

DEVELOPMENT OF COMPUTERS.

HISTORY OF COMPUTING.

Before 1900, most data processing was done manually using simple tools like stones & sticks to count and keep records.

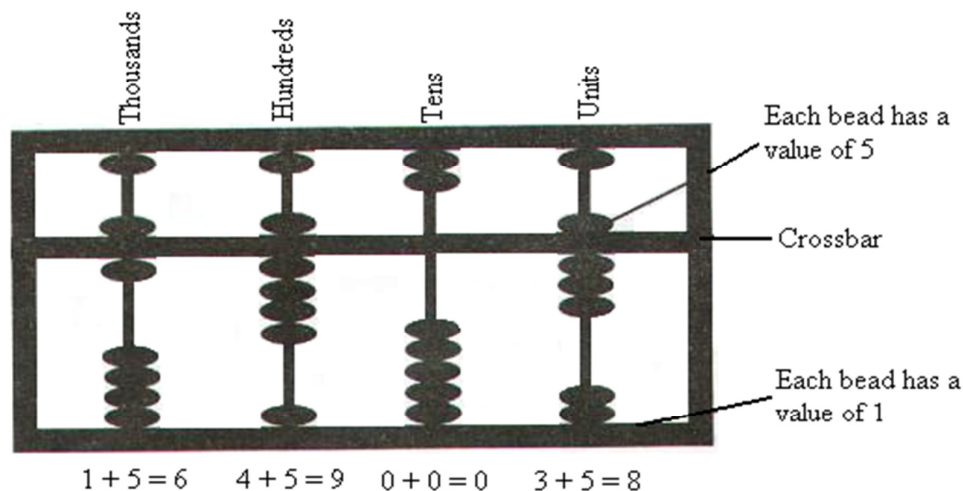
Around 2000 years ago, Asian merchants came up with a special calculating tool called Abacus that could be used to calculate large figures.

An Abacus is made up of a rectangular frame and a crossbar at the middle. It is fitted with wires or strings running across from the frame to the crossbar.

How to represent a number using an Abacus.

Each bead in the lower row has a value of 1, while each bead in the upper row has a value of 5. To represent a number, the bead is moved to the crossbar. Those beads away from the crossbar represent zeros.

The Figure below represents the number 6908 (Six thousand nine hundred and eight).



After Abacus, the first machine that is usually regarded as the forerunner of modern computers was named the Analytical Engine, and was developed by an English mathematician called Charles Babbage.

In 1939, Professor Howard Aken of Horrard University designed the first computer-like machine named Mark I. Since then, a series of advancements in electronics has occurred. With each breakthrough, the computers based on the older form of electronics have been replaced by a new “generation” of computers based on the newer form of electronics.

COMPUTER GENERATIONS.

A Computer generation is a grouped summary of the gradual developments in the computer technology. The historical events are not considered in terms of individual years, but are classified in durations (a period of more than a year).

1ST Generation computers (1946 – 1956).

The 1st generation of computers used thousands of electronic gadgets called **Vacuum tubes** or **Thermionic valves** to store & process information.

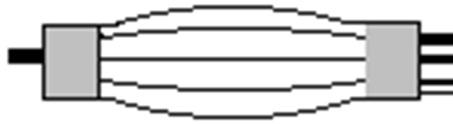


FIGURE 1: VACUUM TUBE

The tubes consumed a lot of power, and generated a lot of heat during processing due to overheating.

The computers constantly broke down due to the excessive heat generated, hence were short-lived, and were not very reliable.

They also used Magnetic drum memories.

Cards were used to enter data into the computers.

Their internal memory capacity was limited. The maximum memory size was approx. 2 KB (2,000 bytes).

The computers used big physical devices in their circuitry; hence they were very large in size, i.e. the computer could occupy several office blocks. For example, ENIAC occupied an area of about 150m² - the size of an average 3-bedroom house.

They were very slow - their speed was measured in Milliseconds. E.g., ENIAC (the earliest electronic computer) could perform 5,000 additions per second & 300 multiplications per second.

The computers were very costly - they costed millions of dollars.

Examples of 1ST Generation computers:

1. ENIAC (Electronic Numerical Integrator And Calculator) built in 1946 for use in World War II. It contained 18,000 Vacuum tubes.
2. EDVAC (Electronic Discrete Variable Automatic Computer) developed in 1945 by Dr. John Von Neumann. It was the first computer that used instructions stored in memory.
3. UNIVAC (UNIVersal Automatic Computer).
4. IBM 650.
5. LEO (Lyon's Electronic Office).

2ND Generation computers (1957 – 1963).

The 2nd generation computers used tiny, solid-state electronic devices called Transistors. The transistors were relatively smaller, more stable & reliable than vacuum tubes.



FIGURE 2: TRANSISTOR

The computers consumed less power, produced less heat, were much faster, and more reliable than those made with vacuum tubes.

They used Magnetic core memories.

RAM Memory size expanded to 32 KB.

Their operation speed increased to between 200,000 – 300,000 instructions per second. Their speeds were measured in Microseconds. E.g., a computer could perform 1 million additions per second, which was comparatively higher than that of the 1st generation computers.

The computers were smaller in size & therefore, occupied less space compared to the 1st G computers.

They were less costly than the 1st G computers.

Examples of 2nd Generation computers:

1. NCR 501, IBM 300, IBM 1401, IBM 7070, IBM 7094 Series & CDC-6600 Mainframe computers.
2. ATLAS LEO Mark III.
3. UNIVAC 1107.
4. HONEYWELL 200.

3RD Generation computers (1964 – 1979).

Used electronic devices called Integrated Circuits (ICs), which were made by combining thousands of transistors & diodes together on a semiconductor called a Silicon chip.

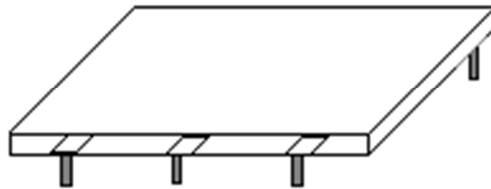


FIGURE 3:INTEGRATED CIRCUIT

The processing speed increased to 5 Million instructions per second (5 MIPS).

The storage capacity of the computers (i.e., the RAM memory sizes) expanded to 2 MB.

They were smaller in size compared to 2nd generation computers.

The computers used a wide range of peripheral devices.

The computers could support more than user at the same time. They were also able to support remote communication facilities.

Magnetic disks were developed for storage purposes.

The 1st microcomputer was produced during this period (1974).

Examples of 3rd Generation computers:

1. IBM 360, 370;
2. ICL 1900 Series;
3. 8-bit Microcomputers & PDP-11 Mainframe computers.

4TH Generation computers (1979 – 1989).

The 4th generation computers used Large Scale Integrated (LSI) circuits & Very Large Scale Integrated (VLSI) circuits. These circuits were made by compressing more tiny circuits and transistors into even smaller space of the silicon chip.

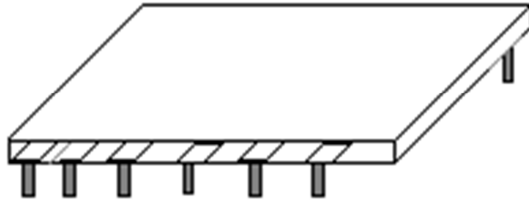


FIGURE 4:VERY LARGE INTEGRATED CIRCUIT

The computers were small, and very fast. Their processing speeds increased to 50 Million instructions per second.

Had large storage capacity, i.e., their memory sizes expanded to several hundred Megabytes.

Memories used included Magnetic disks, Bubble memories & Optical disks.

Examples of 4th Generation computers:

1. IBM 308 and 4300;
2. Amdahl 580
3. Honeywell DPS-88
4. Burroughs 7700, and the 16-bit & 32-bit microcomputers. The first microcomputer was called Apple II.

5TH Generation computers (1990 – Present).

In this generation fall today's computers.

The technologies used are Parallel architectures, 3-Dimensional circuit design & super conducting materials.

These technologies have led to the development of computers referred to as Supercomputers, which are very powerful, and have very high processing speeds. Their speeds are measured in Nanoseconds & Picoseconds.

They are able to perform parallel (or multi-processing) whereby a single task is split among a number of processors.

The memory sizes range between 1 Gigabyte & 1 Terabyte.

The computers are designed using VLSI and the Microchip technology that has given rise to the smaller computers, known as Microcomputers used today.

The computers have special instruction sets that allow them to support complex programs that mimic human intelligence often referred to as Artificial Intelligence. Such programs can help managers to make decisions and also provide critical expert services to users instead of relying on human professionals.

Review Questions.

1. Briefly describe the history of computers.
2. (a). What do you mean by computer generations?
(b). Describe the FIVE generations of computers in terms of technology used and give an example of a computer developed in each generation.
(c). Compare computer memory sizes during the Five computer generation periods.
3. What was the most remarkable discovery during the second computer generation?
4. (a). Technology is the basis of computer classification. Based on this, explain briefly the difference between the first three computer generations.
(b). What is so peculiar in the fourth and fifth generation of computers?
5. Match the following generations of computers with the technology used to develop them.

Generation	Technology
First generation	A). Very Large Integrated Circuit
Second generation	B). Thermionic valves (Vacuum tubes)
Third generation	C). Transistors
Fourth generation	D). Integrated Circuits

6. Give four characteristics of First generation computer.
7. Write the following abbreviations in full:
 - (a). ENIAC
 - (b). VLSI
 - (c). IC
8. What is Artificial Intelligence?