Generations of computers

Generation of Computers

- **Computers were developed in different phases known as generations of computer. Depending upon the technologies used the development of electronic computers can be divided into five generations.**

S.N.	Generation & Description
1	**First Generation** The period of first generation: 1946-1959. Vacuum tube based.
2	**Second Generation** The period of second generation: 1959-1965. Transistor based.
3	**Third Generation** The period of third generation: 1965-1971. Integrated Circuit based.
4	**Fourth Generation** The period of fourth generation: 1971-1980. VLSI microprocessor based.
5	**Fifth Generation** The period of fifth generation : 1980-onwards.ULSI microprocessor based

First generation

- **The duration lasted from 1946-1959 was based on vacuum tubes.**
- **Because thousands of such bulbs were used, the computers were very large and generate a large amount of heat, causing many problems in temperature regulation.**

Vacuum tube

First generation

- Magnetic drums were used for memory purpose and instruction and data was given through punch cards.
- Computer were operated manually and instruction given in machine language.
- E.g. – UNIVAC (Universal automatic computer), ENIAC (Electronic Numerical Integrator And Calculator) , Mark I etc.

Main Features –

1. Vacuum tube technology used
2. Magnetic drums were used for storage.
3. Supported Machine Language only
4. They were too bulky in size, requiring large room for installation.
5. Non – portable
6. Computers were very costly and generate lot of heat which requires A.C.
7. Computers were Huge in size as large numbers of vacuum tubes were used in single computer.

Advantages

1. These computers were the fastest calculating devices of their time.
2. Computations were performed in millisecond.

Disadvantages

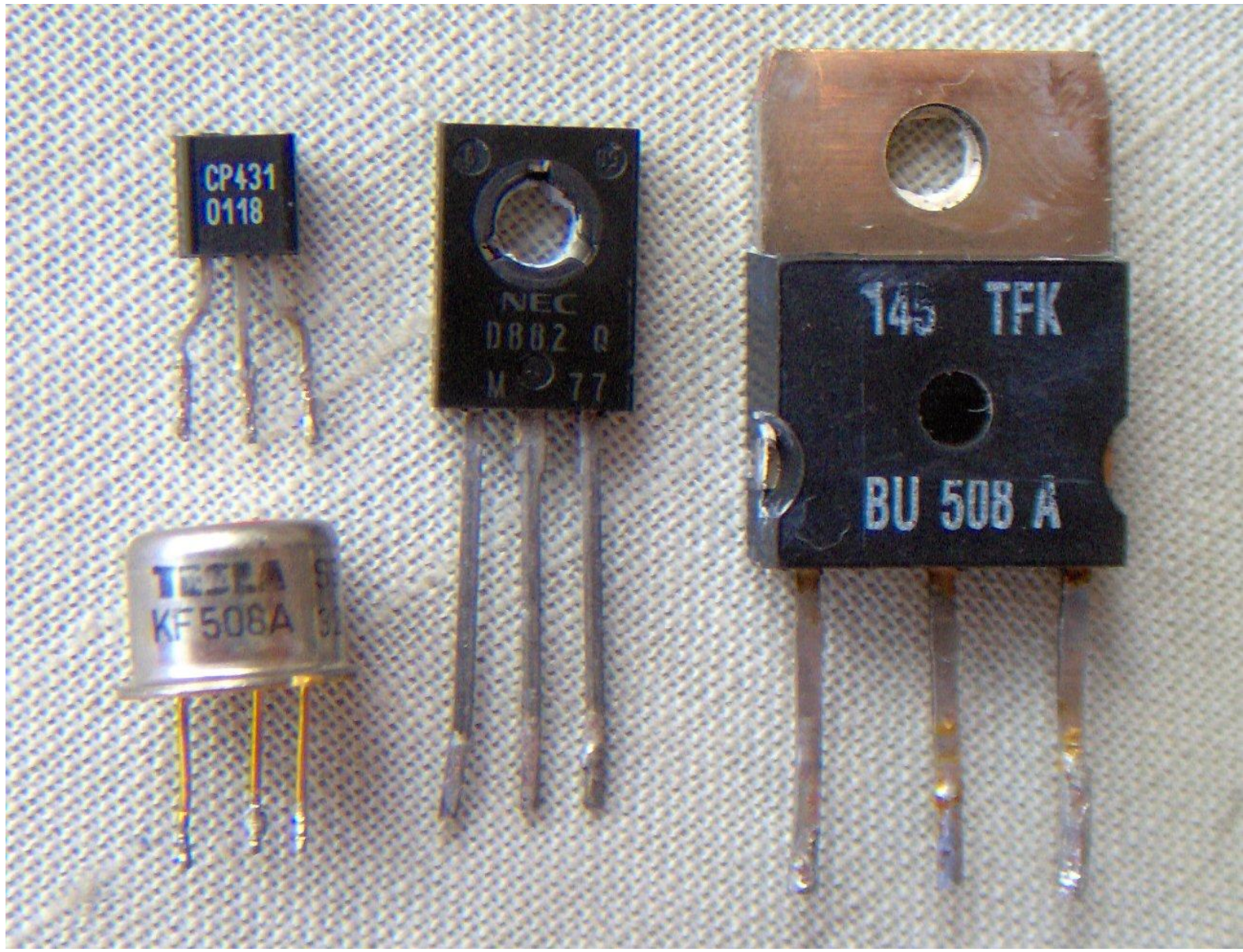
1. The computers were very large in size.
2. They consumed a large amount of energy.
3. They heated very soon due to thousands of vacuum tubes.
4. They were not reliable.
5. Air conditioning was required.
6. Regular maintenance was required.

Disadvantages

7. First generation computers were prone to hardware failure.
8. Non-portable.
9. Used machine language only.
10. Used magnetic drums which provide very less data storage.
11. Not versatile and very faulty.

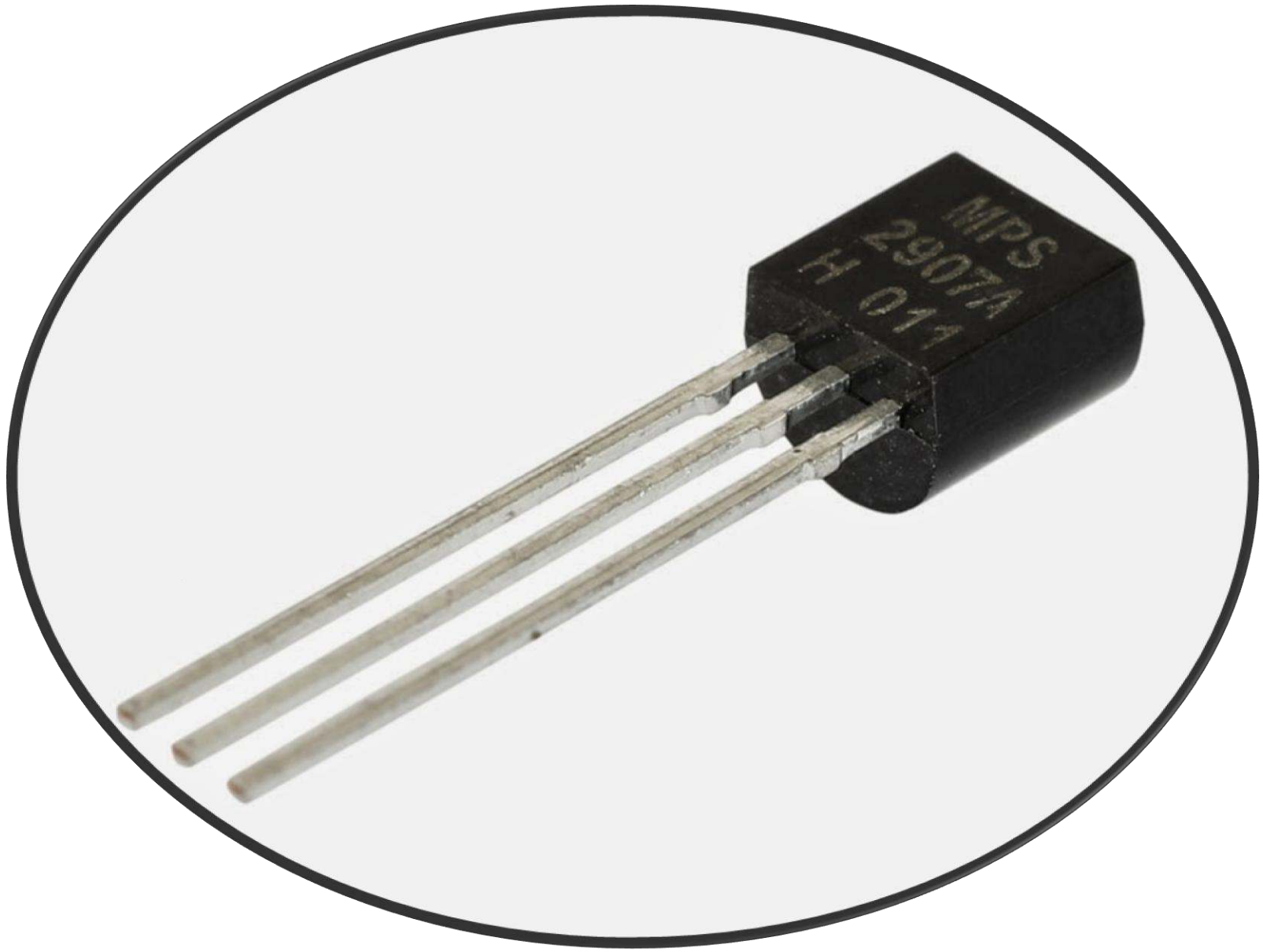
Second Generation

- **The period of this generation is from 1959 to 1964. During this period transistors were used and they were cheaper, consumed less power, more compact in size and faster than vacuum tubes.**
- **The problem of heat maintenance was solved and size of computer reduced, while speed and reliability were increased.**



Second Generation

- In this generation, magnetic cores were used as primary memory and magnetic tape and magnetic disks as secondary storage devices.
- E.g. – IBM-1400 series, IBM-1600 series, UNIVAC III etc.



Main Features –

1. Use of transistors
2. High level languages were developed during second generation period.
3. Magnetic disks and magnetic tapes were used as secondary memory.
4. Punch cards were still used for giving input to computer.
5. Batch processing and Multiprogramming Operating system used.

Advantages

1. Smaller in size as compared to the first generation computers.
2. The 2nd generation Computers were more reliable
3. 2nd generation computer consume less energy.
4. 2nd generation computers could be used for Commercial purpose
5. 2nd generation computer were 10 times faster than 1st generation computers.
6. Generate less heat as compared to First generation computers.
7. Support high level language.
8. They had larger primary and secondary memory as compared to first generation computers.
9. Less expensive as compare to first generation computers.

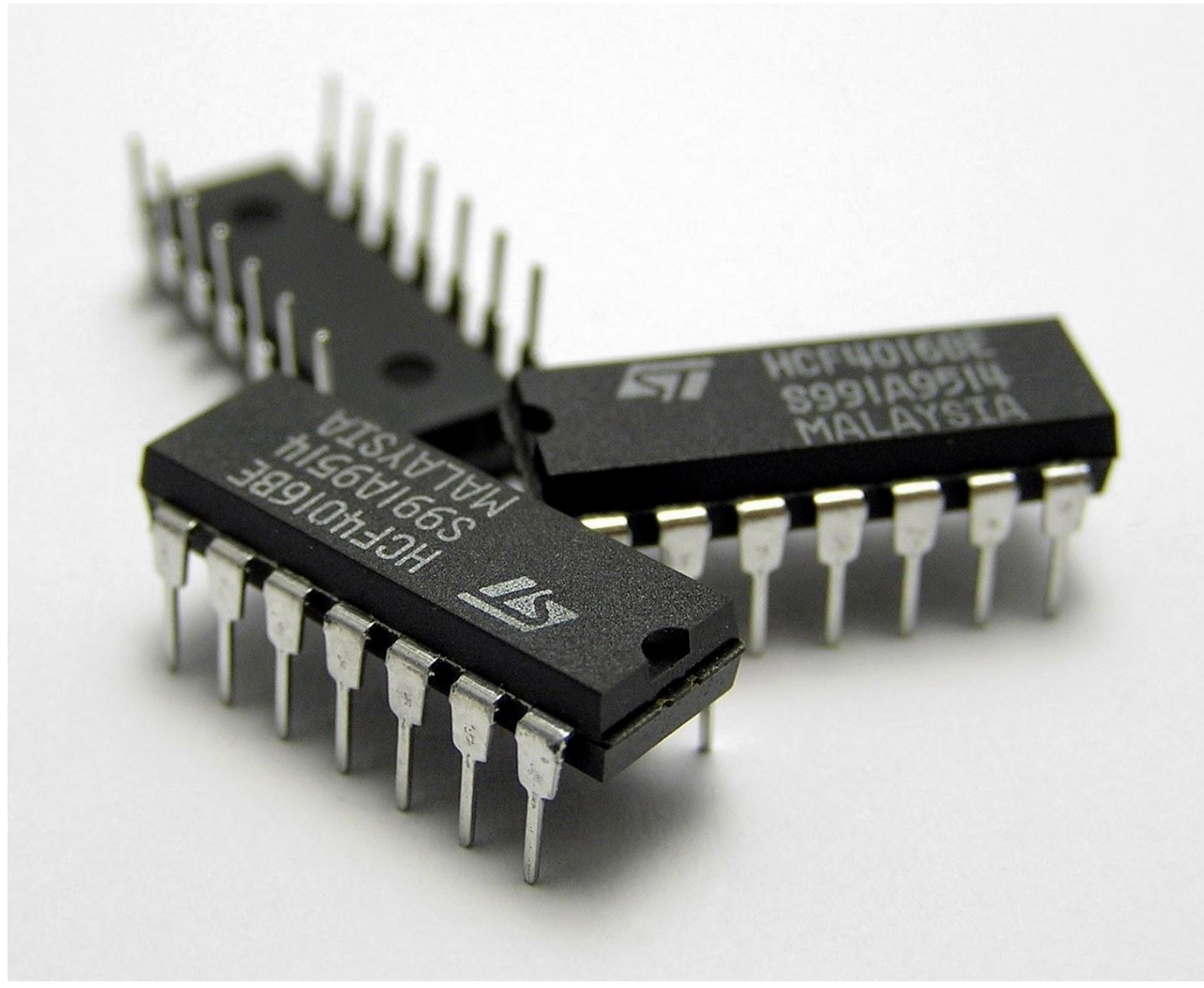
Disadvantages

1. Cooling system was required
2. Constant maintenance was required
3. In computer thousand of transistors had to be assembled manually hence commercial production was difficult.
4. Only used for specific purposes
5. Costly and not versatile
6. Punch cards were used for input.

Third generation

➢In this generation the integrated circuits (IC) were used.

➢Integrated circuits contain many electronic components on a single chip like register, transistor and capacitor.



Third generation

- Hence size of computer became very small with better performance and reliability.
- Many popular high level language were developed in third generations like PASCAL, C etc.
- E.g. – IBM 360 series, IBM 370 series, UNIVAC 1108 etc.

Main Features –

1. **Major Innovation - Integrated circuit (ICs) as basic electronic component.**
2. **Main Memory - PROM and DRAM.**
3. **External Storage - Improve disk (Floppy Disk)**
4. **Input and Output Devices - Keyboard for input, monitor for output.**
5. **Languages - More high level languages.**
6. **Operating System - Complete operating systems were introduced.**

Advantages

1. Smaller in size as compared to second generation.
2. More reliable.
3. Portable
4. Less electricity consumption.
5. Heat generation was rare.
6. General purpose computer.
7. Used fan for heat discharge to prevent damage.
8. Used mouse and keyboard for input.
9. Speed of computer increased to nanoseconds.
10. Commercial production was easier and cheaper.

Disadvantages

1. Air conditioning was required.
2. Highly sophisticated technology required for the manufacturing of IC chips.

Fourth generation

- **The Integrated circuits were more developed in fourth generation.**
- **Computer used LSI (large scale integration) and VLSI (very large scale integration) circuit that made them more powerful, compact, reliable, and affordable.**
- **Portable computer were developed for individuals for personal use at home.**
- **E.g. – *IBM-3033, Osborne I, Star 1000 etc.***

Microprocessor

Main Features –

1. Major Innovation - LSIC and VLSIC (Micro Processor)
2. Main Memory - EPROM and SRAM.
3. External Storage - Floppy Disk and Hard Disk.
4. Input and Output Devices –keyboard and mouse for input Monitor for output.
5. Operating System - MS-DOS and PC-DOS
6. A great development in the fields of networks, concept of internet was developed.

Advantages

1. Smaller in size and much reliable.
2. No air conditioning system required in most cases.
3. Much faster computation.
4. Portable and cheap.
5. The heat generated was negligible.
6. Totally general purpose computer.

Fifth generation

- **This generation is started from 1981 and still continued; VSLI technology becomes ULSI (Ultra Large Scale integration) technology, resulting in production of microprocessors chips, having ten million electronic component.**

- **<u>E.g</u>. – IBM notebooks, Pentium PCs etc.**

Main Features –

1. Major Innovations - ULSIC (Ultra large scale integrated circuit)
2. External Storage - Modified magnetic and Optical disks.
3. Input/output Devices - Keyboard, Pointing Device and Scanner as input and Monitor as main output.
4. Languages - AI (Artificial Intelligence) Expert systems.
5. Operating System - GUI based e.g. Windows 95, Windows NT.
6. Size - Very small in size example: Laptop, Note book, Digital Diary, Palm top and Pocket PC.