

## **COMPUTER GENERATIONS**

The word “Generation” – for computers, indicates a step in technology. Every step includes a major change in the components used for constructing a computer. Originally the term ‘generation’ was used to distinguish between varying hardware technologies (in some cases software also).

### **First Generation (1942-1955) (IBM-650)**

The computers produced between 1942-1955 are called the first generation computers. They were extremely large with low reliability. They used **VACUUM TUBES** in their circuitry, were fairly large and generated considerable heat, needed lot of space to install and required special air conditioning system. Storage technique and the use of punched cards for input output were primitive. The language used was the machine language, whose knowledge was restricted to a few individuals. And above all, they were very expensive due to the increased installation and maintenance costs. IBM-650 was, however, the most popular first generation computer and was introduced in 1950 with magnetic drum memory and punched cards for input and output. It was intended for both business and scientific application.

#### *Disadvantages:*

The first generation computers had the following unfavorable features.

1. Too bulky in size.
2. Unreliable for excessive heat generation.
3. Air conditioning requirement was too much due to heat generation
4. Non-portable.

### **Second Generation (1955-1964) (IBM – 700)**

The Second Generation computers used a more advanced technology by replacing the Vacuum Tubes with **TRANSISTORS**. A transistor is a two

state device made from silicon. These components were smaller in size, easier to manufacture less power consuming, cheaper and more durable. The processing capacity and the speed of operation of the components built from transistor were considerably increased. Computer storage technique improved with the use of Magnetic Disks. The machine language was replaced by high-level language like FORTRAN. One of the main computer series during the time was the IBM 700 series. Each successful number of this series showed increased performance and capacity and reduced cost.

#### *Advantages:*

In comparison to first generation computers, the second generation computer had the following favorable features.

1. Smaller in size as compared to first generation computers
2. More reliable
3. Less heat generated
4. Faster computational speed

#### *Disadvantages:*

Some unfavorable features can also be seen in this generation.

1. Air conditioning required.
2. Frequent maintenance required.
3. Commercial production was difficult and costly.

### **Third Generation (1964-1975)**

The third generation computers employed integrated circuits in which all the elements of an electronic circuit were contained in a tiny silicon wafer.

**The Integrated Circuits (IC) based on the Small, Medium and Large-Scale Integration (LSI)** technology replaced the individual Transistors in the third generation computers. Each Large Scale integrated Circuit had hundred or

more components packed into an assembly. The LSI technology led to the development of very small but extremely powerful micro computers. Integrated Circuits (IC) refers to the miniaturization of electronic circuits – such that hundreds of components are formed on a small chip of silicon. This chip is able to perform a variety of functions that in the past required several different electronic components. The third generation computers are much cheaper and more reliable than the second- generation computers. They are faster with more capacity and allow connection of a wide variety of peripherals. Particularly magnetic disk units.

*Advantages:*

1. Smaller in size as compared to previous generation computers
2. Even more reliable than second generation
3. Lower heat generated than second generation
4. Reduce computational times
5. Low maintenance cost
6. Comparatively portable
7. Less power consumption
8. Commercial production easier and cheaper.

**Fourth Generation (1975-1984)**

Fourth generation machines appeared in the 1970's, utilizing still newer electronic technology, which enabled them to be even smaller and faster than those of 3<sup>rd</sup> generation. The fourth generation computers used **VLSI (Very Large Scale Integration) technology**. The VLSI devices have thousands of more components packed into an assembly. The technology led to the development of microprocessors, where an entire CPU circuitry is placed on a single chip. The circuits designed here, provided lower cost, reduced failures, smaller size etc. Intel 4004 was the first microprocessor, developed by Ted Hoff. All modern day computers like IBM PCs, Apple Macintosh, SUN SparcStations, etc. fall under this generation of computers.

*Advantages:*

1. Low cost machine
2. High speed
3. Large memory
4. Small size
5. Less power consumption
6. Floppy disk is used as storage device
7. Hardware failure is negligible
8. Heat generated is negligible
9. Cheapest among all generations

**Fifth Generation (1984-1990)**

Scientists are now at work with the fifth generation of computers. The world is moving towards the development of what one can call '**Super Large Scale Integration**' – which in turn will compliment and improve speed, miniaturization and cost reduction. Development of ARTIFICIAL INTELLIGENCE, to make computer function and take decisions almost like human being, implementation of expert systems, robots, intelligent programs, speech synthesizers as well as the use of video disks and tapes for external storage media, are included in the fifth generation of computer innovation.

**Generation of Computers**

| <b>Year</b> | <b>Generatio<br/>n<br/>Number</b> | <b>Type of technology</b>                                  |
|-------------|-----------------------------------|--|
| 1940        | 1                                 | Valves (Vacuum tubes)                                      |
| 1950        | 2                                 | Transistor   |
| 1960        | 3                                 | IC (Integrated Circuit) with LSI (Large Scale Integration) |
| 1970        | 4                                 | Microprocessor with VLSI (Very Large Scale                 |

|                |   |  |
|----------------|---|--|
|                |   | Integration)   |
| Late<br>1980's | 5 | Hardware and Software technology AI<br>(Artificial Intelligence) |



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