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HISTORY OF COMPUTERS

A computer is an electronic device designed to perform arithmetic and logical operations automatically. The word *computer* originates from the Latin verb *computare*, which means "to count" or "to calculate" Originally, the term **"computer" referred to a person**—someone who performed calculations manually or with mechanical tools. This usage dates back to the **1640s**. The shift to machines began in the **late 19th century**, and by **1945**, the term was commonly used to describe programmable electronic devices.

Before computers were developed people used sticks, stones, and bones as counting tools. As technology advanced and the human mind improved with time more computing devices were developed like Abacus, Napier's Bones, etc. These devices were used as computers for performing mathematical computations but not very complex ones.

Popular Computing Devices:

1. Abacus:
   - Invented around 4000 years ago in China.
   - Structure: Wooden rack with metal rods and beads.
   - Used for arithmetic calculations.

2. Napier's Bones:
   - Invented by John Napier.
   - Used ivory strips for multiplication and division.
   - First to use the decimal point system.

3. Pascaline:
   - Invented by Blaise Pascal (1642-1644).
   - First mechanical and automatic calculator.
   - Used gears and wheels for addition and subtraction.

4. Stepped Reckoner:
   - Invented by Gottfried Wilhelm Leibniz in 1673.
   - Digital mechanical calculator using fluted drums.

5. Difference Engine:
   - Designed by Charles Babbage in the 1820s.
   - Steam-driven mechanical computer for simple calculations.

6. Analytical Engine:
   - Developed by Charles Babbage in 1830.
   - Used punch cards and had permanent memory.

7. Tabulating Machine:
   - Invented by Herman Hollerith in 1890.
   - Used punch cards for tabulating statistics.
   - Led to the formation of IBM in 1924.

8. Differential Analyzer:
   - Invented by Vannevar Bush in 1930.
   - First electronic analog computer using vacuum tubes.

9. Mark I:
   - Developed by Howard Aiken in 1944.
   - First programmable digital computer.

Generations of Computers:

Generation	Time Period	Technology Used	Key Features	Operating Systems	Programming Languages	Examples
First	1940–1956	Vacuum Tubes	Slow, huge, expensive; used punch cards; magnetic tape and paper tape for input/output	Batch processing	Machine language	ENIAC, UNIVAC-1, EDVAC
Second	1957–1963	Transistors	Smaller, faster, cheaper; magnetic core memory; magnetic disks and tapes for storage	Batch and multiprogramming	Assembly, COBOL, FORTRAN	IBM 1620, IBM 7094, CDC 1604, CDC 3600
Third	1964–1970	Integrated Circuits (ICs)	Reliable, efficient, compact; remote processing; time-sharing systems	Multiprogramming, time-sharing	FORTRAN II–IV, COBOL, PASCAL, PL/1	IBM-360 series, Honeywell-6000, IBM-370/168
Fourth	1971–1990	VLSI (Very Large Scale	Millions of transistors per chip; powerful, fast,	Real-time, time-sharing, distributed	C, C++	STAR 1000, PDP 11, CRAY-1, CRAY-X-MP

		Integration)	affordable; real-time and distributed systems			
Fifth	1990–Present	ULSI (Ultra Large Scale Integration), AI	AI software; parallel processing; intelligent systems; compact and portable	AI-driven, advanced OS	C, C++, Java, .NET	Desktop, Laptop, Notebook, Ultrabook

First Generation (1940s–1950s)

- **Technology**: Vacuum tubes
- **Features**: Bulky, slow, machine language
- **Uses**: Scientific and military calculations
- **Advantages**: First electronic computers
- **Disadvantages**: High power use, frequent failures
- **Examples**: ENIAC, UNIVAC-1, EDVAC

Second Generation (1950s–1960s)

- **Technology**: Transistors
- **Features**: Smaller, faster, used assembly and early high-level languages
- **Uses**: Business, banking, research
- **Advantages**: More reliable, energy-efficient
- **Disadvantages**: Still large, limited multitasking
- **Examples**: IBM 1620, IBM 7094, CDC 1604

Third Generation (1960s–1970s)

- **Technology**: Integrated Circuits (ICs)
- **Features**: Multiprogramming, time-sharing, OS introduced
- **Uses**: Commercial apps, databases
- **Advantages**: Faster, cheaper, multi-user support
- **Disadvantages**: Complex hardware, limited portability
- **Examples**: IBM-360, Honeywell-6000

Fourth Generation (1970s–1990)

- **Technology**: Microprocessors, VLSI
- **Features**: Personal computers, GUI, networking
- **Uses**: Education, office, internet

- **Advantages**: Compact, powerful, user-friendly
- **Disadvantages**: Cyber risks, rapid obsolescence
- **Examples**: STAR 1000, PDP 11, CRAY-1

Fifth Generation (1990–Future)

- **Technology**: AI, ULSI, quantum computing
- **Features**: Machine learning, NLP, robotics
- **Uses**: Voice assistants, autonomous systems, diagnostics
- **Advantages**: Intelligent, adaptive, human-like interaction
- **Disadvantages**: Ethical concerns, high cost, data dependency
- **Examples**: Smartphones, Windows 11 (with Copilot), AI robots

Key Milestones in Computer History

- **First Computer**: **ENIAC**, completed in 1945, was the first general-purpose programmable electronic computer. It weighed 27 tons and occupied 1800 square feet.
- **Father of Computers**: **Charles Babbage**, who designed the Analytical Engine in the 1830s—a mechanical general-purpose computer that introduced concepts like memory and control units.
- **First Programmer**: **Ada Lovelace**, who wrote the first algorithm intended for Babbage's Analytical Engine. She's considered the world's first computer programmer.
- **First Mechanical Calculator**: **Pascaline**, invented by Blaise Pascal in 1642, could perform addition and subtraction using gears.
- **First Transistor Computer**: Built by the U.S. Air Force, it marked the transition from vacuum tubes to transistors in the 1950s.
- **First Woman with a PhD in Computer Science (U.S.)**: **Mary Kenneth Keller**, who earned her doctorate in 1965 and advocated for computer literacy and education.
- **First Computer Mouse**: Invented by **Douglas Engelbart** in 1964—made of wood and used to navigate graphical interfaces.
- **First Personal Computer (PC)**: **Altair 8800**, released in 1974 by Henry Edward Roberts, who coined the term "personal computer".
- **First Operating System for PCs**: **MS-DOS**, developed by Microsoft and used in IBM PCs in the early 1980s.
- **Modern Computing Pioneer**: **Alan Turing**, who laid the theoretical foundation for modern computers with his concept of the Turing Machine.

Famous Computing Pioneers

Name	Contribution
Charles Babbage	Designed the Analytical Engine—considered the first concept of a computer
Ada Lovelace	Wrote the first algorithm—world's first programmer

Name	Contribution
Alan Turing	Created the Turing Machine—laid the foundation of theoretical computer science
John von Neumann	Developed the stored-program architecture used in nearly all modern computers
Grace Hopper	Invented the first compiler—paved the way for modern programming languages
Tim Berners-Lee	Invented the World Wide Web