Fundamentals of Computers and Computing

CSE 1101

(Computer Generation)

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Generation of computer

- The computer has evolved from a large-sized simple calculating machine to a smaller but much more powerful machine.

- The evolution of computer to the current state is defined in terms of the generations of computer.

- Each generation of computer is designed based on a new technological development, resulting in better, cheaper and smaller computers that are more powerful, faster and efficient than their predecessors.
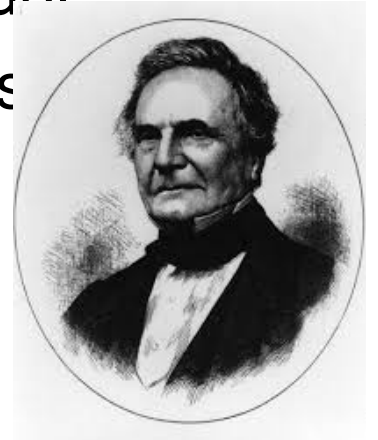
Generation of computer

- Currently, there are ten generations of computer. In the following subsections, we will discuss the generations of computer in terms of the technology used by them (hardware and software), computing characteristics (speed, i.e., number of instructions executed per second), physical appearance, and their applications.

Generation of computer

- The computer we are using today had its beginning with a 19th century English mathematics professor, Charles Babbage

- Computers are being classified mainly five generations

1. First generation
2. Second generation
3. Third generation
4. Fourth generation
5. Fifth generation

First Generation Computers (1937-1959)

- The first computers used **vacuum tubes**(a sealed glass tube containing a near-vacuum which allows the free passage of electric current.

- They were often enormous and taking up entire room.

- First generation computers relied on machine language.

- They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions(defect or breakdown).

- Other developments continued until in 1946 the first general– purpose digital computer, the Electronic Numerical Integrator and Computer (ENIAC) was built.

- It is said that this computer weighed 30 tons, and had 18,000 vacuum tubes which was used for processing.

- Computers of this generation could only perform single task, and they had no operating system.

First Generation Computers

First Generation Computers

Advantages :

- It was only electronic device
- First device to hold memory

Disadvantages :

- Too bulky i.e large in size
- Vacuum tubes burn frequently
- They were producing heat
- Maintenance problems

Second Generation Computers (1959-1965)

- **Transistors** replaced vacuum tubes in the second generation of computers.

- Second-generation computers moved from cryptic binary machine language to symbolic.

- High-level programming languages were also being developed at this time, such as machine and assembly languages.

- These were also the first computers that stored their instructions in their memory.

Second generation computers

Second generation computers

Advantages :
- Reliable in comparison to first generation computers
- Smaller size as compared to first generation computers
- Generated less heat as compared to first generation computers
- Consumed less electricity as compared to first generation computers
- Faster than first generation computers

Disadvantages :
- They over heated quickly
- Maintenance problems
- Still very costly
- A.C. needed

Third Generation Computers (1965-1971)

- The development of the **integrated circuit (IC)** was the hallmark of the third generation of computers.

- Transistors were miniaturized and placed on siliconchips, called semiconductors.

- Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an operating system.

- Allowed the device to run many different applications at one time.

Third generation computers

Third generation computers

Advantages :

- ICs are very small in size

- Improved performance

- Production cost cheap

- More reliable in comparison to previous two generations

- Generated less heat

- Lesser maintenance

- Supported high-level language

Disadvantages :

- Still costly

- A.C needed

Fourth Generation Computers (1971-1980)

- Fourth generation computers use Very Large Scale Integrated (VLSI) circuits.
- VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of fourth generation.
- Fourth generation computers became more powerful, compact, reliable, and affordable.
- As a result, it gave rise to personal computer (PC) revolution.
- In this generation time sharing, real time, networks, distributed operating system were used.
- All the high-level languages like C, C++, DBASE etc., were used in this generation.

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Fourth Generation Computers

Microprocessor

Fourth generation computers

Advantages :

- VLSI technology used

- Portable and reliable

- Use of PC's

- No A.C. needed

- Concept of internet was introduced

- Great developments in the fields of networks

- Computers became easily available

Disadvantages :

- microprocessor design and fabrication is very complex and requires expensive setup and highly skilled staff for manufacturing.

Fifth Generation Computers(1980-present)

- The period of fifth generation is 1980-till date.
- In the fifth generation, the VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components.
- This generation is based on parallel processing hardware and AI (Artificial Intelligence) software.
- AI is an emerging branch in computer science, which interprets means and method of making computers think like human beings.
- All the high-level languages like C and C++, Java, .Net etc., are used in this generation.
- The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.

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Fifth Generation Computers

Main features of fifth generation computers

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates