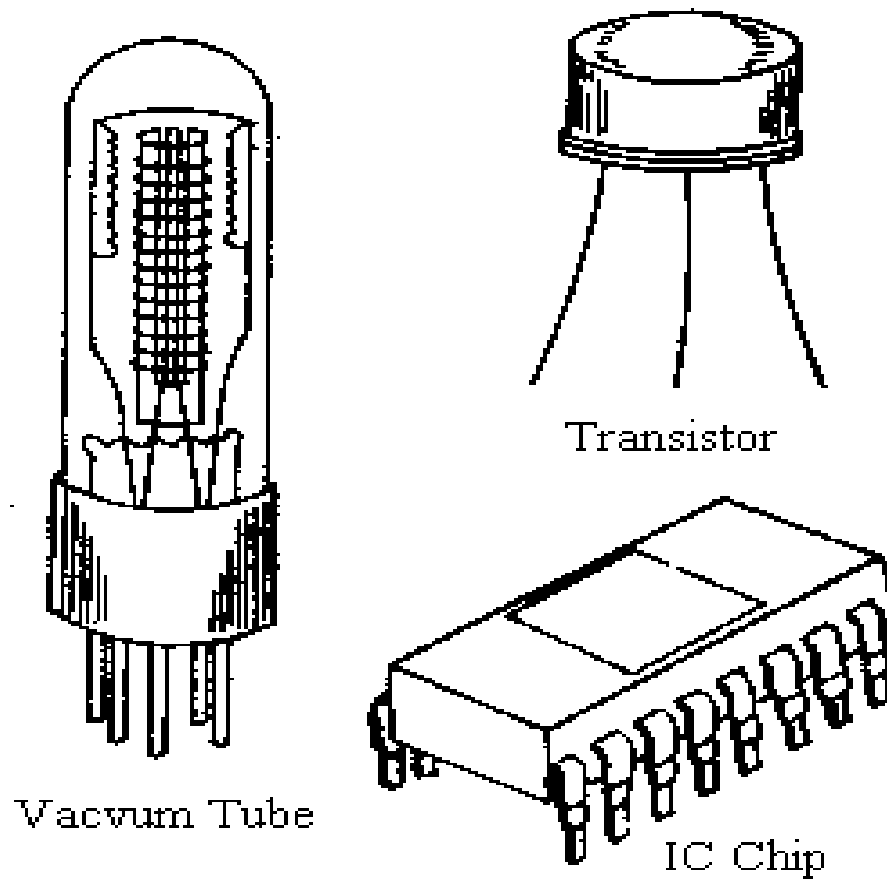


# Computer Generations

## Lecture 2

You know that the evolution of computer started from 16th century and resulted in the form that we see today. The present day computer, however, has also undergone rapid change during the last fifty years. This period, during which the evolution of computer took place, can be divided into five distinct phases known as ***Generations of Computers***. Each phase is distinguished from others on the basis of the type of ***switching circuits*** used.



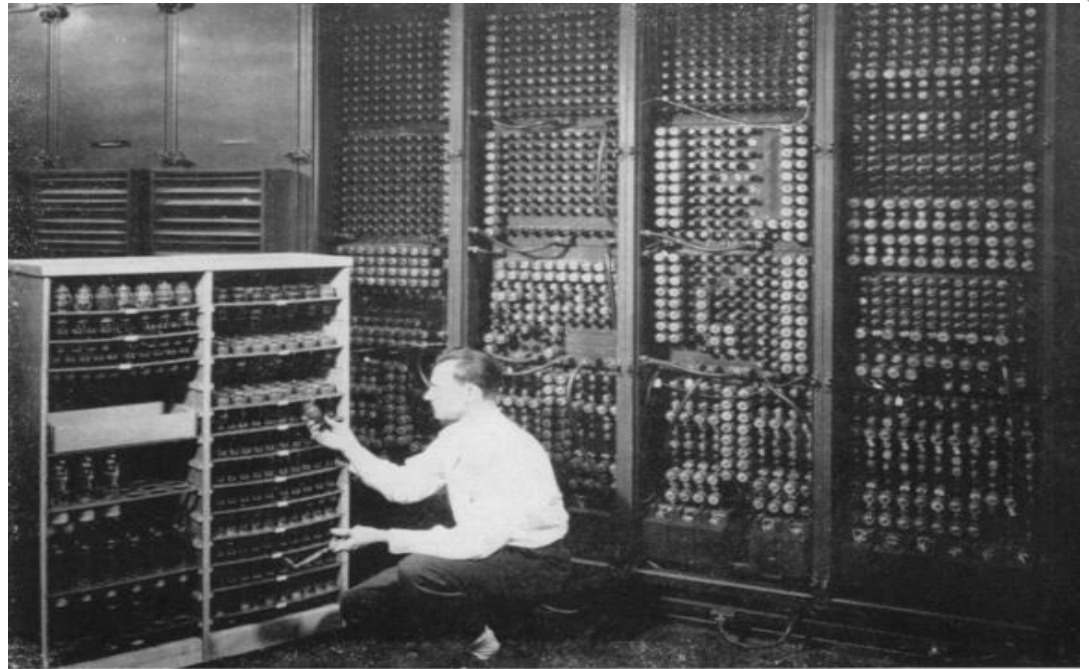
**Fig. 1.1: Vacuum tube, transistor, IC**

# First Generation Computers

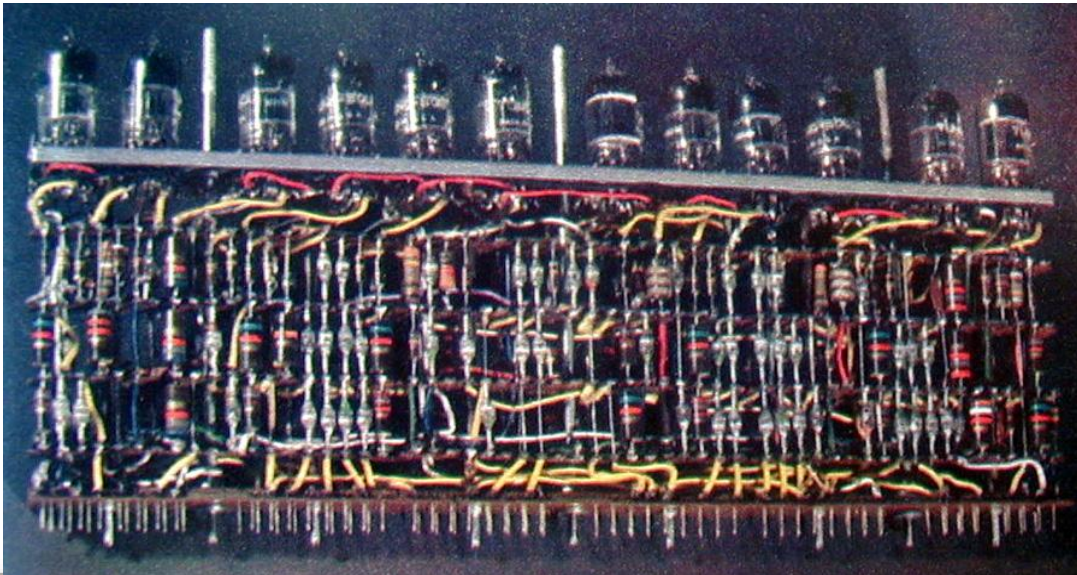
First generation computers used *Thermionic valves*. These computers were large in size and writing programs on them was difficult.

Some of the computers of this generation are:





Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.



## ENIAC:

It was the first electronic computer built in 1946 at University of Pennsylvania, USA by John Eckert and John Mauchy. *It was named **Electronic Numerical Integrator and Calculator** (ENIAC).* The ENIAC was 30×50 feet long, weighed 30 tons, contained 18,000 vacuum tubes, 70,000 registers, 10,000 capacitors and required 150,000 watts of electricity. Today your favorite computer is many times as powerful as ENIAC, still size is very small.

## EDVAC:

It stands for *Electronic Discrete Variable Automatic Computer* and was developed in 1950. The concept of storing data and instructions inside the computer was introduced here. This allowed much faster operation since the computer had rapid access to both data and instructions. The other advantage of storing instruction was that computer could do logical decision internally.

## Other Important Computers of First Generation

**EDSAC:** It stands for *Electronic Delay Storage Automatic Computer* and was developed by M.V. Wilkes at Cambridge University in 1949.

**UNIVAC-1:** produced it in 1951 by Universal Accounting Computer setup.



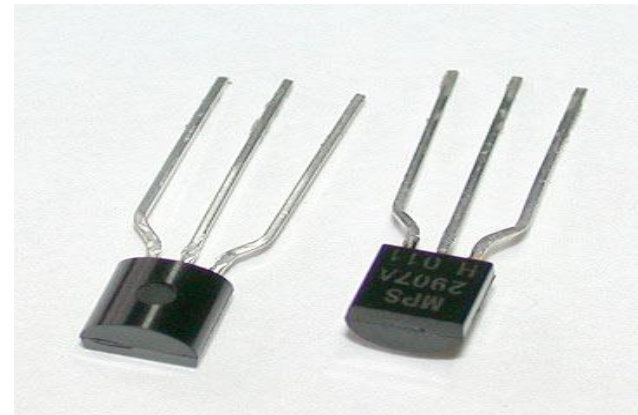
## Limitations of First Generation Computer

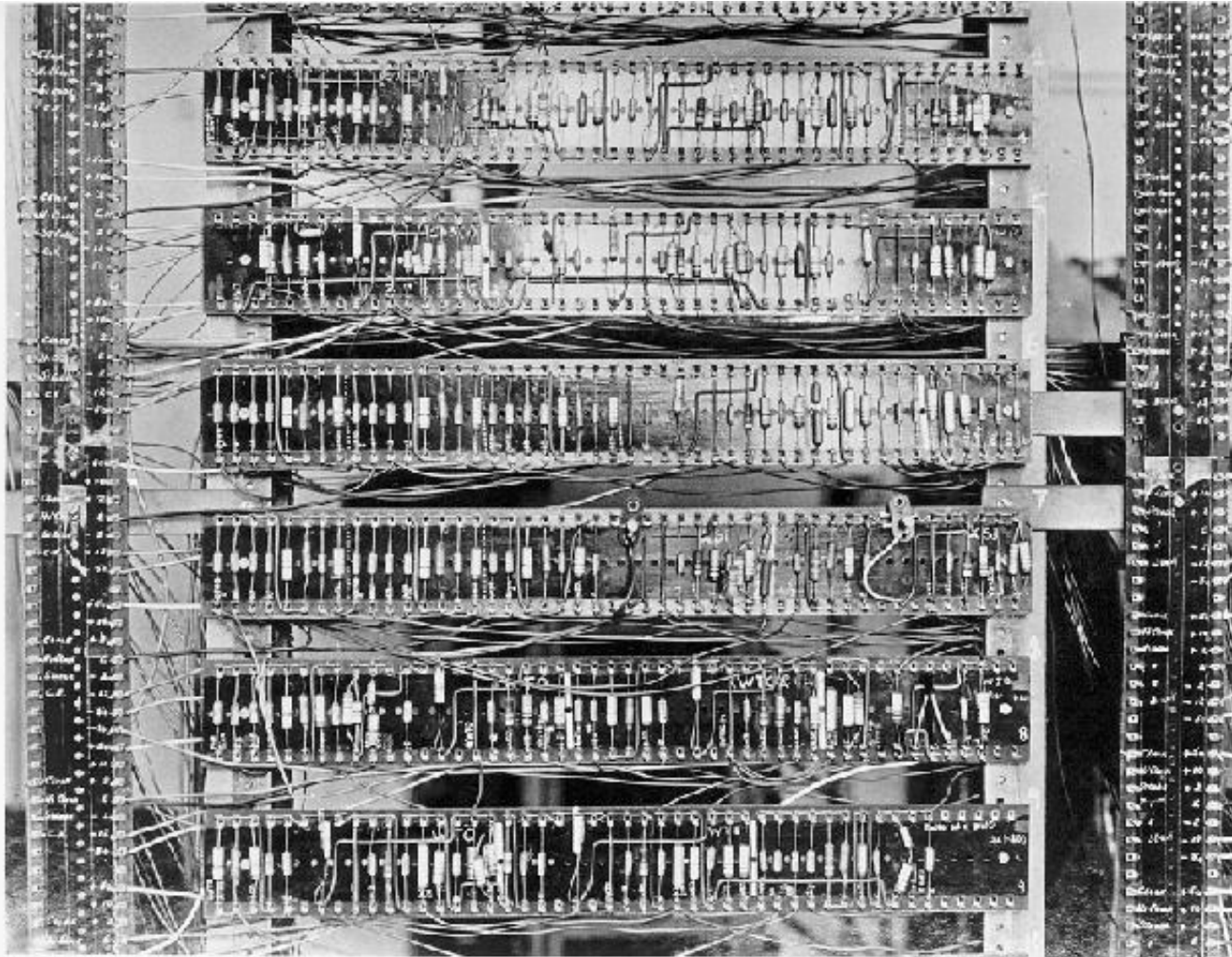
Followings are the major drawbacks of First generation computers.

1. The operating speed was quite slow.
2. Power consumption was very high.
3. It required large space for installation.
4. The programming capability was quite low.

## Second Generation Computers

Around 1955 a device called *Transistor* replaced the bulky electric tubes in the first generation computer. Transistors are smaller than electric tubes and have higher operating speed. They have no filament and require no heating. Manufacturing cost was also very low. Thus the size of the computer got reduced considerably.





The 16th of November 2003 marked the 50th Birthday of Transistor Computer

It is in the second generation that the concept of *Central Processing Unit (CPU), memory, programming language and input & output units* were developed. The programming languages such as COBOL, FORTRAN were developed during this period. Some of the computers of the Second Generation are:

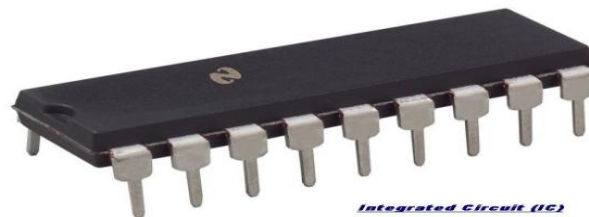
*Common Business-Oriented Language & FORMula TRANslation*

- IBM 1620**: Its size was smaller as compared to First Generation computers and mostly used for scientific purpose.
- IBM 1401**: Its size was small to medium and used for business applications.
- CDC 3600**: Its size was large and is used for scientific purposes.

## Third Generation Computers

The third generation computers were introduced in 1964. They used *Integrated Circuits* (ICs). These ICs are popularly known as *Chips*.

A single IC has many transistors, registers and capacitors built on a single thin slice of silicon. So it is quite obvious that the size of the computer got further reduced. Some of the computers developed during this period were IBM-360, ICL-1900, IBM-370, and VAX-750



Higher level language such as BASIC (*Beginners All purpose Symbolic Instruction Code*) was developed during this period.

Computers of these generations were

- ✓ small in size,
- ✓ low cost,
- ✓ large memory
- ✓ and processing speed is very high.



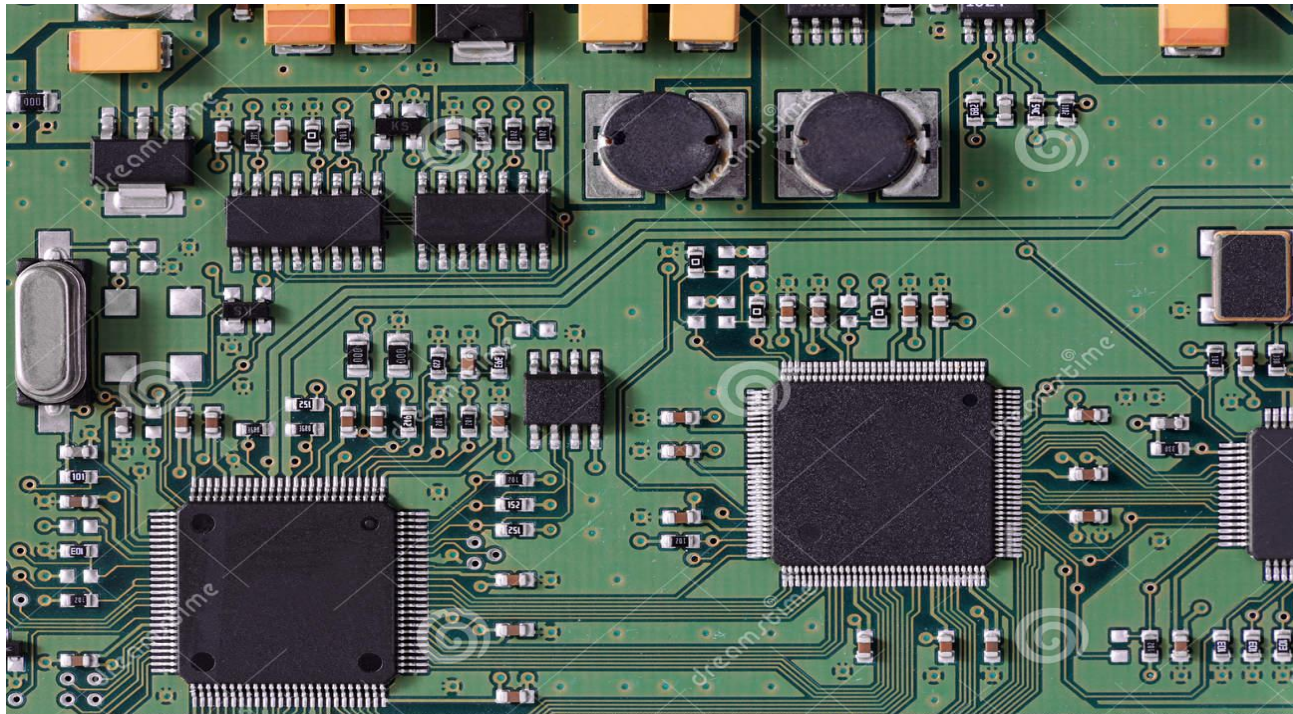
## Fourth Generation Computers

The previous days computers that we have seen are the fourth generation computers that started around 1975 till 1990. It uses *large scale Integrated Circuits* (LSIC) built on a single silicon chip called *microprocessors*. Due to the development of microprocessor it is possible to place computer's *central processing unit* (CPU) on single chip.



These computers are called microcomputers. Later *very large scale Integrated Circuits* (VLSIC) replaced LSIC's.

Thus the computer which was occupying a very large room in earlier days can now be placed on a table.



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## Fifth Generation Computer

The computers of 1990s and later on are said to be Fifth Generation computers. The speed is extremely high in fifth generation computer. Apart from this it can perform *parallel processing*. The concept of *Artificial intelligence* has been introduced to allow the computer to take its own decision. It is still in a developmental stage.

# Computer Generations

Generation	Approximate Dates	Technology	Typical Speed (operations per second)
1	1946–1957	Vacuum tube	40,000
2	1958–1964	Transistor	200,000
3	1965–1971	Small and medium scale integration	1,000,000
4	1972–1977	Large scale integration	10,000,000
5	1978–1991	Very large scale integration	100,000,000
6	1991–	Ultra large scale integration	1,000,000,000

## ❖ TYPES OF COMPUTERS

Now let us discuss the varieties of computers that we see today. Although they belong to the fourth and fifth generation they can be divided into **different categories depending upon the size, efficiency, memory and number of users.** Broadly they can be divided it to the following categories:

## 1. Microcomputer:

Microcomputer is at the lowest end of the computer range in terms of speed and storage capacity. Its CPU is a microprocessor. The first microcomputers were built of 8-bit microprocessor chips. The most common application of personal computers (PC) is in this category. The PC supports a number of input and output devices. An improvement of 8-bit chip is 16-bit and 32-bit chips. Examples of microcomputer are IBM PC.

## 2. Mini Computer:

This is designed to support more than one user at a time. It possesses large storage capacity and operates at a higher speed. The mini computer is used in multi-user system in which various users can work at the same time. This type of computer is generally used for processing large volume of data in an organization. They are also used as servers in Local Area Networks (LAN).

### 3. Mainframes:

These types of computers are generally 32-bit microprocessors. They operate at very high speed, have very large storage capacity and can handle the work load of many users. They are generally used in centralized databases. They are also used as controlling nodes in Wide Area Networks (WAN). Example of mainframes are DEC, ICL and IBM 3000 series.

## 4. Supercomputer:

They are the fastest and most expensive machines. They have high processing speed compared to other computers. They have also multiprocessing technique. One of the ways in which supercomputers are built is by interconnecting hundreds of microprocessors. Supercomputers are mainly being used for weather forecasting, biomedical research, remote sensing, aircraft design and other areas of science and technology. Examples of supercomputers are CRAY YMP, CRAY2, NEC SX-3, CRAY XMP and PARAM from India.





**IBM -Supercomputer**





**Supercomputer**