Computer Fundamentals

Generation of Computers

Riya Jacob K
Asst. Professor on contract, Dept of BCA
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Generations of Computers

- Generation in computer terminology is a change in technology a computer is/was being used.
- Initially, the generation term was used to distinguish between varying hardware technologies.
- Nowadays, generation includes both hardware and software, which together make up an entire computer system.
- There are five computer generations known till date.

Sl. No	Generation & Description
1	<u>First Generation</u> The period of first generation: 1940-1956. Vacuum tube based.
2	<u>Second Generation</u> The period of second generation: 1956-1963. Transistor based.
3	<u>Third Generation</u> The period of third generation: 1964-1971. Integrated Circuit based.
4	<u>Fourth Generation</u> The period of fourth generation: 1971-Present. VLSI microprocessor based.
5	<u>Fifth Generation</u> The period of fifth generation(Present and Beyond) ULSI microprocessor based.

First Generation Computers

- The period of first generation was from 1940-1956.
- The computers of first generation used vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit).
- These tubes, like electric bulbs, produced a lot of heat and the installations used to fuse frequently.
- Therefore, they were very expensive and only large organizations were able to afford it.
- In this generation, mainly batch processing operating system was used.
- Punch cards, paper tape, and magnetic tape was used as input and output devices.
- The computers in this generation used machine code as the programming language

- The main features of the first generation are:
  - Vacuum tube technology
  - Unreliable
  - Supported machine language only
  - Very costly
  - Generates lot of heat
  - Slow input and output devices
  - Huge size
  - Need of AC
  - Non-portable
  - Consumes lot of electricity
- Some computers of this generation were:
  - ENIAC
  - EDVAC
  - UNIVAC
  - IBM-701
  - IBM-750

Second Generation Computers

(1956-1963)

- The replacement of vacuum tubes by transistors saw the advent of the second generation of computing.

- Although first invented in 1947, transistors weren't used significantly in computers until the end of the 1950s.

- They were a big improvement over the vacuum tube, despite still subjecting computers to damaging levels of heat.

- However they were hugely superior to the vacuum tubes, making computers smaller, faster, cheaper and less heavy on electricity use.

- They still relied on punched card for input/printouts.

- The language evolved from cryptic binary language to symbolic ('assembly') languages. T

- his meant programmers could create instructions in words. About the same time high level programming languages were being developed (early versions of COBOL and FORTRAN).

- Transistor-driven machines were the first computers to store instructions into their memories – moving from magnetic drum to magnetic core 'technology'. The early versions of these machines were developed for the atomic energy industry.

- The main features of second generation are:
  - Use of transistors
  - Reliable in comparison to first generation computers
  - Smaller size as compared to first generation computers
  - Generates less heat as compared to first generation computers
  - Consumed less electricity as compared to first generation computers
  - Faster than first generation computers
  - Still very costly
  - AC required
  - Supported machine and assembly languages

- Some computers of this generation were:
  - IBM 1620
  - IBM 7094
  - CDC 1604
  - CDC 3600
  - UNIVAC 1108

Third Generation Computers(1964-71)

- By this phase, transistors were now being miniaturised and put on silicon chips (called semiconductors).
- This led to a massive increase in spee and efficiency of these machines.
- These were the first computers wher users interacted using keyboards and monitors which interfaced with an operating system, a significant leap u from the punch cards and printouts.
- This enabled these machines to run several applications at once using a central program which functioned to monitor memory.
- As a result of these advances which again made machines cheaper and smaller, a new mass market of users emerged during the '60s.

- The main features of third generation are:
  - IC used
  - More reliable in comparison to previous two generations
  - Smaller size
  - Generated less heat
  - Faster
  - Lesser maintenance
  - Costly
  - AC required
  - Consumed lesser electricity
  - Supported high-level language

- Some computers of this generation were:
  - IBM-360 series
  - Honeywell-6000 series
  - PDP (Personal Data Processor)
  - IBM-370/168
  - TDC-316

Fourth Generation Computers

(1971-Present)

- This revolution can be summed in one word: Intel. The chip-maker developed the Intel 4004 chip in 1971, which positioned all computer components (CPU, memory, input/output controls) onto a single chip.
- What filled a room in the 1940s now fit in the palm of the hand.
- The Intel chip housed thousands of integrated circuits.
- The year 1981 saw the first ever computer (IBM) specifically designed for home use and 1984 saw the MacIntosh introduced by Apple.
- Microprocessors even moved beyond the realm of computers and into an increasing number of everyday products.
- The increased power of these small computers meant they could be linked, creating networks.
- Which ultimately led to the development, birth and rapid evolution of the Internet.
- Other major advances during this period have been the Graphical user interface (GUI), the mouse and more recently the astounding advances in lap-top capability and hand-held devices.

- The main features of fourth generation are:
  - VLSI technology used
  - Very cheap
  - Portable and reliable
  - Use of PCs
  - Very small size
  - Pipeline processing
  - No AC required
  - Concept of internet was introduced
  - Great developments in the fields of networks
  - Computers became easily available

- Some computers of this generation were:
  - DEC 10
  - STAR 1000
  - PDP 11
  - CRAY-1(Super Computer)
  - CRAY-X-MP(Super Computer)

Fifth Generation Computers

(Present and beyond)

- Computer devices with artificial intelligence are still in development, but some of these technologies are beginning to emerge and be used such as voice recognition.

- AI is a reality made possible by using parallel processing and superconductors. Leaning to the future, computers will be radically transformed again by quantum computation, molecular and nano technology.

- The essence of fifth generation will be using these technologies to ultimately create machines which can process and respond to natural language, and have capability to learn and organise themselves.