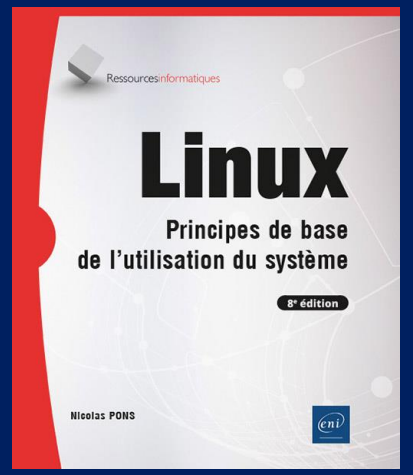
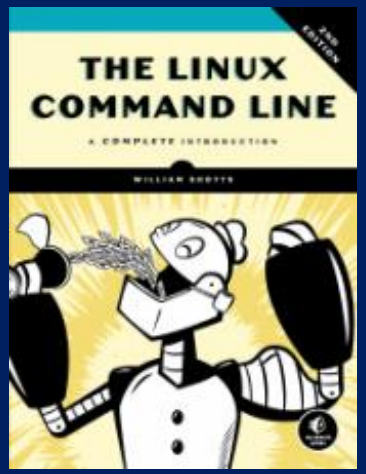
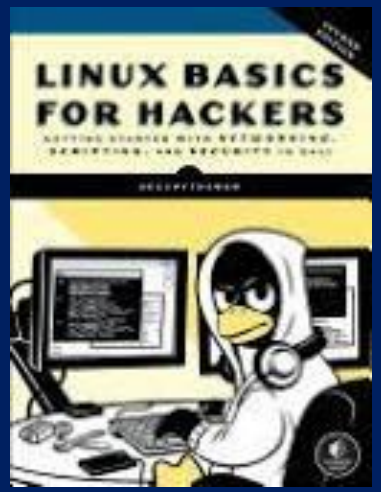


LinuxPrincipes de base de l'utilisation du système (8e édition)



The Linux Command Line

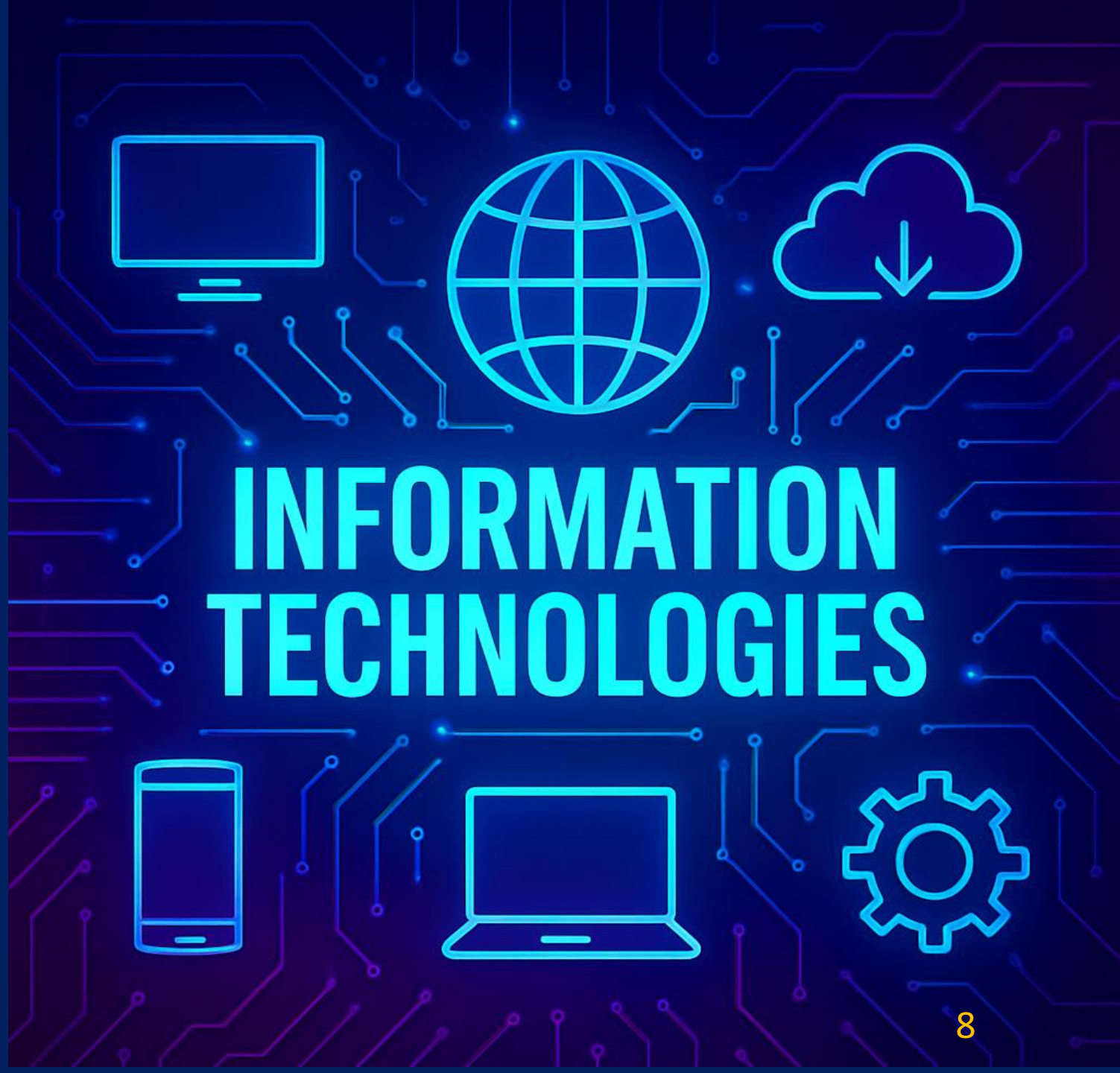


Linux Basics For Hackers

Chapter 1

Information technologies

Prepared by:
Dr. Bilal Dendani



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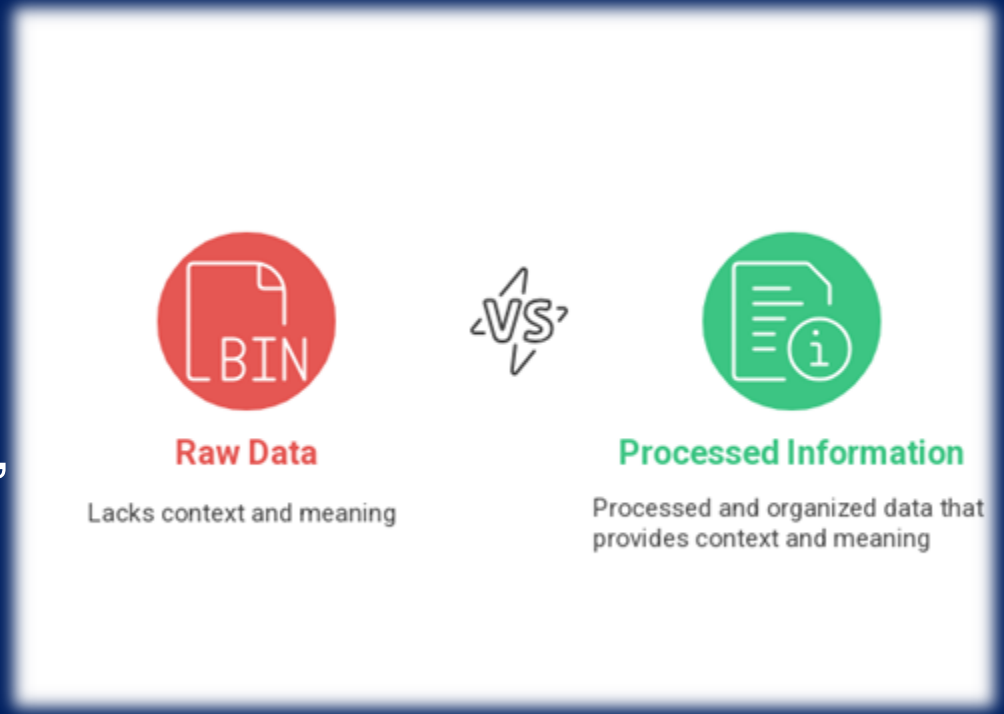
1. Data vs Information

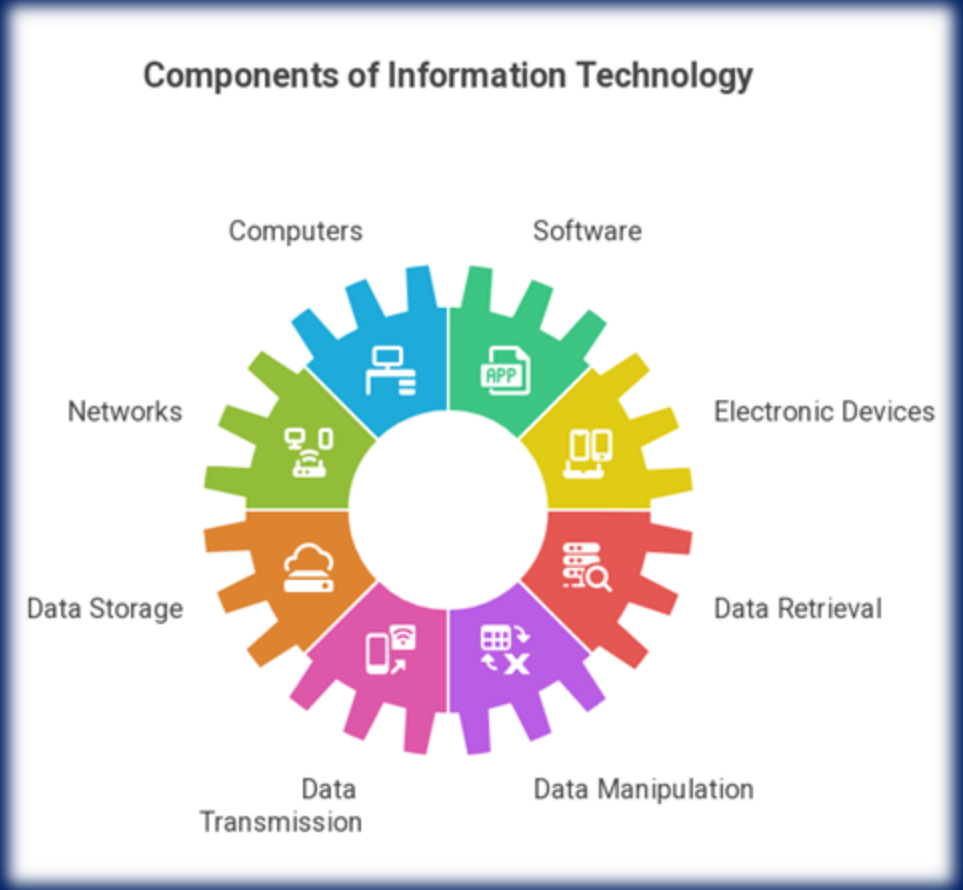
- Data consists of raw, unorganized facts, figures, and symbols that lack meaning on their own.
  - Examples : (e.g., 2025, 37°C, "Open Source")

- information is data that has been processed, organized, and given context to make it meaningful, understandable, and useful for decision-making and understanding
  - Examples : (e.g., "The year is 2025", "The temperature is 37°C", Linux Open source)



2. What is information technology?

Information technology encompasses the use of computers, software, networks, and other electronic devices to store, retrieve, transmit, and manipulate data. It is the foundation upon which our digital infrastructure is built, enabling everything from simple data processing to complex problem-solving in various industries.



3. What is a Computer?

- A computer is an electronic device that processes data and performs tasks according to a set of instructions.
  - Components: Central Processing Unit (CPU), Memory, Input/Output Devices.

- Types of Computers
  - Personal Computers (PCs), Supercomputer, mainframe, Tablets and Smartphones, …

4. Key components of Information technology (IT)

- **Hardware**

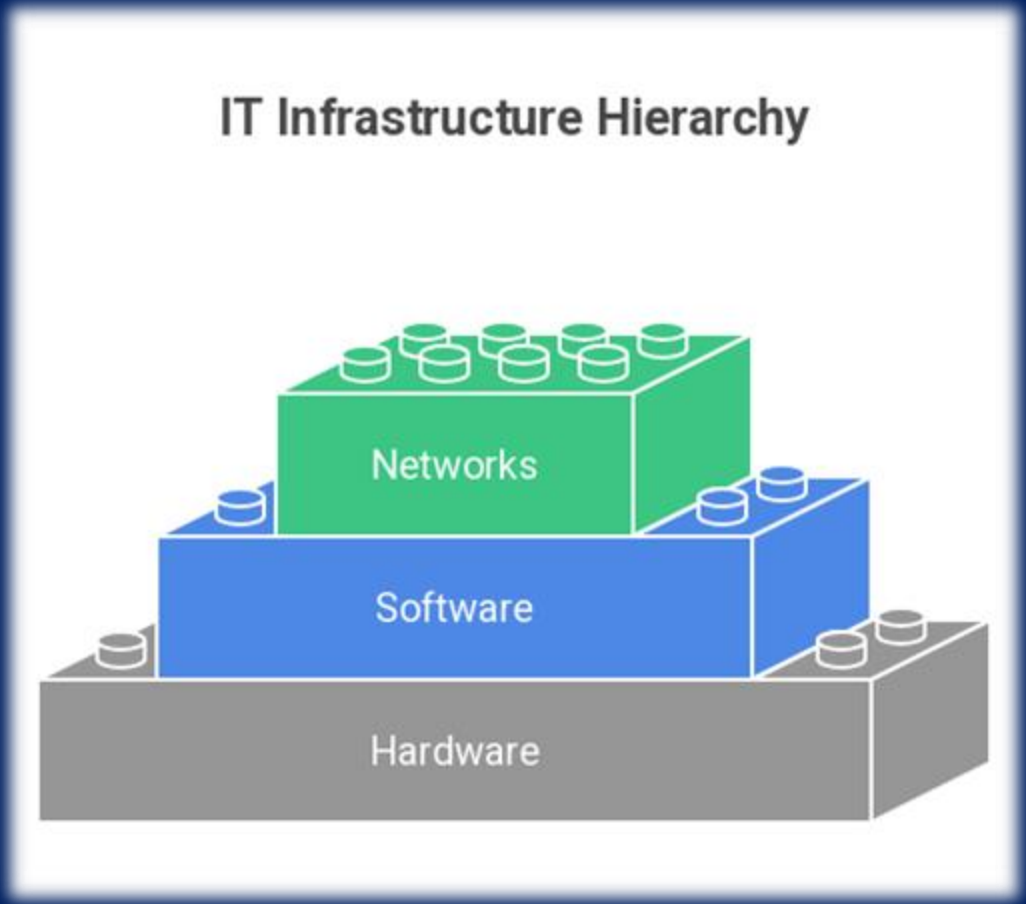
  Physical components of a computer system, including the central processing unit (CPU), memory, storage devices, and input/output devices.

- **Software**

  Programs and applications that control the hardware and enable users to perform specific tasks.

- **Networks**

  Infrastructure that allows computers and devices to connect and share information.



5. Hardware vs software

- Computers consist of two main components:

  - Hardware: physical components of a computer system, consist of physical parts: Motherboard, CPU, RAM, Graphics Card Storage Device, Network Card.

  - Software Programs and instructions that run on hardware, such as Operating System (OS), browsers, and games applications.

6. Networks

- What is a computer network?
- The computer network refers to connected computers/devices to share resources and info through themselves.
- Computer networks allow users to communicate with each other and transfer information. Data transmissions can involve exchanging messages between users, remote access to databases, or sharing files.
- Types : Local Area Network (LAN), Worl Area Network (WAN), internet

7. Internet

- The internet is a vast, global network of interconnected computer networks that allows billions of devices to communicate and exchange data with each other

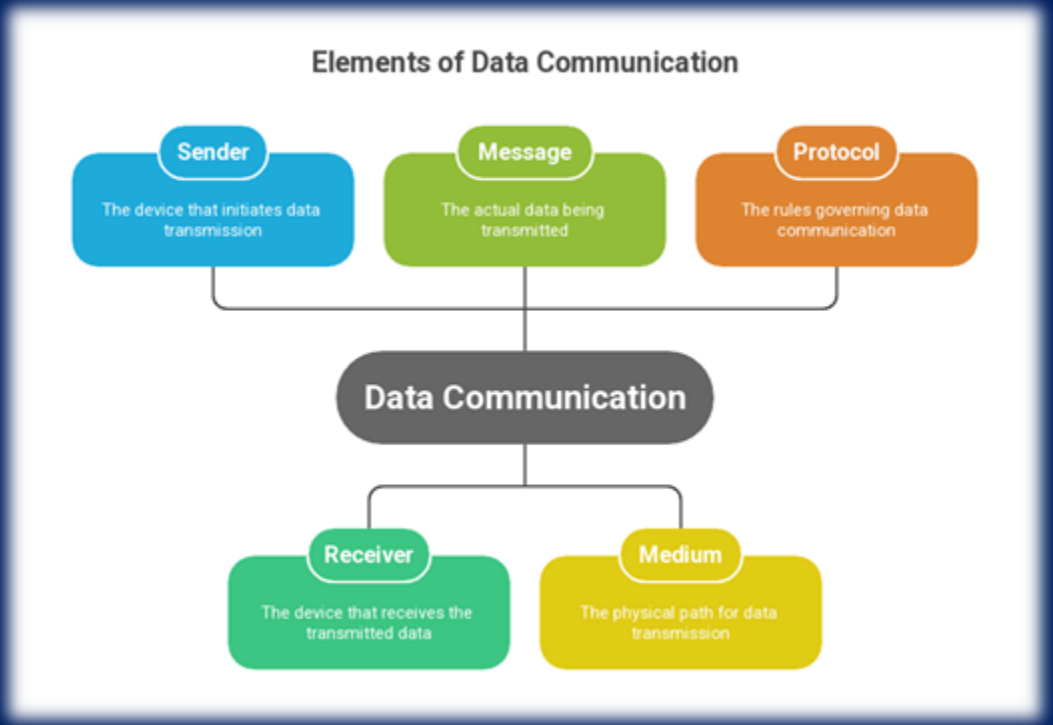
- Main Functions:
  - Email, instant messaging, video calls
  - World Wide Web (WWW)
  - File sharing and cloud services
  - E-commerce, e-learning, e-government

- **Examples:** Google, Wikipedia, YouTube, Facebook.

8. Data communication

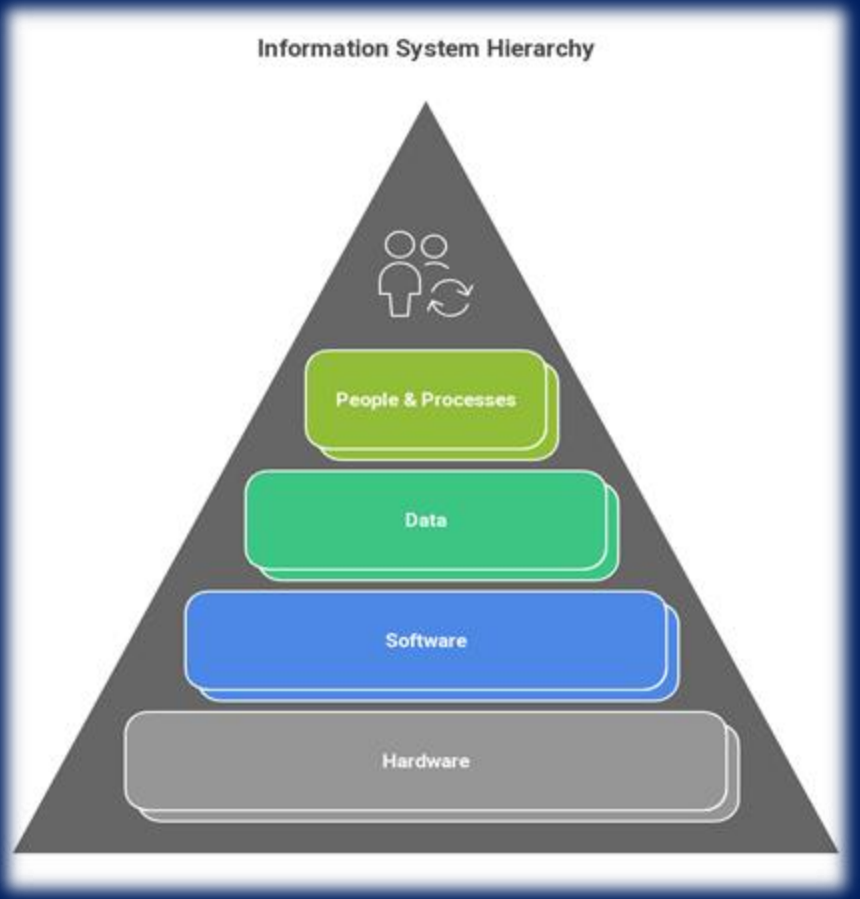
- Data communication refers to the process of transmitting data between two or more devices through a transmission medium.

- **Examples:**
  - Sending an email 📧
  - Video call via Zoom or Google Meet 📹
  - Transferring files via Bluetooth 📲



9. Information systems

- An information system (IS) is an organized set of components that collect, store, process, and distribute information, to Support decision-making, coordination, control, and analysis in organizations.



Main Components

1. **Hardware** – physical devices (servers, computers, networks).
2. **Software** – programs that manage and process data.
3. **Data** – the raw material transformed into information.
4. **People & Processes** – users, managers, and rules that guide usage.

Example: University student management system (enrollment, grades, schedules).

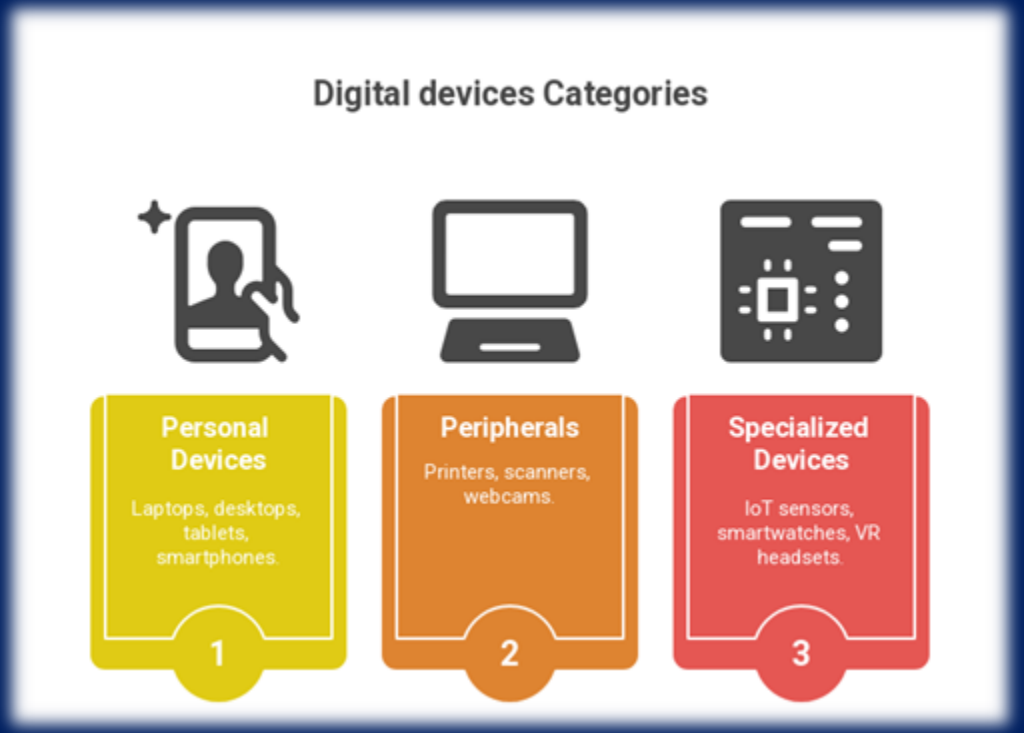
10. Digital Devices

- Digital devices refers to the electronic devices that process and transmit digital data. These devices consists of an Entry points and tools to access, process, and exchange information.

Without digital devices, no interaction with information systems is possible.

Examples of digital device by category:

- **Personal Devices:** Laptops, desktops, tablets, smartphones.
- **Peripherals:** Printers, scanners, webcams.
- **Specialized Devices:** IoT sensors, smartwatches.



11. Cloud computing

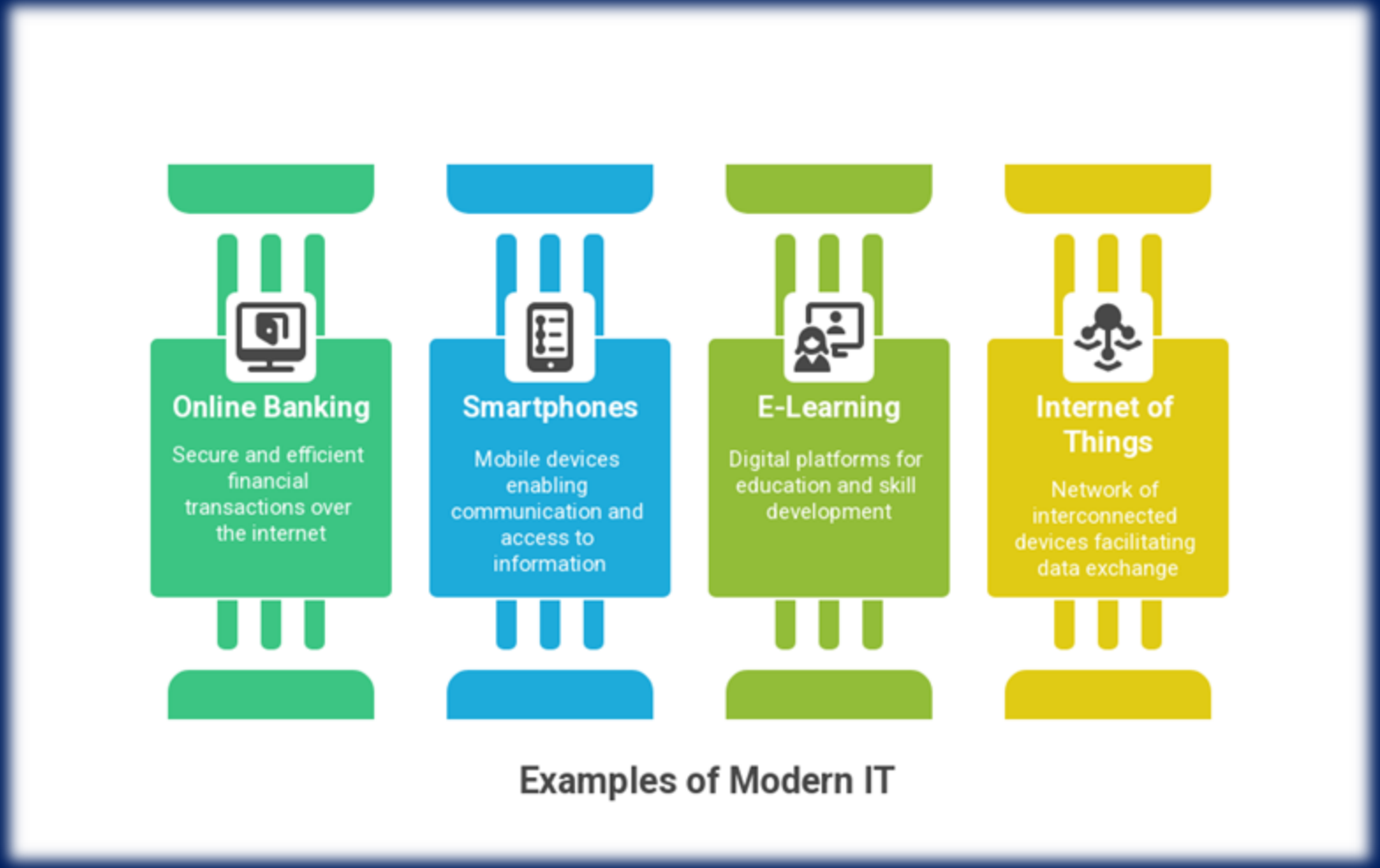
- Cloud computing refers to a concept of on-demand access to computing resources (storage, processing, applications) delivered via the Internet.

- Allows users to access and store data and applications over the internet instead of relying on local servers or personal computers.
- Service Models:

    - IaaS (Infrastructure as a Service): virtual machines, storage.
    - PaaS (Platform as a Service): development environments.
    - SaaS (Software as a Service): apps like Google Docs, Office 365.

Example: Google Drive, AWS, Microsoft Azure.

12. Some examples information technologies



13. Importance of Information Technology (IT)

- Enhances efficiency and productivity by automating processes and reducing human errors.
- IT enables global communication and collaboration, connecting people from different parts of the world.
- IT drives innovation and enables the development of new products, services, and business models.

2. Tools of Information Technology

Definition:

Information technology (IT) tools refer to the resources and technologies (including hardware, software, and platforms) that enable the collection, processing, storage, transmission, and utilization of information.

These tools aim to transform and abstract IT concepts into practical systems we use in daily life (from smartphones to online platforms).

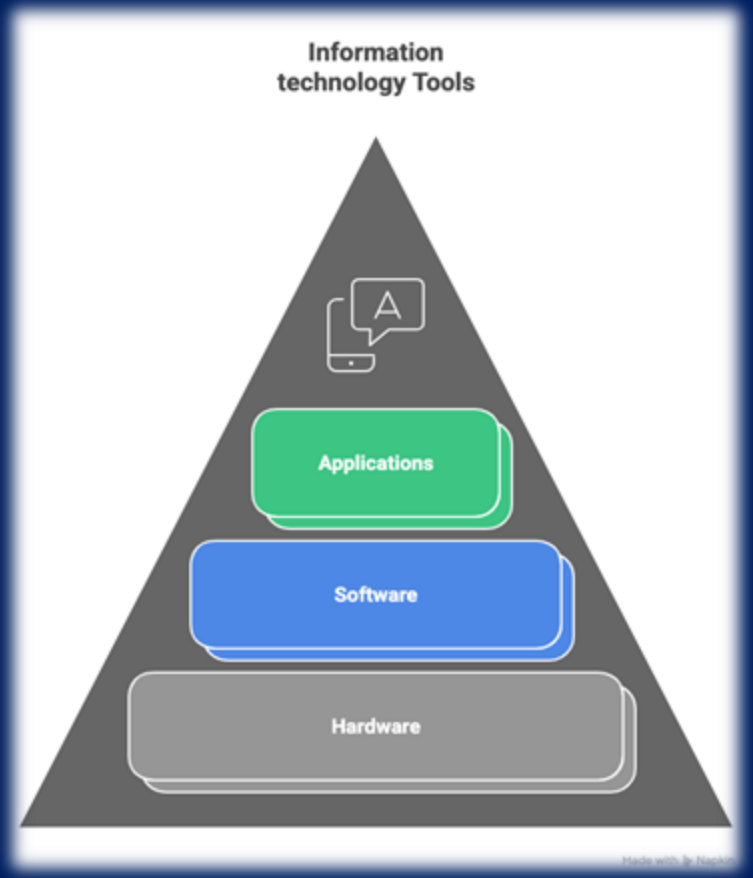
Categories of IT Tools

Hardware 💻 :

Physical devices that store, process, and transmit information (computers, networks, peripherals, mobile devices, IoT).

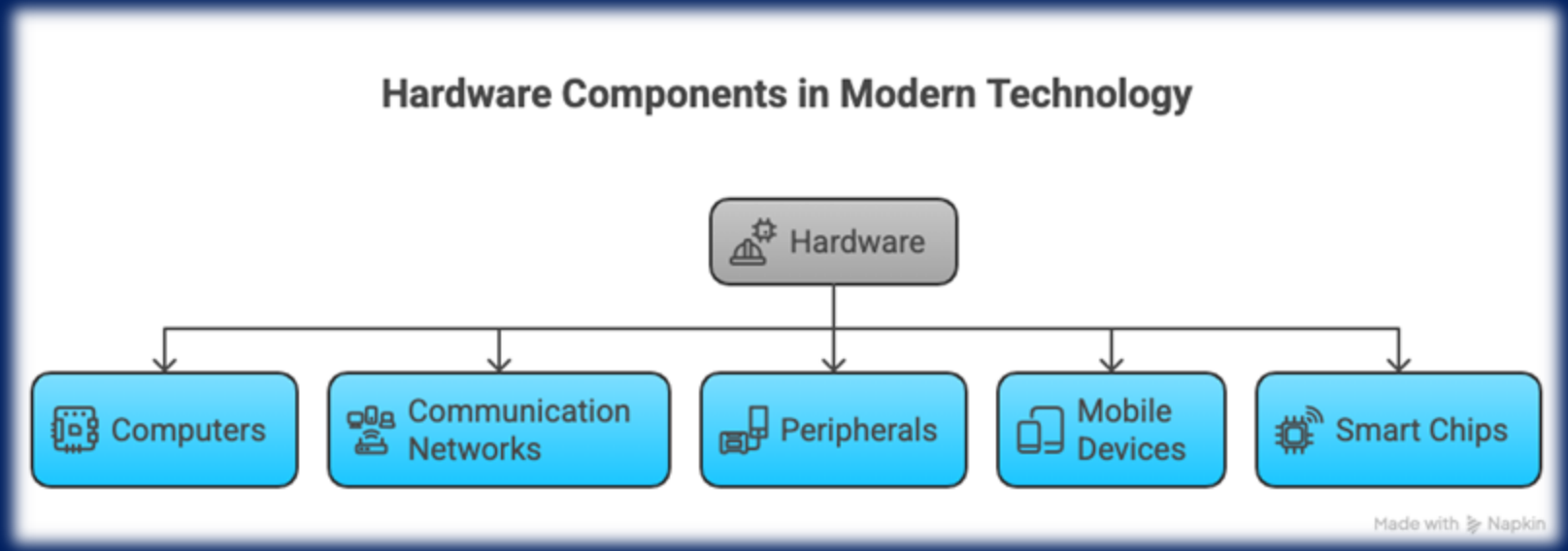
Software ⚙️ Programs and operating systems that control hardware and allow tasks to be performed.

Applications 🌐 Practical uses of IT tools that enable communication, collaboration, and automation in real-world contexts.



2.1 Hardware

- Hardware refers to the physical components of a computer that come in many different forms, including the monitor, servers, central processing unit, keyboard and mouse. Computer servers run business applications. Servers interact with client devices in the client-server model. They also communicate with other servers across computer networks, which typically link to the internet.



2.1.1. Computers

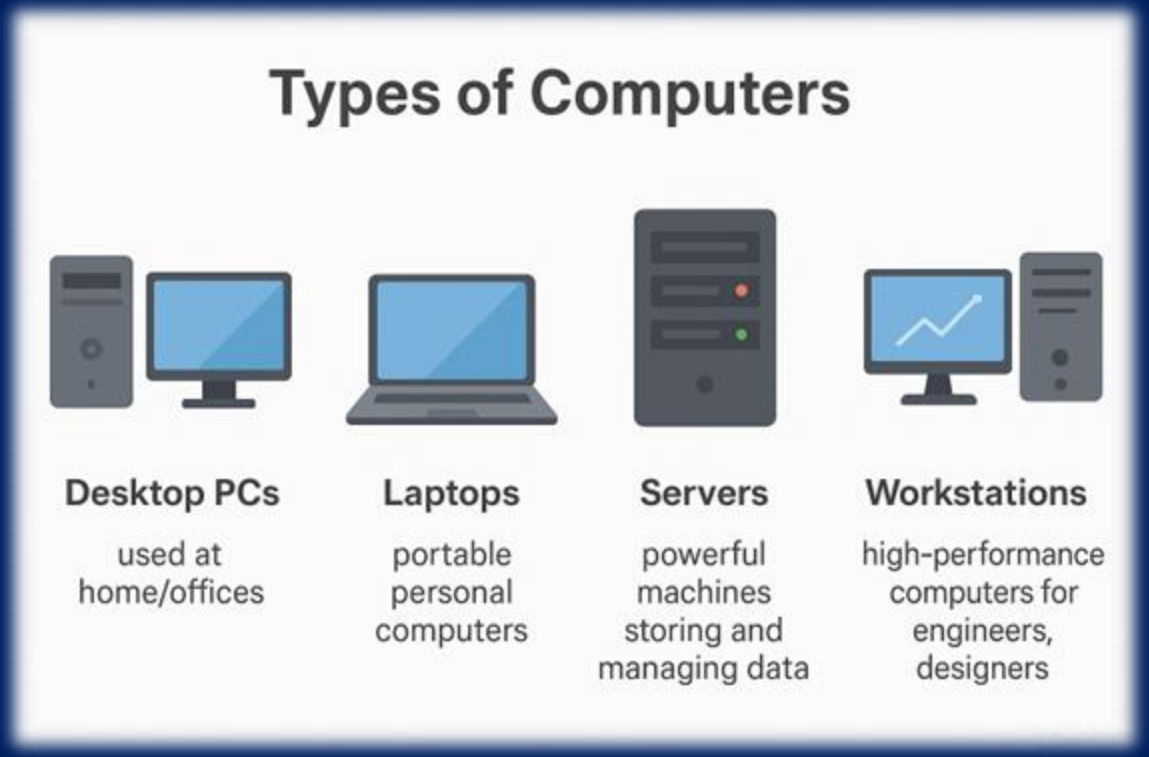
A computer is an electronic device that processes data and performs tasks according to a set of instructions. Computers come in different forms, each designed for specific tasks and users. The main types include:

Desktop PCs: fixed computers used at home or in offices.

Laptops: portable personal computers for mobility.

Servers: powerful systems that manage and store data.

Workstations: high-performance machines for engineers and designers.



2.1.2 Comparison of Computer Types

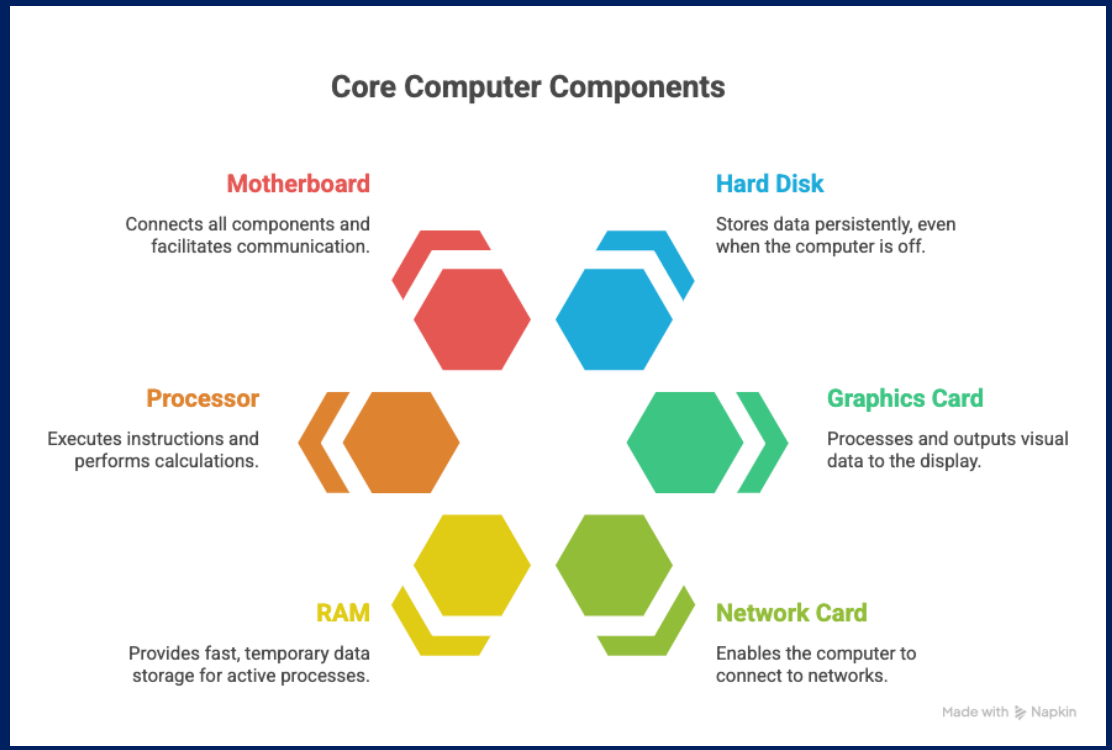
Type of Computer	Mobility	Power & Performance	Common Users	Typical Uses / Examples
Desktop PC	Low – fixed at one location	Moderate – suitable for office or home tasks	Home users, students, office workers	Word processing, Internet browsing, office work
Laptop	High – portable with built-in battery	Moderate to high depending on model	Students, teachers, professionals	Studying, presentations, online work, travel computing
Server	Low – stationary in data centers	Very High – handles multiple users and large data	Organizations, IT administrators, web hosting companies	Data storage, website hosting, network management
Workstation	Low to medium – not easily portable	Very High – optimized for heavy computation & graphics	Engineers, designers, researchers	3D modeling, simulations, scientific calculations

2.1.3 Main components of the computer

Every computer, regardless of its type, contains key components that work together to process data and execute instructions.

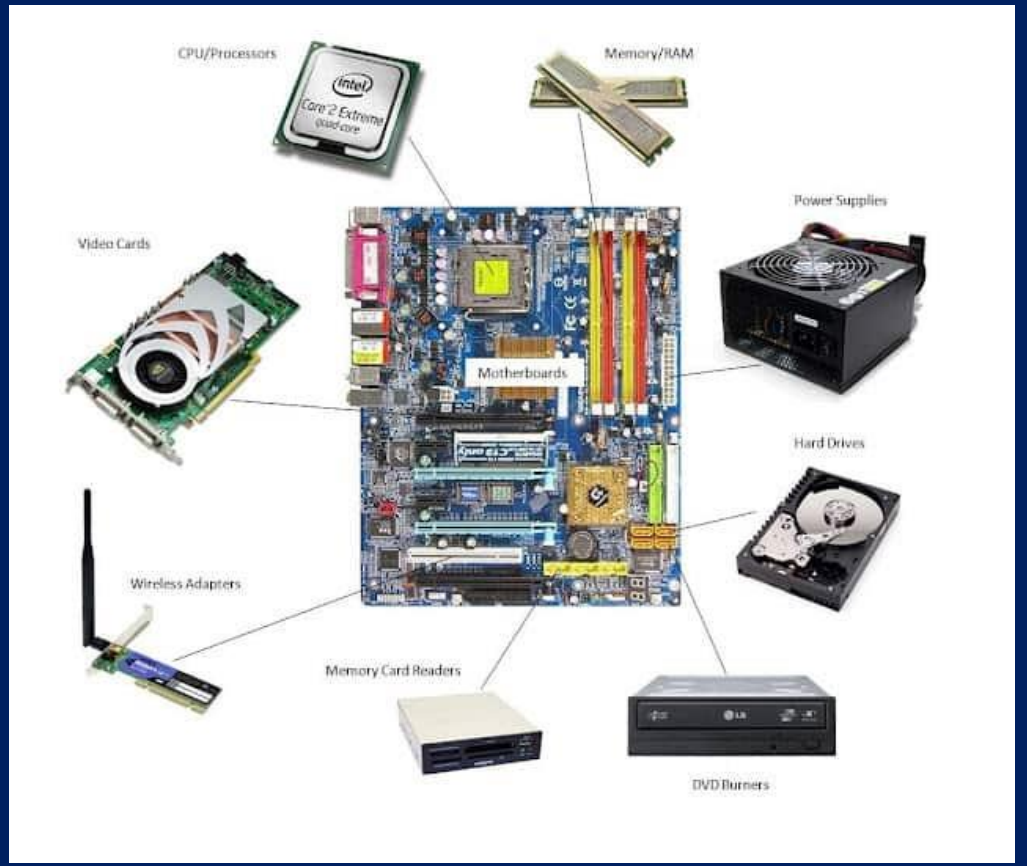
The main components are:

- Motherboard
- Processor (CPU)
- Random Access Memory (RAM)
- Hard Disk
- Graphics Card
- Network Card



2.1.3.1 Motherboard

- Basic computer component consisting of printed circuit boards and connection ports.
- Supports all hardware components (RAM, graphics card, processor, sound card, etc.).
- the role of the motherboard is to centralize and process the data exchanged in a computer with the help of the processor
- The motherboard manages the hard disk, keyboard, mouse, and network USB ports...

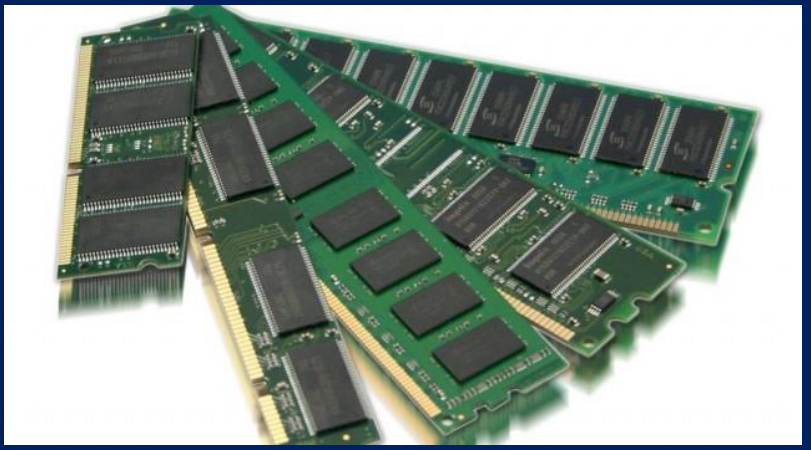


2.1.3.2. Processor

- The processor is the brain of the computer, orchestrating the exchange of data between the various components (hard disk, RAM, graphics card).
- Executes program instructions stored in the memory.
- The processor is characterized by its frequency, i.e. the rate at which it executes instructions.
- A processor clocked at 800 MHz will perform roughly 800 million operations per second.
- The first microprocessor (Intel 4004) was invented by Intel engineers Marcian Hoff and Federico Faggin in 1971.

2.1.3.3. Random Access Memory (RAM)

- RAM (Random Access Memory) is a temporary (volatile) storage component for the computer.
- The Random Access Memory (RAM) allows to storage and access of information in a quick and temporary manner.
- Its major advantage is that it can be read very quickly compared with a hard disk and other storage components.



2.1.3.4. Hard disk

- One of the main components of a computer.
- It's a non-volatile mass memory used to store data permanently.
  - unlike RAM, which is erased each time the computer is restarted.
- Hard disks have a greater storage capacity than RAM.
- The hard disk contains the operating system (OS), your installed programs, and your personal data.
- There are two categories of hard disk: HDD and SDD.

2.1.3.5. Graphics card

- A graphics card is a hardware component that allows your computer to display images on the screen.
- It is also called a video card, a display adapter, or a graphics processing unit (GPU).
- A graphics card has its own memory and processor that can handle complex graphics tasks, such as rendering 3D scenes, playing videos, and running games

- different types and models of graphics cards. Some of the most popular brands of graphics cards are NVIDIA, AMD, and Intel

2.1.3.6. Network card

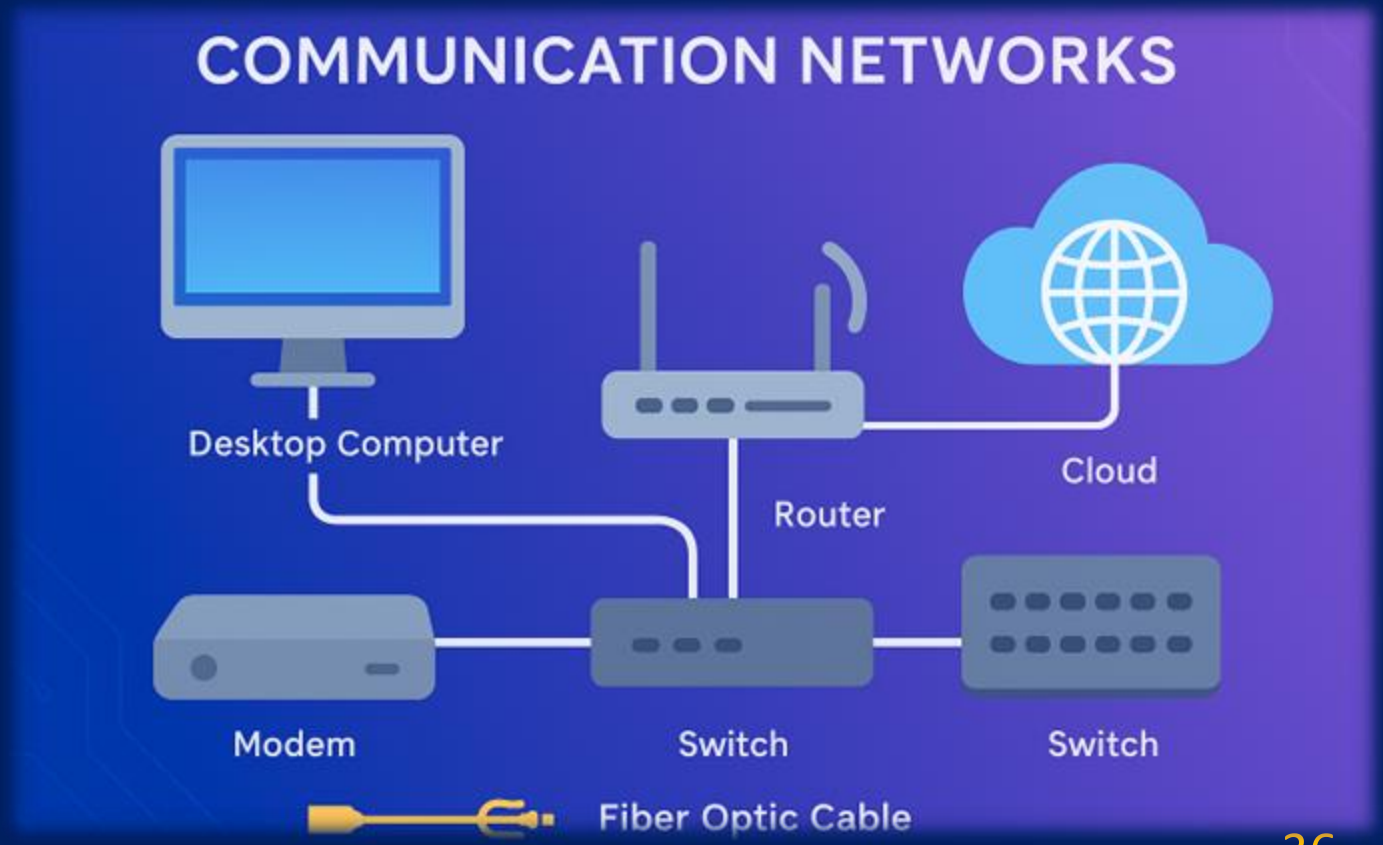
- A device that allows the computer to communicate with other devices on a network, such as the Internet.
- It is installed on the motherboard and connects to the network via RJ45 cable.
- There are different types of network cards: ethernet card, Wi-Fi card, Bluetooth card.

2.1.2. Communication Networks in IT

Communication networks connect computers and devices to share data and resources.

They form the backbone of Information Technology, allowing access to the Internet and other digital services.

- Main Components:
    - Routers
    - Switches
    - Modems
    - Transmission Media
        - (Fiber Optics)
    - Wireless Technology (Wi-Fi)



2.1.2.1. Switch

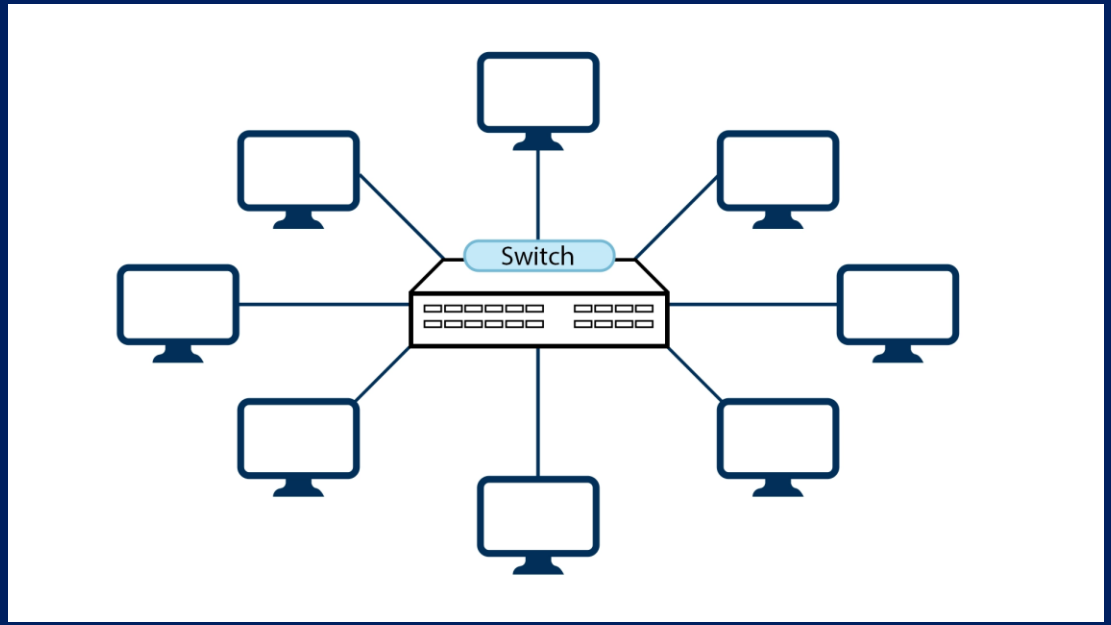
- A **switch** is a networking device that connects multiple devices (computers, printers, servers) within the same local area network (LAN).

The main roles of the switch are :

- Sends data only to the specific device that needs it.

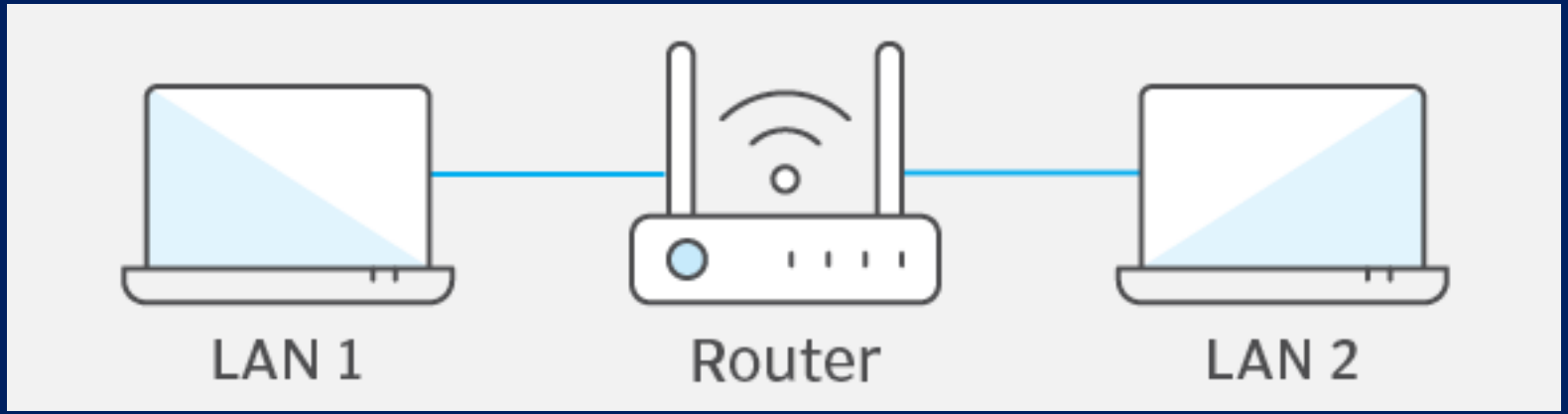
- Increases network efficiency and reduces congestion.

Example: Switches are used in offices and universities to connect many computers in the same building.



2.1.2.2. Router

- A router is a device that directs data packets between different networks (e.g., between your local home network and the Internet).
  - Connects local networks to external ones (LAN → WAN).
  - Determines the best path for data transmission.
  - Can also provide Wi-Fi functionality.



2.1.2.3. Modem

- A **modem** (modulator-demodulator) converts digital data from computers into analog signals that can travel over telephone or cable lines — and vice versa.
- The main roles of the modem are:

  - Provides access to the Internet from your Internet Service Provider (ISP).
  - Translates between your network and the external world.

  Example: The box your ISP installs at home is your modem — it's what connects your house to the Internet.

2.1.2.4. Fiber Optics

- Definition:

Fiber optic cables are transmission media that carry data as pulses of light through glass or plastic fibers.

- Functions:
  - Provide high-speed Internet and long-distance communication.
  - Offer greater bandwidth and reliability than traditional copper cables.

  Example: Used by ISPs to connect cities and by universities for high-speed data transfer.

2.1.2.5. Wi-Fi (Wireless Communication)

Definition:

Wi-Fi is a wireless networking technology that allows devices to connect to a network or the Internet without physical cables.

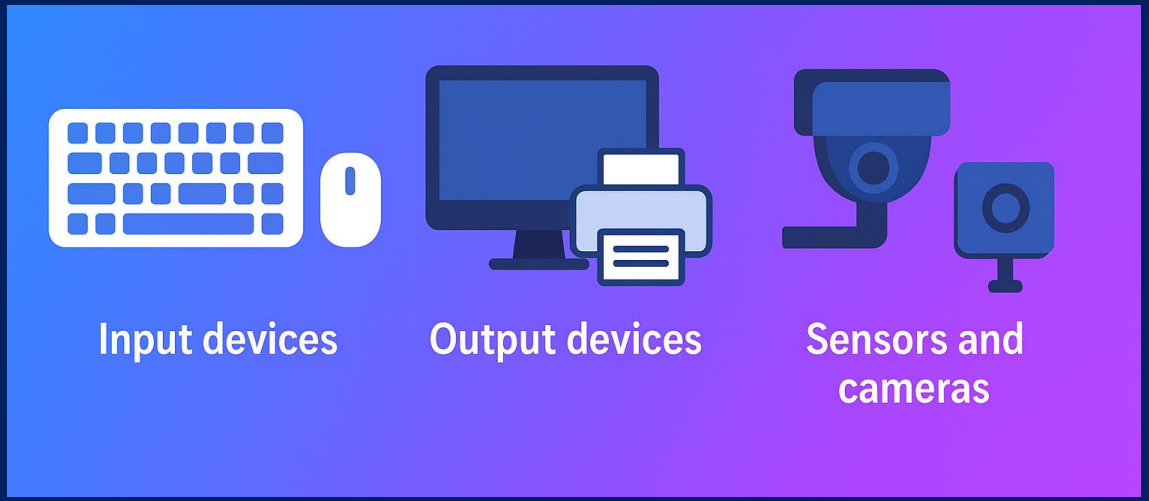
- Functions:
  - Provides mobility and flexibility for users.
  - Connects smartphones, laptops, and IoT devices.

- Example: Campus Wi-Fi networks that let students connect anywhere without plugging in.

2.1.3. Peripherials

Peripherals are external devices connected to a computer to extend its role and functionality. They enable users to input the data, output data and information, or capture signals from the environment.

- Three categories of these devices:
  - The input devices are used to introduce data to the computer.
  - The output devices are used to output, write, and display information.
  - Sensors and cameras capture data from the environment.



2.1.3.1 Input Devices

- Input devices send commands and data to the computer for processing.
- Examples

  - Keyboard: used to type text and commands.
  - Mouse: controls on-screen movement.
  - Scanner: converts printed documents to digital form.
  - Camera: captures images and video.
  - Sensors: detect physical changes (temperature, light, motion, etc.).

2.1.3.2 Output Devices

- Output devices are the devices used to display, write, or project information processed by the computer.
- Examples:
  - Monitor: displays text, graphics, and video.
  - Printer: produces hard copies of documents or images.
  - Speakers: output sound.
  - Projector: displays information to a larger audience.

2.1.3.3 Printers & Scanners

- Printers: Output devices that produce text or images on paper. Types: inkjet, laser, 3D.
- Scanners: Input devices that digitize physical documents or images.

2.1.3.4 Cameras and Sensors

- **Cameras**: capture visual data (images and videos).
- **Sensors**: detect and measure environmental data (light, heat, pressure, motion).

2.1.4. Mobile Devices

- 2.1.4.1 Definition of mobile devices :
  - Mobile devices are portable computing tools that enable users to access data, communicate, and perform tasks anywhere, anytime.
  - They are essential components of modern information technology, connecting users to networks and cloud services.

2.1.4.2 Main Types of Mobile Devices

- PDA (Personal Digital Assistant): The earliest widely popular handheld devices designed for personal organization (calendars, contacts, notes) were the precursor to modern smartphones. Examples, PalmPilot or early Windows Mobile devices came first.
- Smartphone**:** They are evolved directly from the PDA by adding full **mobile phone capabilities** and later, robust internet access and application ecosystems.
- Tablet**:** The tablet came after the smartphone, taking the multi-touch interface and application ecosystem of the smartphone but scaling it up with a **larger screen** and primarily focusing on media consumption, casual gaming, and content creation, often filling a gap between a smartphone and a laptop.

2.1.4.3 Key Features of Mobile Devices

The Key Features and Capabilities relevant to mobile devices are :

- Touchscreen Interface: for intuitive interaction.
- Wireless Connectivity: Wi-Fi, Bluetooth, mobile networks.
- Sensors: GPS, accelerometer, camera, microphone.
- Operating Systems: Android, iOS, HarmonyOS.
- Applications (Apps): tools for communication, entertainment, and productivity.

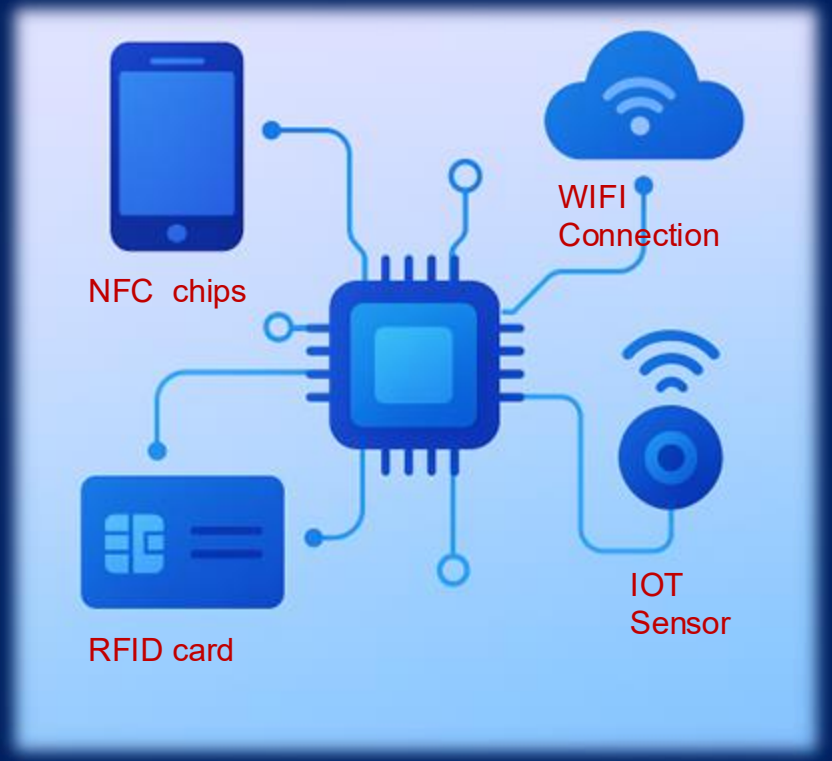
2.1.4.4. Role of Mobile Devices in Information Technology

- Mobile devices enable mobility in the modern information technology (IT) ecosystem,
- Allows communication and cloud-based collaboration.
- They integrate hardware, software, and networks into a single portable tool.
- **Examples of Uses:**
  - Business communication
  - Remote work and cloud storage
  - Data collection via sensors
  - E-learning and mobile apps

2.1.5 Smart Chips in Information Technology

- Smart chips are **small, intelligent electronic components** designed to process information, communicate, and interact with other devices.

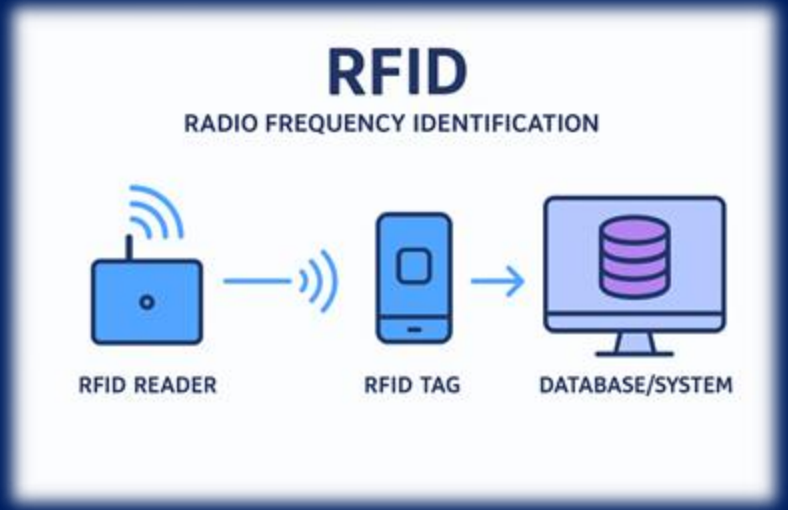
- They are used in **IoT systems**, **contactless payments**, **smart cards**, and **connected sensors.**
- Examples: RFID tags, NFC chips, embedded processors, IoT sensors.



2.1.5.1 Radio Frequency Identification (RFID)

- RFID is a wireless technology that uses radio waves to identify and track objects, animals, or people automatically.

- Main Components:
  - RFID Tag: a small chip attached to an object, containing unique data.
  - RFID Reader: a device that emits radio signals to detect and read tags.
  - Database/System: stores and manages the information collected.



2.1.5.1 RFID applications

- Access cards and student IDs.
- Library and inventory tracking.
- Logistics and supply chain management.
- Contactless payment systems.

2.1.5.2 NFC – Near Field Communication

- NFC (Near Field Communication) is a short-range wireless technology that enables two devices to communicate when they are very close, usually less than 10 cm apart.

Key Characteristics:

- Based on RFID technology, but works in two-way communication.
- Requires close proximity, ideal for secure exchanges.
- Common in smartphones, cards, and IoT devices.

Examples of Use:

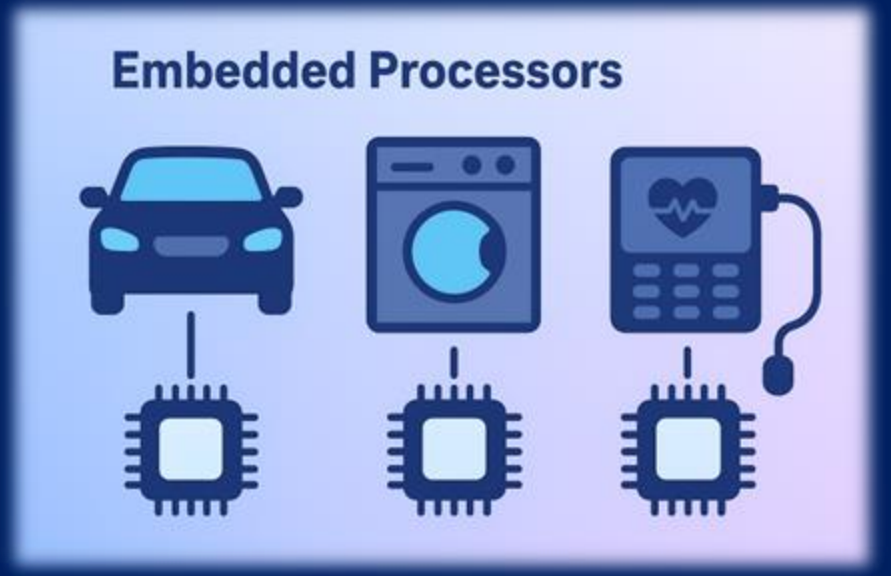
- Mobile contactless payments (Apple Pay, Google Pay).
- Smart transportation tickets or student cards.
- Pairing Bluetooth devices instantly.

2.1.5.3 Embedded Processors

- Embedded processors are specialized microchips built into machines or devices to perform specific functions.

Examples:

- In cars: control engine systems and sensors.
- In household appliances: manage washing cycles, temperature, etc.
- In medical devices: control monitoring systems.



2.1.5.4 IOT (Internet of Things) Sensors

- IoT Sensors, Connecting the Physical and Digital Worlds, collect and transmit real-world data (temperature, light, motion, humidity) to connected systems.

- Examples:
  - Smart homes (temperature, light sensors).
  - Smart cities (traffic, pollution sensors).
  - Agriculture (soil moisture sensors).

2.2 From Hardware to Software: The Brain Behind the Machine

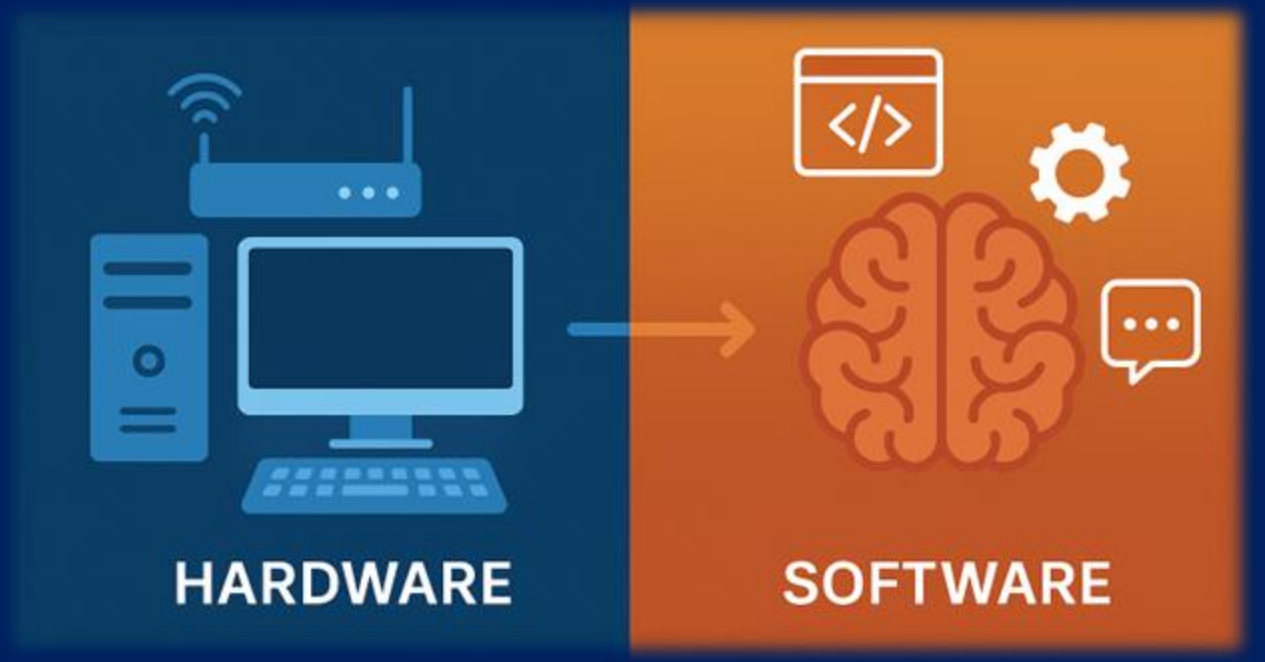
Software definition

- What Is Software?

Software is a collection of programs, instructions, or data that tell a computer how to work and perform specific tasks.

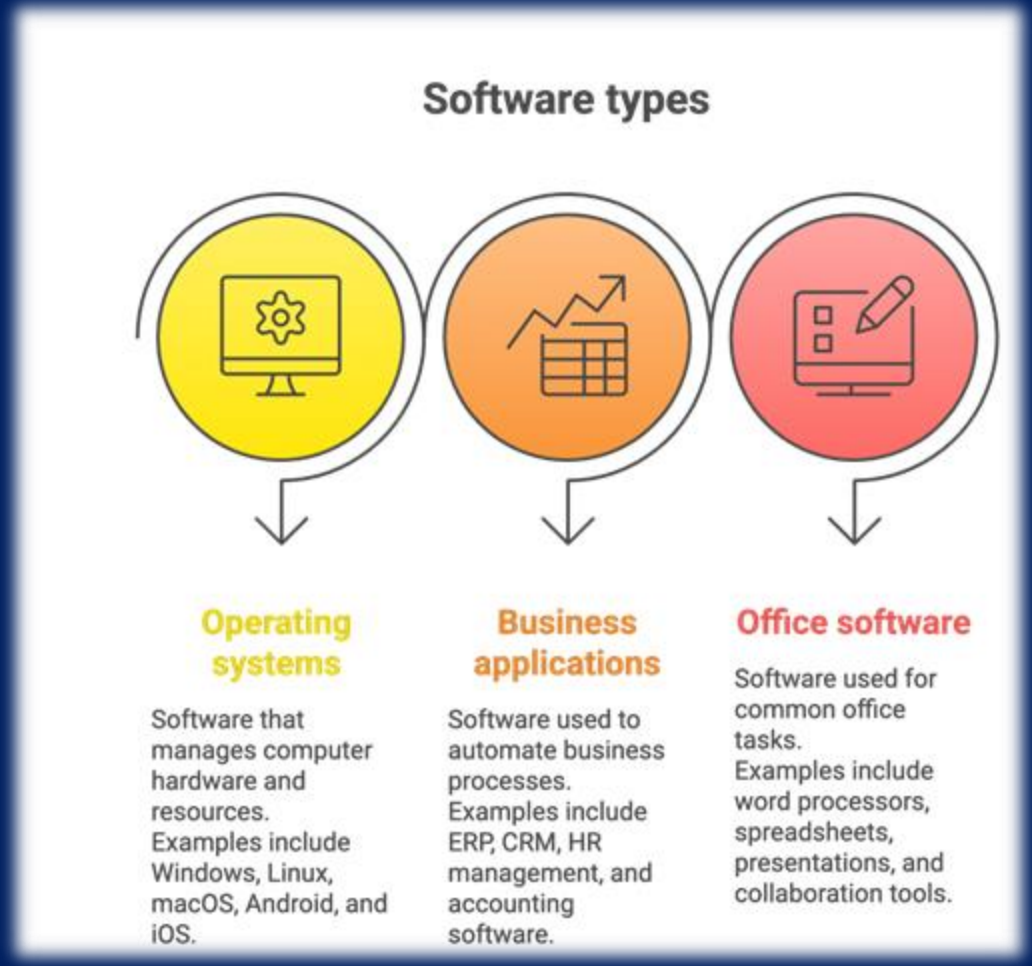
- Why is the hardware useless without software?

Software gives instructions to the hardware to perform specific tasks.



Categories of the software

1. Operating systems: Windows, Linux, macOS, Android, iOS.
2. Business applications: ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), HR management, accounting software, etc.
3. Office software: word processors (Word), spreadsheets (Excel), presentations (PowerPoint), collaboration tools (Google Workspace, Microsoft 365).



2.2.1 The operating system (OS) and its key roles?

2.2.1.1 What is an OS

- An Operating System (OS) is system software that manages hardware and software resources and provides services for computer programs.
- **Key Roles:**

1. **Resource Management** – controls CPU, memory, storage, and devices.
2. **User Interface** – provides a way for users to interact (CLI or GUI).
3. **File Management** – organizes and secures files and directories.
4. **Process Management** – handles tasks and applications efficiently.

2.2.1.2 Operating system types

Type	Description	Examples
Desktop OS	Designed for personal computers and laptops.	Windows, macOS, Linux
Mobile OS	Optimized for smartphones and tablets.	Android, iOS
Server OS	Manages networks, data, and multiple users.	Ubuntu Server, Windows Server, Red Hat
Embedded OS	Runs on devices like routers, smart TVs, cars.	Embedded Linux, VxWorks
Real-Time OS (RTOS)	Used for time-critical systems.	FreeRTOS, QNX

2.2.1.3 Desktop OS: Overview

Windows

Dominant market share, best for PC gaming, and widest software/hardware choice.

Linux

Open-source, ultimate customization, and the backbone of servers and the cloud.

macOS

Focus on creative professionals, strong security, and deep ecosystem integration.

2.2.1.4 Microsoft Windows

The Global Standard

The most dominant desktop OS worldwide, known for its versatility and vast software library.

- Developer: Microsoft
- Primary Use: PCs, Laptops, Workstations
- Key Trait: Unmatched hardware and software compatibility, making it the default for gaming and business.

2.2.1.5 Linux Open source OS

Linux open source OS

A kernel that powers hundreds of different OS distributions (like Ubuntu, Fedora), valued for its flexibility and security.

- **Developer:** Open-Source Community
- **Primary Use:** Servers, Cloud, Supercomputers, Desktops
- **Key Trait:** Free, open-source, highly customizable, and the backbone of the internet and most web servers.

2.2.1.6 Apple Mac OS

- Design & Performance
  - Known for its sleek design, strong security, and focus on creative professionals.
  - Developer: Apple Inc.
  - Primary Use: Mac computers (MacBook, iMac)
  - Key Trait: Seamless integration with the Apple ecosystem (iPhone, iPad) and a polished, Unix-based foundation.

2.2.1.7 Mobile OS: Overview

Android 

Choose if you value an **open platform**, a wide **variety of devices** at all price points, and deep **customization**.

iOS

Choose if you value a **closed, secure ecosystem**, seamless **hardware optimization**, and a simple, **user-friendly** experience.

2.2.1.8 Google Android

- The World's Mobile Leader
  - The most popular mobile OS, built on the Linux kernel and championed by Google.
  - Developer: Google / Open Handset Alliance
  - Primary Use: Smartphones, Tablets, Smart TVs
  - Key Trait: Open platform, highly customizable, and available on a massive range of devices from countless manufacturers.

2.2.1.9 Apple IOS

- Apple iOS
  - The Secure Ecosystem
  - The secure, high-performance OS exclusive to Apple's mobile hardware.
  - **Developer:** Apple Inc.
  - **Primary Use:** iPhone, iPad (as iPadOS)
  - **Key Trait:** A closed, secure ecosystem known for its user-friendliness, curated App Store, and seamless hardware optimization.

2.2.1.10 Comparison Between Operating Systems

Feature	Windows	macOS	Linux	Android	iOS
License Type	Proprietary	Proprietary	Open Source	Open Source (Core)	Proprietary
Customization	Limited	Limited	Very High	Moderate	Very Limited
User Interface	GUI-based	GUI-based	GUI/CLI	Touch-based	Touch-based
Security	Moderate	High	Very High	High	Very High
Usage Domain	PC/Office	Design, Education	Servers, Developers	Mobile	Mobile
Cost	Paid	Paid (included)	Free	Free	Included

2.2.2 Business applications software

- Business applications are software systems designed to support organizational activities, improve productivity, and automate business processes.

- They help companies:
  - Manage operations
  - Handle customers and resources
  - Process data efficiently
  - Make better decisions

2.2.2.1 ERP: Enterprise Resource Planning

- Enterprise Resource Planning (ERP) is an integrated software system that centralizes and manages a company's core processes.

- Key Modules:
  - Human Resources
  - Inventory Management
  - Sales & Procurement
  - Finance & Accounting
  - Supply Chain

2.2.2.2 Customer Relationship Management

- CRM software helps organizations manage interactions with customers, improve sales, and provide better service.
- It enables increasing customer satisfaction and business growth.

Features:

- Contact & customer data management
- Sales tracking
- Marketing automation
- Customer service management
- Reporting and dashboards

2.2.2.3 Human Resources (HR) Management Systems

- Human Resource (HR) software helps organizations manage employee information and administrative tasks.
- Core Functions:
  - Employee records and profiles
  - Payroll management
  - Attendance & leave tracking
  - Recruitment & onboarding
  - Performance evaluation

2.2.2.4 Accounting and Financial Management Software

- Accounting and Financial Management Software helps manage financial transactions, budgeting, and reporting.
- **Features:**
  - Invoicing
  - Budgeting
  - Expense tracking
  - Tax management
  - Financial statements

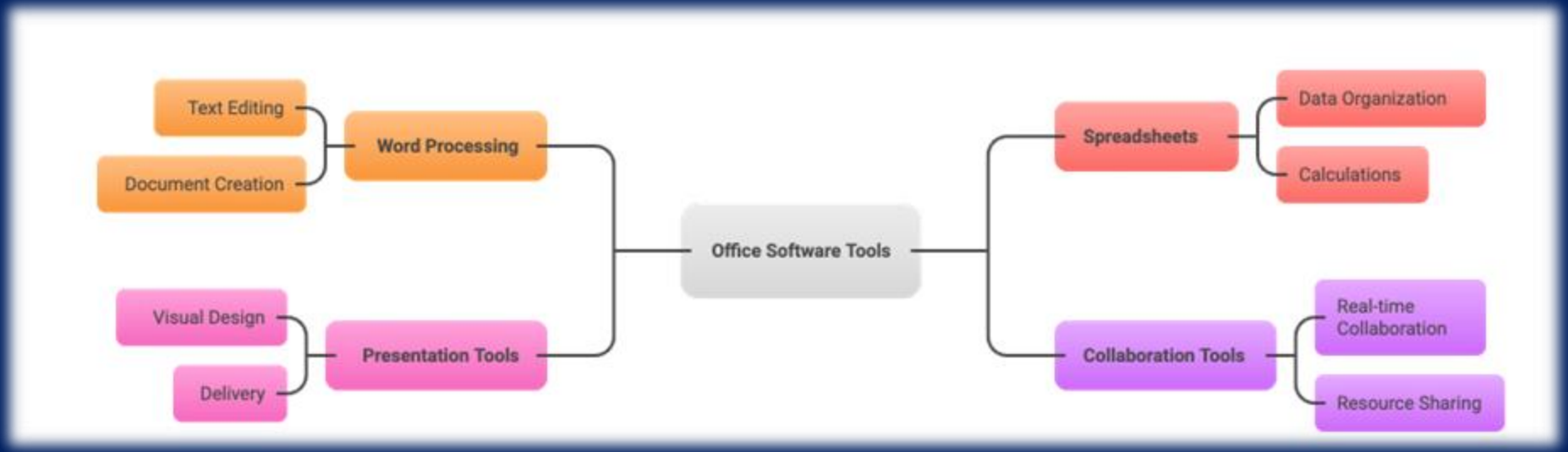
Examples:
QuickBooks, Sage, Odoo (open-source ERP with accounting module), SAP.

Summary of Business Applications

Category	Purpose	Examples
ERP	Manage internal company operations	SAP, Odoo
CRM	Manage customer relationships	Salesforce, HubSpot
HR Software	Manage employee data	Zoho HR, OrangeHRM
Accounting	Handle financial operations	QuickBooks, Sage, Odoo

2.2.3 What Are Office Software Tools?

- Office software refers to tools used to create, edit, organize, and share digital documents.
- Essential in all organizations (education, business, administration).
- Improves productivity and collaboration.



Why Office Software Matters in IT & Open Source

- Fundamental for every profession.
- Enables efficient digital communication.
- Cloud-based office suites power modern IT systems.
- Many open-source alternatives exist (LibreOffice, OnlyOffice, Collabora).

2.2.3.1 Word Processors software

- Software used for creating, editing, formatting, and printing text documents, such as Microsoft Word and Google Docs.

Main Functions of Word Processing Software include :

- Text editing & formatting
- Spell-check & grammar correction
- Inserting tables, images, and charts
- Styles & templates
- Exporting documents (PDF, DOCX…)

Examples:

- Microsoft Word
- Google Docs (cloud-based)
- LibreOffice Writer (open source)

2.2.3.2 Spreadsheets (Excel, Google Sheets)

- Spreadsheets are tools used for numerical data processing, calculations, and data analysis.

Key Features of spreadsheets Software include :

- Formulas & functions
- Charts & graphs
- Data filtering and sorting
- Pivot tables
- Automation (Excel macros, Google Sheets scripts)

Examples:

- Microsoft Excel
- Google Sheets
- LibreOffice Calc

2.2.3.3 Presentation Software (PowerPoint, Google Slides)

Presentation software represents Tools used to create visual presentations for meetings, teaching, and reports.

Key Features provided by presentation software are:

- Slide design templates
- Images, icons, diagrams
- Animations and transitions
- Speaker notes
- Video & audio integration

Examples:

- Microsoft PowerPoint
- Google Slides
- LibreOffice Impress
- Latex Beamer presentation

2.2.3.4 Collaboration & Cloud Productivity Tools

- Cloud collaboration utilities refer to Platforms allowing teamwork in real time through the internet.

Key Features

- Cloud storage (Drive, OneDrive)
- Real-time document editing
- Version history
- Team communication & messaging
- Integration with calendars & forms

Examples:

- Google Workspace (Docs, Sheets, Drive, Meet)
- Microsoft 365 (Word, Excel, OneDrive, Teams)
- Open source: Nextcloud + Collabora Online

2.3 Application Tools in Information Technology

- What Are Application Tools in IT?
- Application tools are software systems and platforms that enable organizations and users to communicate, collaborate, exchange data, and automate processes.

- They represent the practical use of IT in daily tasks and professional environments.

2.3. Overview of IT Applications

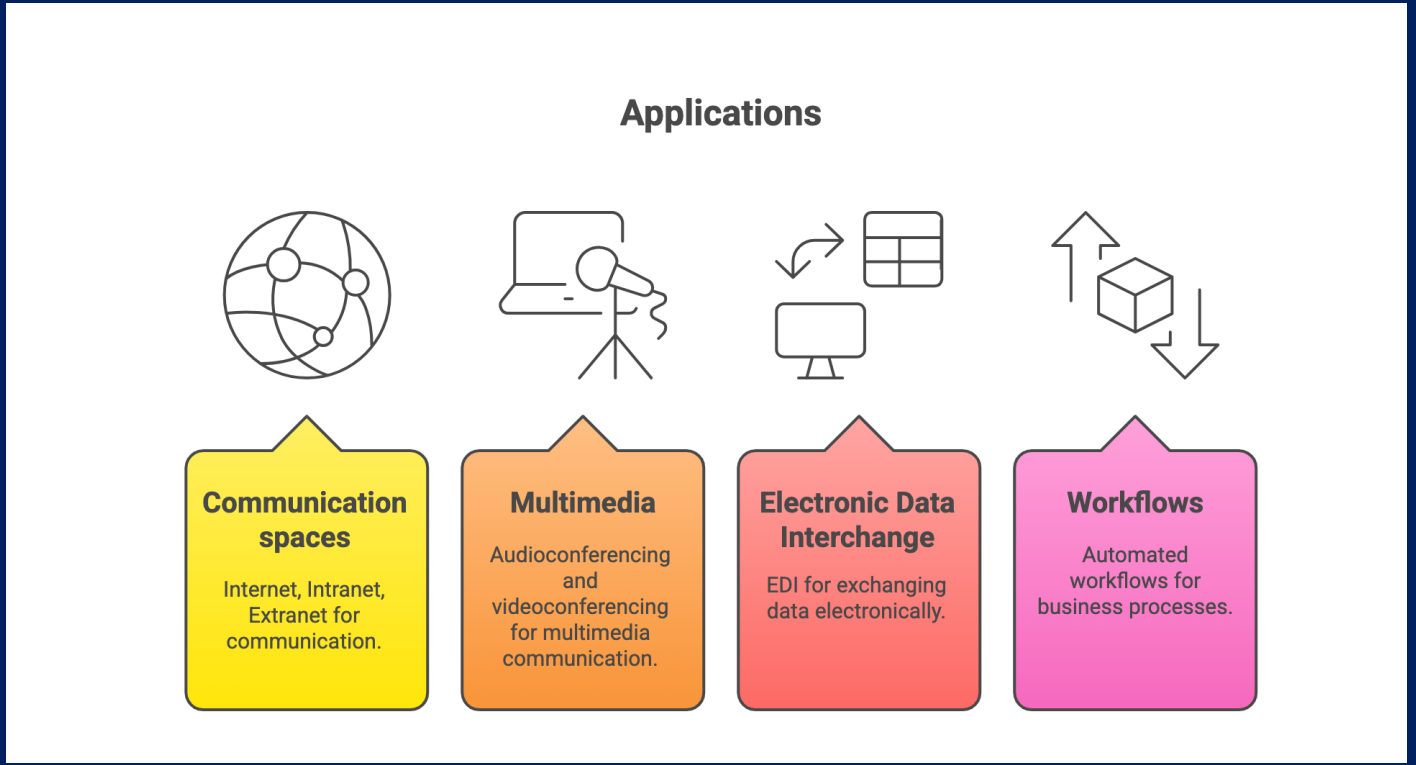
Main Categories of IT Application Tools :

1.Communication spaces
- Internet, Intranet, Extranet

2.Multimedia communication
- Audio conferencing, Video conferencing

3.Electronic Data Interchange (EDI)
- Automated exchange of structured business documents

4.Workflows
- Tools that automate processes and task sequences

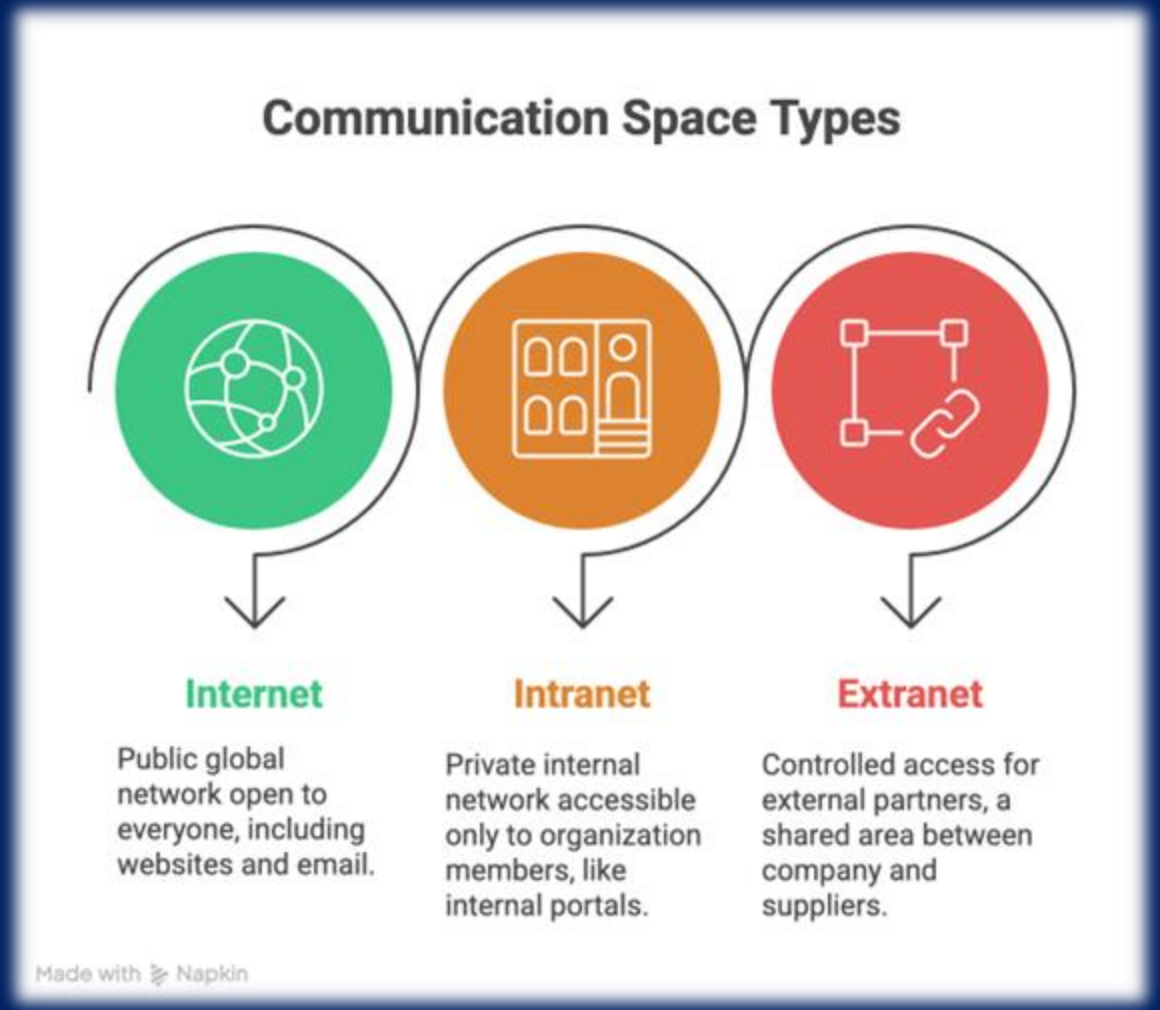


2.3.1 Communication space

- A communication space is a virtual or physical environment that enables individuals or groups to interact, exchange information, and share ideas.
- It provides a structured context—whether online or offline—where communication, collaboration, and knowledge sharing can occur.
- These spaces can take many forms, such as online platforms, social media networks, video-conferencing rooms, intranets, classrooms, or even informal gathering areas.
- Their main purpose is to facilitate smooth, efficient, and meaningful communication between participants.

Three Key Types of Communication space

1. 🌐 **Internet**
    1. Public global network
    2. Open to everyone
    3. Examples: websites, email, online services
2. 🏢 **Intranet**
    1. Private internal network
    2. Accessible *only* to organization members
    3. Examples: internal portals, HR systems, internal documentation
3. 🔗 **Extranet**
    1. Controlled access for *external partners*
    2. Shared area between company and suppliers/customers
    3. Examples: vendor portals, customer collaboration spaces



2.3.1.1 The Internet

- The Internet is a *global public network* connecting millions of devices worldwide.

Characteristics:

- Open and accessible to everyone
- Uses standard communication protocols (TCP/IP)
- Enables email, websites, cloud services, and e-commerce

Examples:

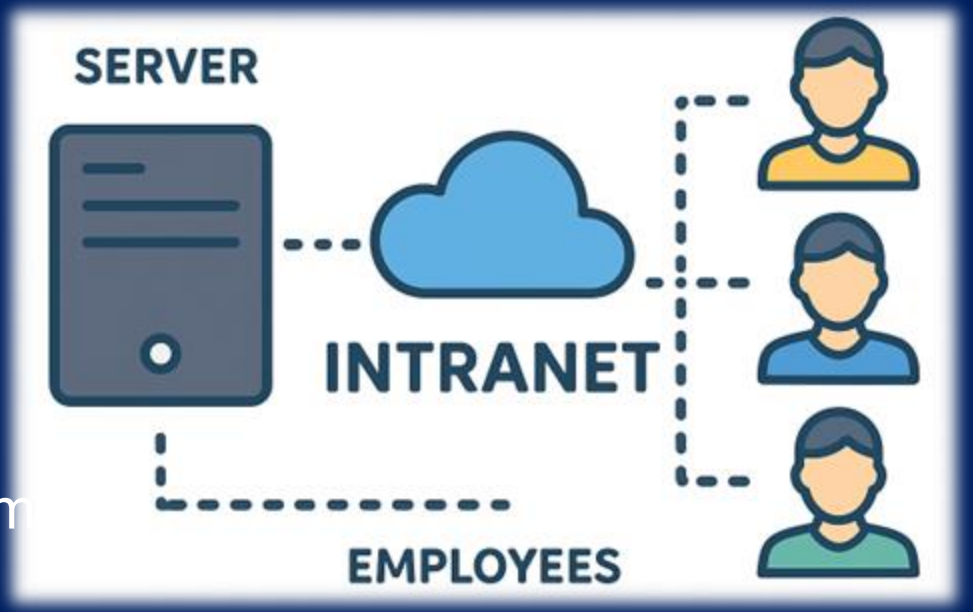
- Gmail, YouTube, Google Search
- Online banking
- E-learning platforms

2.3.1.2 The Intranet

An **Intranet** is a **private, internal network** used within an organization. It provides employees with secure access to shared information, tools, and resources.

Key Characteristics

- **Secure & Private**
  Accessible only to employees with login credentials.
- **Centralized Information**
  Policies, documents, reports, procedures stored in one place.
- **Supports Internal Collaboration**
  Internal email, forums, and team communication platform
- **Integrated Tools**
  HR systems, project management, training platforms.



2.3.1.3 Extranet: Extending Internal Access Securely

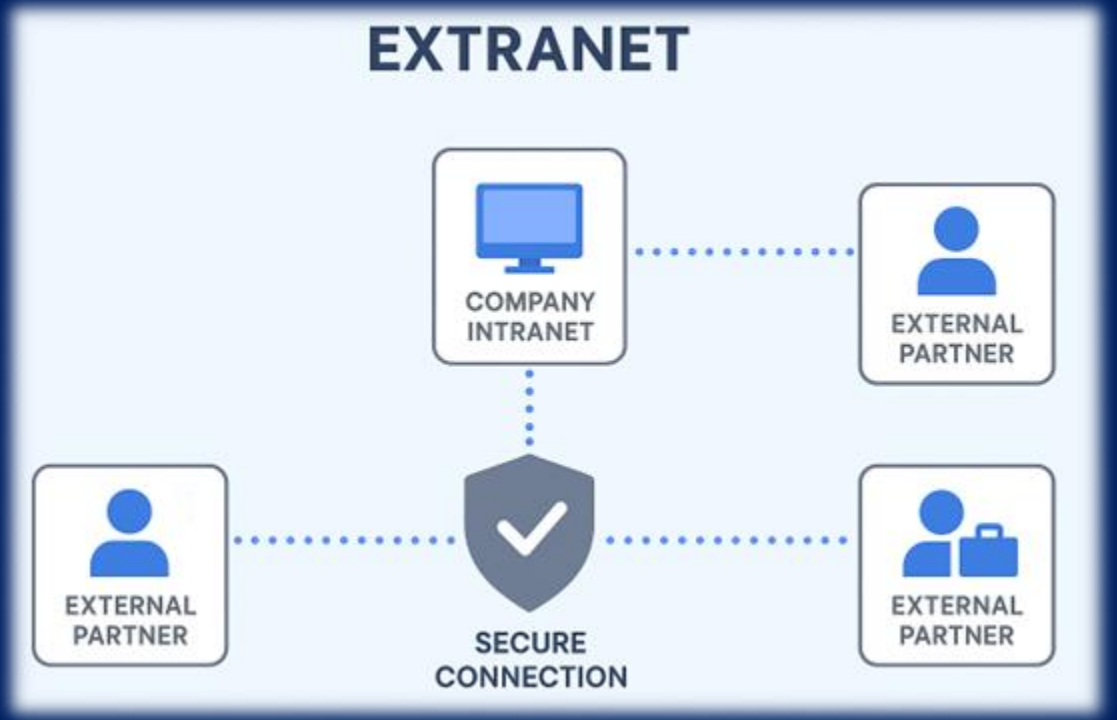
- An Extranet is a private network that allows controlled access to external users such as partners, suppliers, clients, or collaborators.

- It extends an organization's Intranet beyond its internal boundaries while maintaining strict security.

- Key Characteristics
  - Selective Access: Only authorized external users can access specific resources.
  - Secure Communication: Uses VPNs, authentication systems, encryption, and firewalls.
  - Collaboration-Oriented: Shares documents, databases, schedules, and project spaces.
  - Bridges Organizations: Connects businesses for smoother operations and joint workflows.

Extranet: How it works?

1. The company has a private network (its own computers and servers).
2. Some trusted partners (clients, suppliers, etc.) need access to certain information.
3. The company creates a secure external access to part of its network.
4. Partners connect through the internet using a login or secure link.
5. A firewall protects the company and only lets authorized users enter.
6. Partners access specific resources (files, orders, data) shared with them — nothing more.



2.3.2 Multimedia in Information Technology

- Multimedia refers to the communication using multiple media formats, such as audio, video, and interactive tools
- Used for remote collaboration, teaching, and business meetings

Two major tools:

- Audioconferencing
- Videoconferencing

2.3.2.1 Audioconferencing

What is Audioconferencing?

- Real-time communication using **audio only**
- Multiple participants can connect by telephone or VoIP
- Common uses:
  - Customer support
  - Team discussions
  - Remote training

Examples

- Zoom (audio mode), Skype call, WhatsApp audio group calls

How Audioconferencing Works

- Users connect via phone or app
- Audio signals are sent through the internet/phone network
- A server or conferencing platform manages connections
- Participants communicate in real time

2.3.2.2 Videoconferencing

What is Videoconferencing?

Videoconferencing enables real-time communication between participants using audio and video streams over the internet or telecommunication networks.

Key characteristics :

- Real-time communication using audio + video
- Allows face-to-face meetings remotely
- Features include presentation sharing, screen sharing, chat
- Examples: Google Meet, Zoom, Microsoft Teams

Importance of multimedia tools

- Multimedia technologies like audioconferencing and videoconferencing are integral components of IT, that empower individuals and organizations to communicate, collaborate and share the information effectively.
- The principal aims are :

  - Enable remote work and online learning
  - Reduce travel costs
  - Improve global communication
  - Essential for modern organizations
  - Strongly used in IT, education, healthcare, business

Comparison between audio and video conferencing

Feature	Audioconferencing	Videoconferencing
Communication	Audio only	Audio + video
Bandwidth	Low	High
Hardware	Phone or mic	Camera + mic
Cost	Very low	Low/medium
Best use	Quick meetings	Remote teaching, presentations