

# ICT overview

- **ICT** is a term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems, and services such as videoconferencing and distance learning; it is often discussed in contexts like education, health care, or libraries.

- ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries.

## ## Data vs Information

- Data is a collection of unprocessed items (text, numbers, images, audio, and video) and raw facts and figures by themselves; it does not provide meaning.

- Information is processed data that has meaning and is useful to one or more people.

## ## Digital divide

- The digital divide refers to the gap between demographics and regions that have access to modern information and communications technology, and those that don't or have restricted access, including devices like the telephone, television, personal computers, and the Internet.

## ## Introduction to Computers

- What is a computer? A computer is a general-purpose electronic machine that receives/accepts, processes, stores, and outputs data into meaningful information.

- Alternatively, a computer can be defined as an electronic device operating under control of instructions stored in its memory that can accept data, manipulate it according to specified rules, produce results, and store the results for future use.

## ## Characteristics of Computers

- **Speed:** Computers process data at millions or billions of instructions per second; speed is measured in MHz (one million instructions per second).

- **Accuracy:** Computers are highly accurate; accuracy depends on instructions and hardware; for example, they can compute decimal results with many places without human error.

- **Diligence:** Computers do not suffer fatigue; the last calculation in a sequence can have the same accuracy and speed as the first.

- **Reliability:** Reliability measures performance against a standard for operation without failure.

- **Storage Capability:** Computers can store large amounts of data and recall information almost instantaneously when required.

- **Versatility:** Computers can perform multiple tasks simultaneously (e.g., drafting a letter, playing music, printing).

- **Resource Sharing:** Modern computers connect with each other, enabling sharing of costly resources like printers and allowing data and information to be shared among groups.

## ## Parts of a computer system

- Hardware. - Software.

- Data. - User.

## ## Information processing cycle

- **Input:** The first stage, involving collection of data from outside or within the system; common input devices include keyboard, bar code readers, mouse, scanners, etc.

- **Processing:** The stage where the computer manipulates entered data to make it usable.

- **Output:** The stage where processed information is transmitted to the user; output can be audio, video, text, and graphics, and results can be viewed on a screen or printed.

- **Storage:** After processing, the results can be kept for future use.

### ## How a computer represents data

- The computer reads and stores data in the form of numbers; computers use the binary number system, while humans typically use the decimal number system.
- **Binary number system:** has two distinct digits, 0 and 1.
- **Decimal number system:** contains ten distinct digits, 0 through 9.
- **Digital data representation:** the form in which information is conceived, manipulated, and recorded.
- **Bit (binary digit):** the smallest unit of data a computer can recognize or use; it is 0 or 1.
- **Byte:** the smallest unit of data storage; a byte is 8 bits, about one character of data.
- Half a byte is a nibble.
- One bit is a single 0 or 1; one byte consists of 8 bits.
- **Kilobyte, Megabyte, Gigabyte definitions:**
  - One kilobyte consists of 1,024 bytes (approximately 1000 bytes).
  - One megabyte is 1,024 kilobytes or approximately 1 million bytes.
  - One gigabyte is 1,024 megabytes or approximately 1 billion bytes.

## History and generations of computers (chronological)

- **Earlier Computing Devices (3000 BC–1617 AD):** Abacus was an early computing device used for calculations.
- **Zeroth Generation Computers (1642–1946):** mechanical computers such as Pascaline; Jacquard's punched cards; Babbage's Difference Engine and Analytical Engine; Ada Lovelace contributed programming concepts; Hollerith's tabulating machine; Mark I and Mark II; era ends with invention of vacuum tubes.
- **First Generation Computers (1946–1954):** use of vacuum tubes; large, power-hungry, heat-generating, unreliable, and labor-intensive to assemble; examples include ENIAC, EDSAC, EDVAC, IAS machine, UNIVAC I.
- **Second Generation Computers (1953–1964):** adoption of transistors (smaller, less heat, more reliable); limited storage; manual assembly; integration through ICs began in 1964.
- **Third Generation Computers (1964–1978):** use of Integrated Circuits (ICs); further reduction in size and heat, lower power; notable systems include IBM 360 and PDP-8.
- **Fourth Generation Computers (1978–Till Date):** advent of Large-Scale Integration (LSI) and Very-Large-Scale Integration (VLSI) leading to personal computers and microcomputers.
- **Fifth Generation Computers:** AI-oriented, using Ultra Large-Scale Integration (ULSI) and intelligent software with natural language interfaces (future-oriented).

### ## Classifications of computers

- **Based on Purpose:**
  - General Purpose Computers handle broad office and business tasks (sales analysis, accounting, invoicing, inventory, MIS, etc.).
  - Special Purpose Computers are designed for specific tasks like scientific applications, weather forecasting, space applications, or medical diagnostics.
- **Based on Technology Used:**
  - **Analog Computers:** represent data with continuously varying physical quantities (current, voltage, frequency) for measuring physical quantities (e.g., temperature, speed).
  - **Digital Computers:** represent and store data in discrete numeric form (binary); processing is numeric-based.
  - **Hybrid Computers:** combine analog and digital processing with converters between domains (AI, robotics, process control).

### **## Based on Size and Storage Capacity**

- **Super Computers:** extremely fast, for heavy numerical computations; very expensive and used by specialists.
- **Mainframe Computers:** powerful systems for bulk data processing in organizations; historically called “big iron.”
- **Personal Computers (PCs):** general-purpose, used directly by individuals; desktops, laptops, tablets; internet-connected.
- **Netbooks:** small, light, inexpensive laptops for basic computing and web access.