

Evolution of Computers

The journey of computers began with mechanical devices and evolved into powerful modern machines. The development of computers can be divided into five generations based on technology and architecture.

1st Generation (1940 – 1956): Vacuum Tube **Technology**

- Technology Used: Vacuum tubes for circuitry and magnetic drums for memory.
- Speed & Size: Large in size, consumed high power, and were slow.
- Programming Language: Machine language (binary code).
- Examples: ENIAC, UNIVAC, EDSAC, EDVAC.
- Disadvantages:
 - Overheating and frequent failures.
 - Limited storage capacity.

2nd Generation (1956 – 1963): Transistor **Technology**

- Technology Used: Transistors replaced vacuum tubes.
- Speed & Size: Smaller, faster, and more reliable than the 1st generation.
- Programming Language: Assembly language.
- Examples: IBM 1401, UNIVAC 1108.
- Advantages:
 - Consumed less power.
 - Increased efficiency and speed.
- **Disadvantages:**
 - High maintenance cost.

→ 3rd Generation (1964 – 1971): Integrated Circuits (ICs)

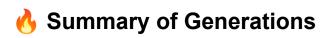
- **Technology Used:** Integrated Circuits (ICs) replaced transistors.
- Speed & Size: Smaller, faster, and cheaper.
- Programming Language: High-level languages like FORTRAN, COBOL, and BASIC.
- Examples: IBM 360 series, PDP-8.
- Advantages:
 - o Lower power consumption.
 - o Increased processing speed.
- Disadvantages:
 - o Maintenance required special expertise.

→ 4th Generation (1971 – 1980s): Microprocessor Technology

- **Technology Used:** Microprocessors integrated thousands of ICs into a single chip.
- Speed & Size: Smaller, portable, and more powerful.
- Programming Language: Advanced languages like C and C++.
- Examples: Intel 4004, Apple II, IBM PC.
- Advantages:
 - Low cost and high performance.
 - Introduction of GUI (Graphical User Interface).
- Disadvantages:
 - o Environmental impact due to electronic waste.

→ 5th Generation (1980s – Present): Artificial Intelligence (AI)

- Technology Used: All and machine learning technologies.
- Speed & Size: Extremely fast, highly efficient, and compact devices.
- Programming Language: Modern languages like Python, Java, and R.
- **Examples:** Modern supercomputers, Al systems, Quantum computers.
- Advantages:
 - Capability of decision-making.
 - Natural language processing and expert systems.
- Disadvantages:
 - o Risk of job automation.
 - High cost of development.



Generatio n	Technology Used	Speed & Size	Examples
1st	Vacuum Tubes	Slow & Large	ENIAC, UNIVAC
2nd	Transistors	Faster & Smaller	IBM 1401, UNIVAC 1108
3rd	Integrated Circuits (ICs)	Compact & Faster	IBM 360 series
4th	Microprocessors	Portable & Powerful	Intel 4004, Apple II
5th	AI and ML	Extremely Fast & Smart	AI Systems, Supercomputers