

Chapter 1

THE EVOLUTION OF COMPUTERS

Computers have changed a lot since they were first made.

The first ones were as big as rooms and could only do simple math problems.

But now, computers are much smaller and faster.

This is because of something called a "microprocessor," which is like a tiny computer inside a bigger one. It helps computers work much better and faster.

This means that computers are much better now than they used to be. They can do all sorts of things, like help us learn, play games, and talk to our friends.

In this chapter, we'll explore how computers have changed over time, from being big and slow to small and fast.

This is called the evolution of computers, and we'll learn about it together.

Lets Start: definition of computer in general is

"a machine which computes".

Hence it is safe to say that -

all the ancient (and modern) machines or tools which were used in any form of calculation were all a form of computer.

Let us walk through some of the ancient and modern computers.

Ancient Computer:

- ✚ Abacus is a perfect example of an ancient machine that used to assist in calculations.
- ✚ It is said that Abacus was invented some 3000 years ago around **1300 BC**.
- ✚ Abacus consists of beads or disks that can be moved up and down on a series of sticks or strings within a wooden or any other frame.
- ✚ Abacus itself does not calculate but helps humans in remembering what is already counted. Thus making calculation easy and faster.



Modern Computer:

The computers that we know of today had their beginning in the 19th Century when

Charles Babbage a English Mathematics professor, proposed the design of **Analytical Engine in 1837**.

It was this design that the basic framework of the computers of today are based on.

Due to this **Charles Babbage** is also often known as

“Father of Computer”



Analytical Engine:

The Analytical Engine was an *old kind of computer* that was made of *gears* and other *mechanical parts*.

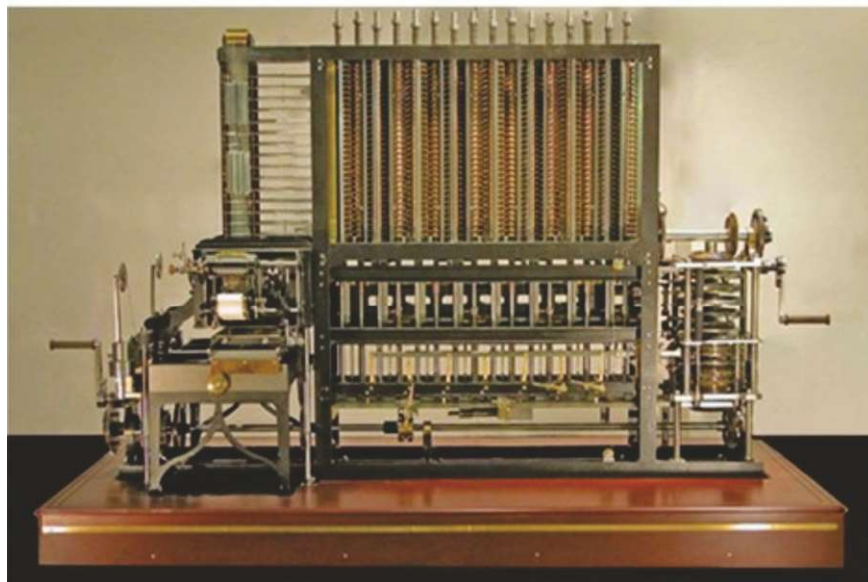
Instead of using electricity, it used special cards with holes in them to get information.

It was really good at doing math problems and could remember things even when it was turned off.

The Analytical Engine was like a big mechanical brain that could think and remember!

- ✚ It was mechanical computer.
- ✚ It used punch-cards as inputs.
- ✚ It was capable of solving mathematical problem and storing information in permanent memory.

Charles Babbage: Analytical Engine 1837



Generations of Computer -

Generally Speaking, Computers can be classified into **Five generations**. Each generation lasted for a certain period of time, and each gave us either a new and improved computer or an improvement to the existing computer.

Let us look into each of these modern generations in detail!

First generation {1937 – 1959} - Vacuum Tubes:

- ✚ In 1937 the first electronic digital computer was built by **Dr. John V. Atanasoff and Clifford Berry**.
- ✚ It was called the **Atanasoff-Berry Computer (ABC)**.
- ✚ Other developments continued until in **1946** the first electronic general- purpose digital computer, the **Electronic Numerical Integrator and Computer (ENIAC)** was built.
 - It is said that this computer weighed **30 tons (~ 27215 KG)**, and had **18,000 vacuum tubes** which were used for processing.
 - When this computer was turned on for the first time lights dim in sections of Philadelphia.
- ✚ Computers of this generation relied on machine learning and could only perform a single task.
- ✚ **Examples: -**
 - ENIAC (Electronic Numerical Integrator and Computer)
 - UNIVACI (Universal Automatic Computer)
 - IBM-701 & 650
 - EDVAC (Electronic Discrete Variable Automatic Computer)

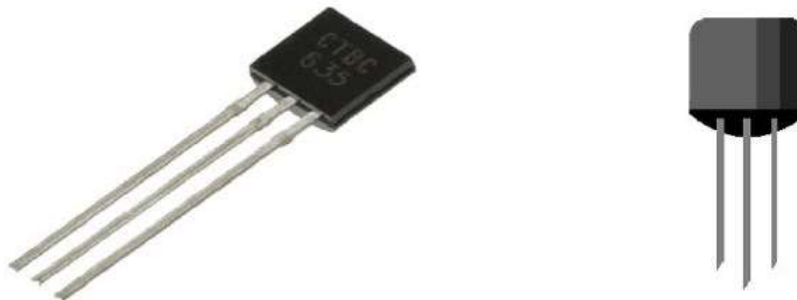


First Generation Vacuum Tubes

Second generation {1959 – 1965} – Transistors:

- + This was the era of the transistor computers.
- + Transistors were
 - cheap,
 - compact and
 - consume less power
- + Transistors made computers faster than the first generation computers.
- + Some of the popular second generation computers are:
 - IBM 1620
 - IBM 7094
 - CDC 1604
 - CDC 3600
 - UNIVAC 1108

[Transistors (1959–1965)]



Second Generation Transistors

Third generation {1965 – 1971} - Integrated Circuits (ICs):

- ✚ The third generation computers used **integrated circuits (ICs)** instead of transistors.
- ✚ Popularly known as **IC**
- ✚ A single IC can pack a huge number of transistors which increased the power of a computer and reduced the cost further.
- ✚ The computers also became more reliable, efficient and smaller in size.
- ✚ These generation computers used
 - remote processing,
 - time- sharing, and
 - multiprogramming as building blocks of the operating system.
- ✚ Also, the high-level programming languages like **FORTRAN-II TO IV, COBOL, PASCAL PL/1, ALGOL-68** were used in this generation.
- ✚ Some of the popular third generation computers are;
 - IBM-360 series
 - Honeywell-6000 series
 - PDP(Personal Data Processor)
 - IBM-370/168
 - TDC-316

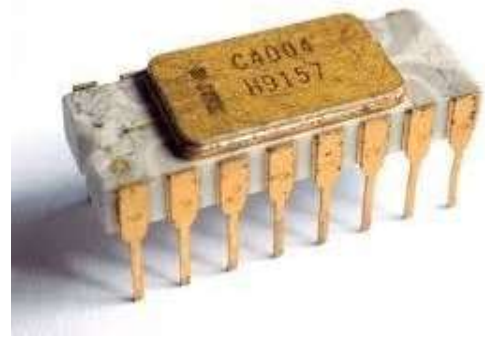
Third Generation of Computers



Integrated Circuit

Fourth generation {1972 – 2010} – Microprocessors:

- ✚ This revolution can be summed up in one word *Intel*.
 - Intel is derived from “**Integrated Electronics**”.
 - It is the world's largest and highest valued semiconductor chip Manufacturer.
- ✚ The Intel chip-maker developed the first ever microprocessor **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. This 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 impressive advances in lap-top capability and hand-held devices.
- ✚ Some of the popular fourth generation computers are;
 - IBM's first personal computer - **IBM 5150**
 - Apple MacIntosh 1984
 - Desktop
 - Laptop



Fourth Generation Intel 4004 Microproces



Fourth Generation modern Microprocessor

Fifth generation {2010 Onwards} - Artificial Intelligence (AI):

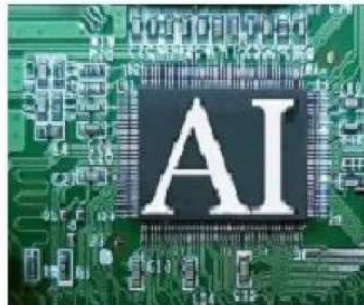
✚ Computer devices with artificial intelligence are still in development, but some of these technologies are beginning to emerge and be used such as **voice recognition**

- **Siri**
- **Alexa**

✚ Other examples of AIs are

- **Personalized search & recommendations,**
- **Auto code debugging and correction,**
- **Robotics,**
- **Driver less cars (Tesla)**

Fifth Generation of Computers



Artificial Intelligence (AI)