Computer Hardware & Networking& Server Configurations
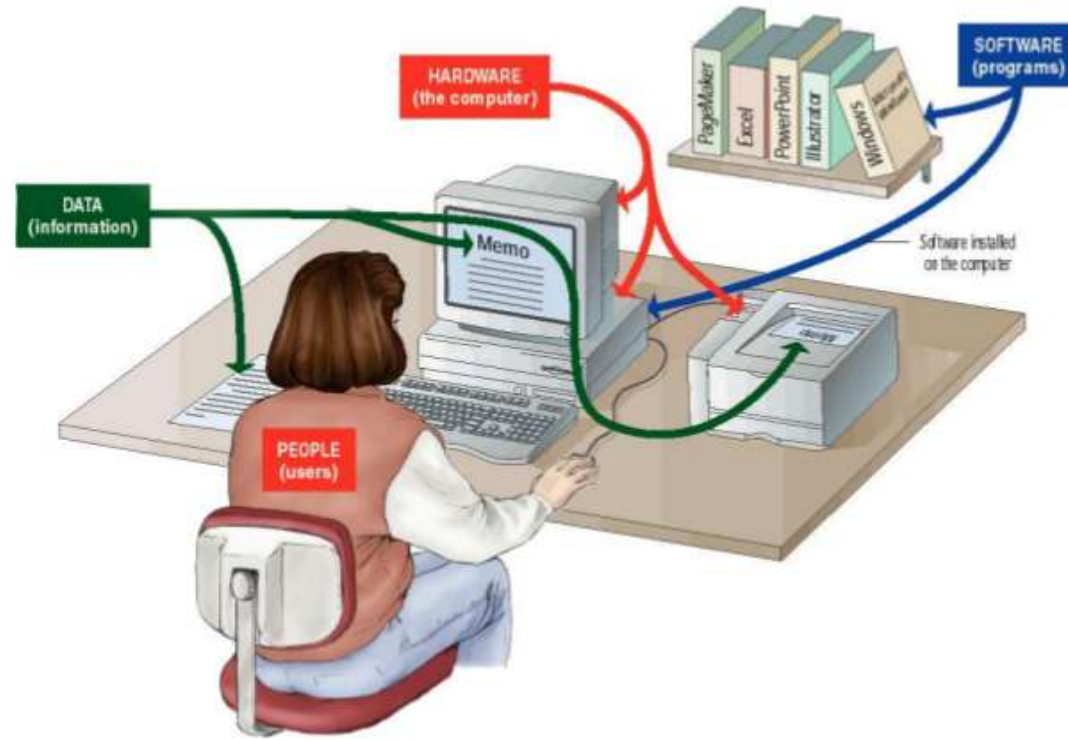# (H7E3 04)

UNIT 01
Introduction to Computer Hardware, PC Components and Functionalities

JAVA INSTITUTE
for Advanced Technology
INNOVATIONS FOR THE KNOWLEDGE SOCIETY

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Basic Components of a Computer System

Total computer system consist of four main parts.

1. Hardware   2. Software

3. Liveware   4. Firmware

1. Hardware

The physical devices of a computer system that can be touched or tangible are called computer hardware.

example: - Ram, Monitor, System Unit, Keyboard, Mouse, VGA Card, Sata Cable etc...

2. Software

A set of instructions (programs)that drive the hardware of a computer system.

example: - Windows 7, Apple Snow Leopard, Ubuntu, Adobe Photoshop, Microsoft Office Word, MS Paint, VLC Player etc.....

3. Liveware

The person who operates the hardware through the software

example:- Data Entry Operator, Programmer, Network Engineer, Graphic Designer, Network Administrator, Web Engineer etc....
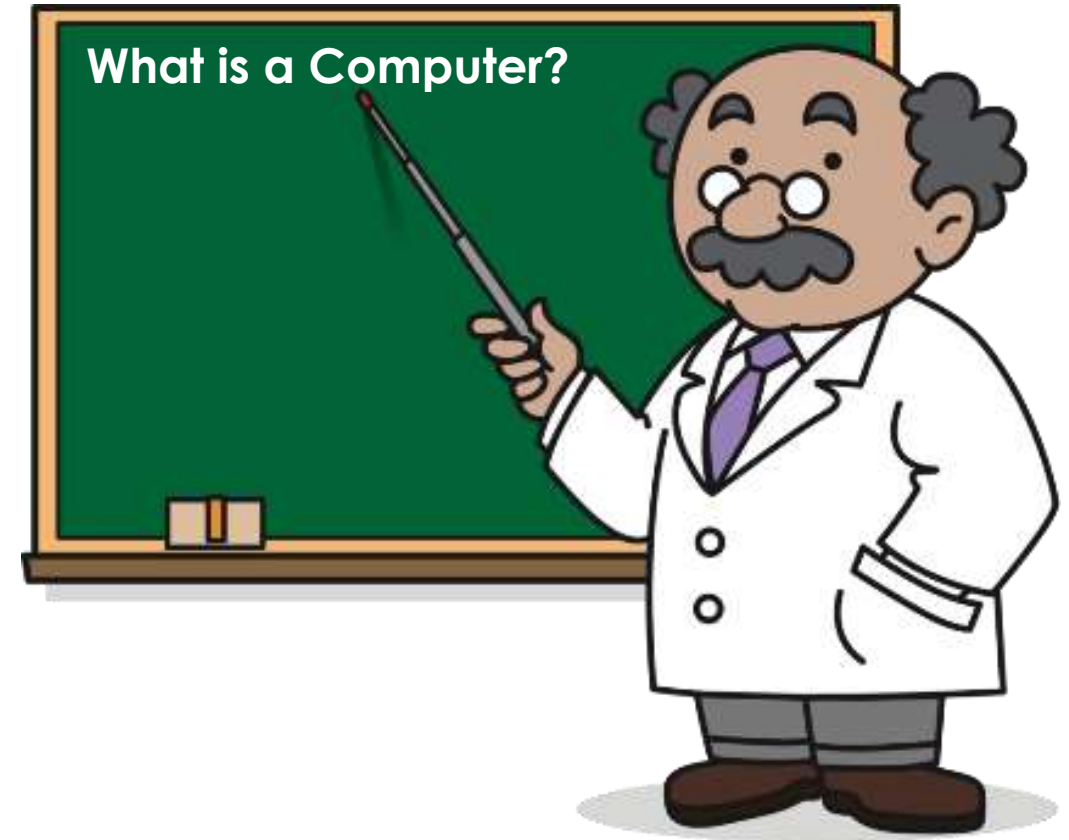
4. Firmware

Also software which is stored inside the hardware

example:- Boot strap program (which is loaded at the start up)

What is a Computer?

A computer is a device that accepts information (<u>in the form of digitalized data</u>) and manipulates it for some result based on a program or sequence of instructions on how the data is to be processed. Complex computers also include the means for storing data (including the program, which is also a form of data) for some necessary duration. A program may be invariable and built into the computer (and called logic circuitry as it is on microprocessors) or different programs may be provided to the computer (loaded into its storage and then started by an administrator or user). Today's computers have both kinds of programming.

A computer is an electronic device that manipulates information, or data. It has the ability to store, retrieve, and process data.
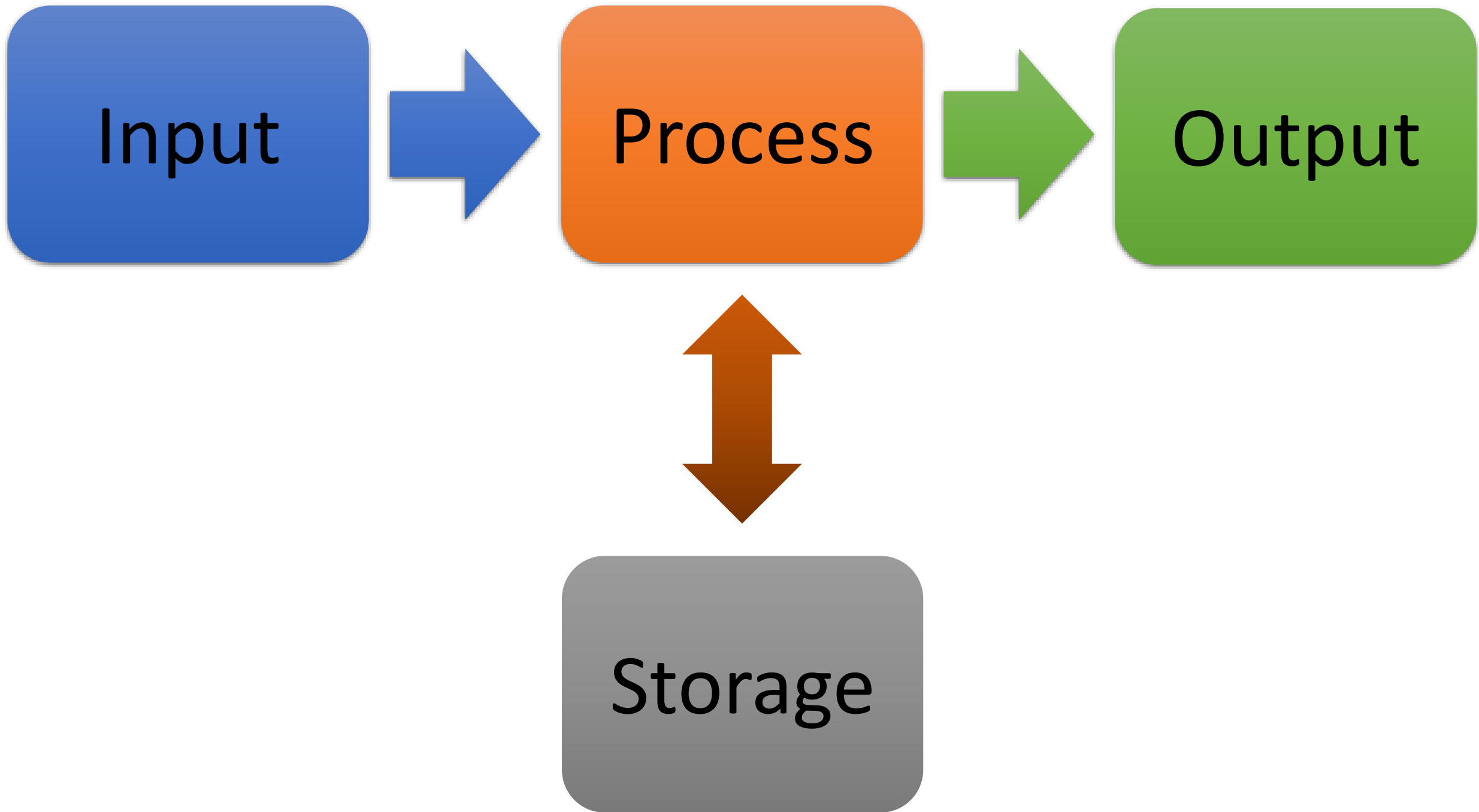
How Its Functions

A computer is an electronic machine that processes information — in other words, an information processor: it takes in raw information (or data) at one end, stores it until it's ready to work on it, chews and crunches it for a bit, then spits out the results at the other end. All these processes have a name. Taking in information is called input, storing information is better known as memory (or storage), chewing information is also known as processing, and spitting out results is called output.
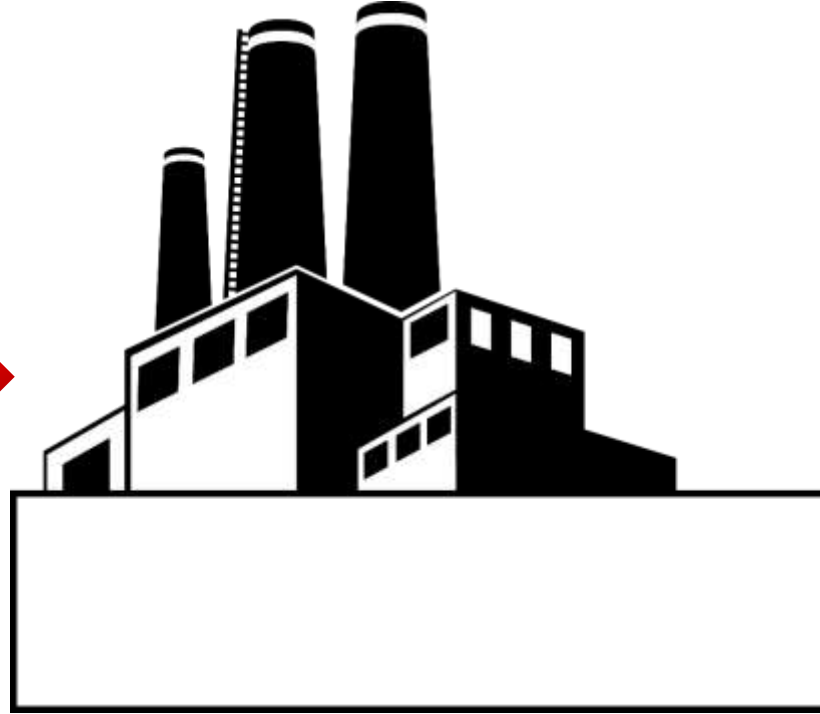
Input		Process		Output
Input	→	**Process**	→	**Output**

Raw Material → **Process** → **Product**

Input	→	Process	→	Output

Data → **Process** → **Information**

A computer can process data, pictures, sound and graphics. They can solve highly complicated problems quickly and accurately. A computer performs basically five major computer operations or functions irrespective of their size and make. These are

1) it accepts data or instructions by way of input,
2) it stores data,
3) it can process data as required by the user,
4) it gives results in the form of output
5) it controls all operations inside a computer.

Four Basic Functions of a Computer

➢ Receive Input

➢ Process Information

➢ Produce Output

➢ Store Information

Storage Device

Input Device

Processor (CPU)

Memory

Output Device

Input

Transferring of information into the system. This may be through a user input device - i.e. keyboard, mouse, scanner etc... Or though previously loaded software/program, cd etc.

Output

Output is the exact opposite of input. Output is the function that allows a computer to display information, from the system, for the user. This can be accomplished through the monitor (or other graphical display), printer, speakers etc.

Processing

This is where the computer actually does the 'work' - manipulating and controlling data over the entire system.

Storage

Most computers are able to store data both temporarily (in order to process), but also long-term (permanently). Storage takes place on hard-drives or external storage devices.

Evolution of the computer

- The history of computer development is often in reference to the different generations of computing devices. Each of the five generations of computers is characterized by a major technological development that fundamentally changed the way computers operate. Most developments resulted in increasingly smaller, cheaper and more powerful and efficient computing devices.

Difference Engine

Charles Babbage

First Generation (1940-1956) Vacuum Tubes

- The first computers used <u>vacuum tubes</u> for circuitry and <u>magnetic drums for memory</u>, and were often enormous, taking up entire rooms. They were very expensive to operate and in addition to using a great deal of electricity, the first computers generated a lot of heat, which was often the cause of malfunctions.

- First generation computers relied on <u>machine language</u>, the lowest-level programming language understood by computers, to perform operations, and they could only solve one problem at a time, and it could take days or weeks to set-up a new problem. Input was based on punched cards and paper tape, and output was displayed on printouts.

- The UNIVAC and <u>ENIAC</u> computers are examples of first-generation computing devices. The UNIVAC was the first commercial computer delivered to a business client, the U.S. Census Bureau in 1951.
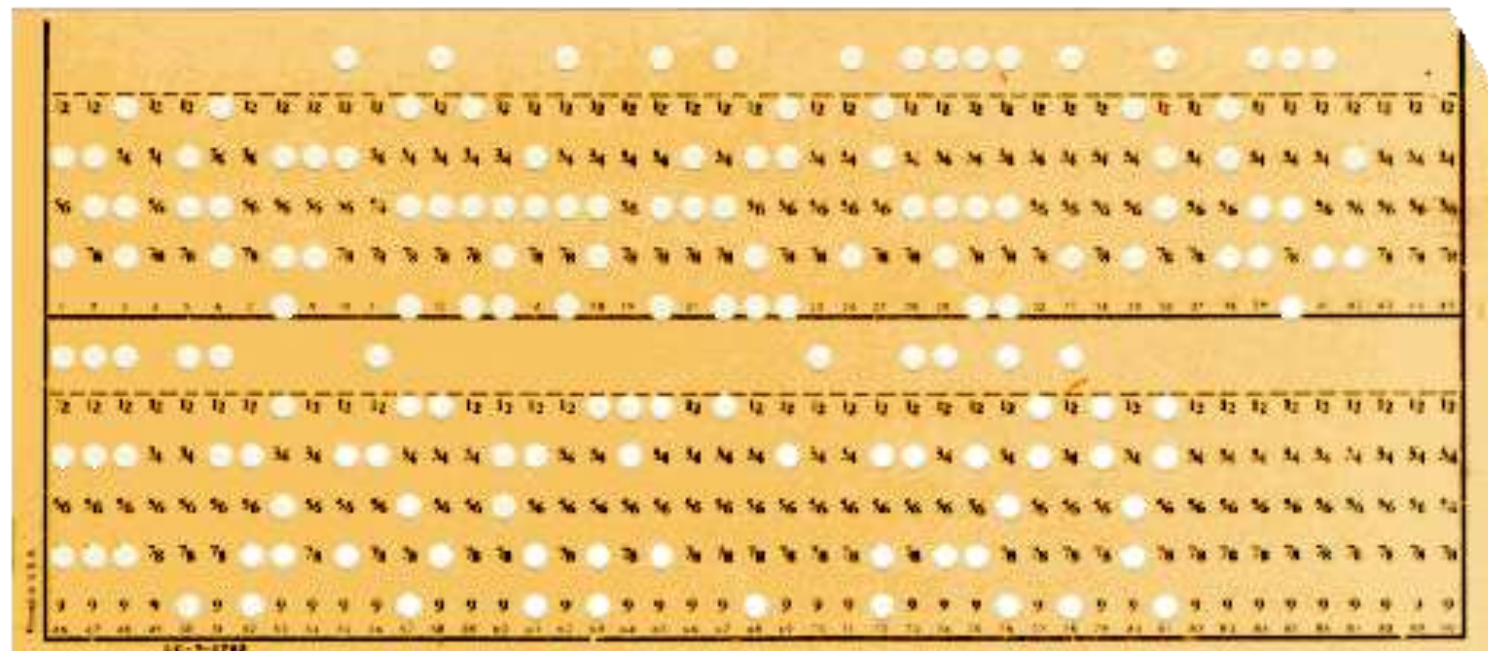
Punch Card in
Punch Card Machine

Vacuum Tube

**ENIAC** (Electronic Numerical Integrator And Computer)

- The first electronic general-purpose Digital computer, ENIAC (Electronic Numerical Integrator And Computer), was developed by Army Ordnance to compute World War II ballistic firing tables. It weighed 30 tons and used 200 kilowatts of electric power.

Second Generation (1956-1963) Transistors

- <u>Transistors</u> replace vacuum tubes and ushered in the second generation of computers. The transistor was invented in 1947 but did not see widespread use in computers until the late 1950s. The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors.

- Though the transistor still generated a great deal of heat that subjected the computer to damage, it was a fast improvement over the vacuum tube. Second-generation computers still relied on punched cards for input and printouts for output.

- Second-generation computers moved from cryptic binary machine language to symbolic, or <u>assembly, languages</u>, which allowed programmers to specify instructions in words. languages were also being developed at this time, such as early versions of <u>COBOL</u> and <u>FORTRAN</u>. These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.

- The first computers of this generation were developed for the atomic energy industry.
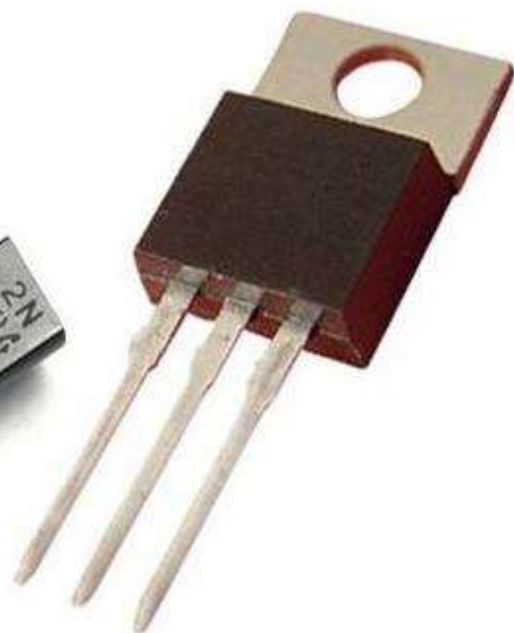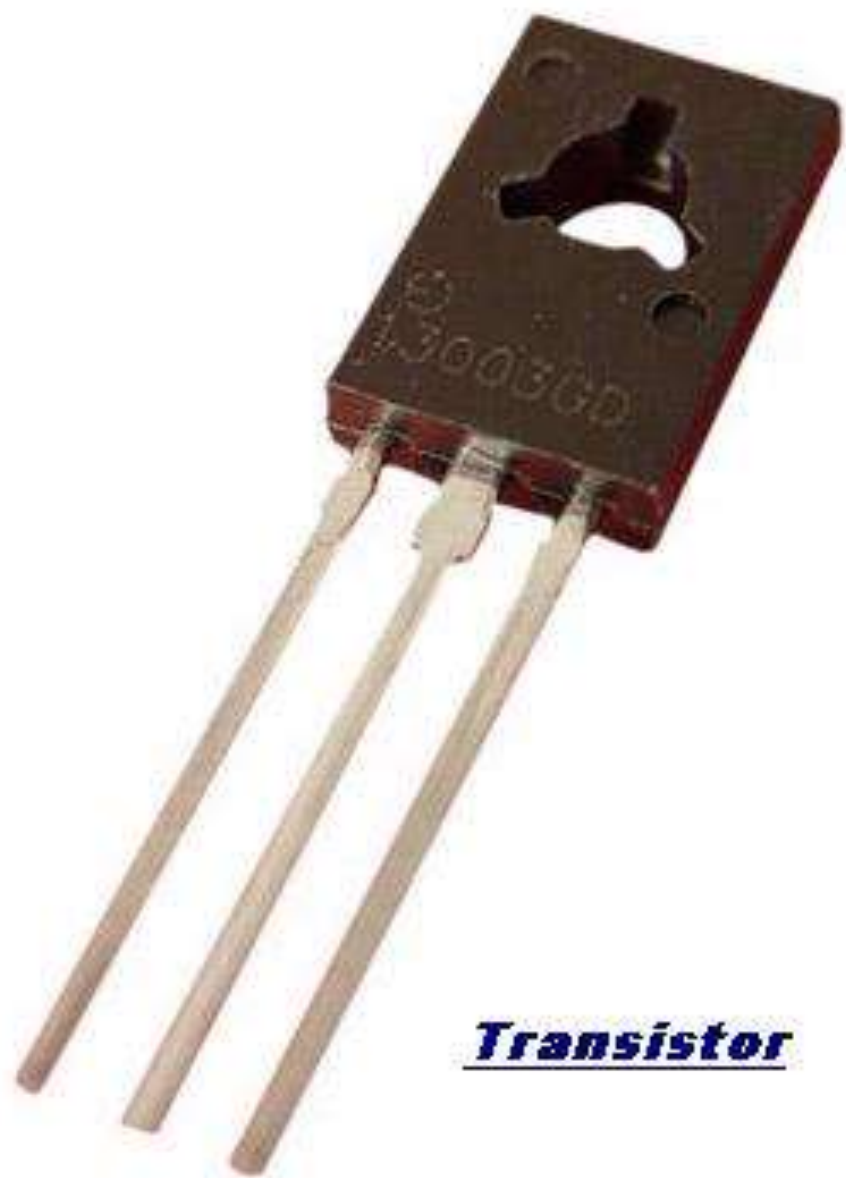
Transistor

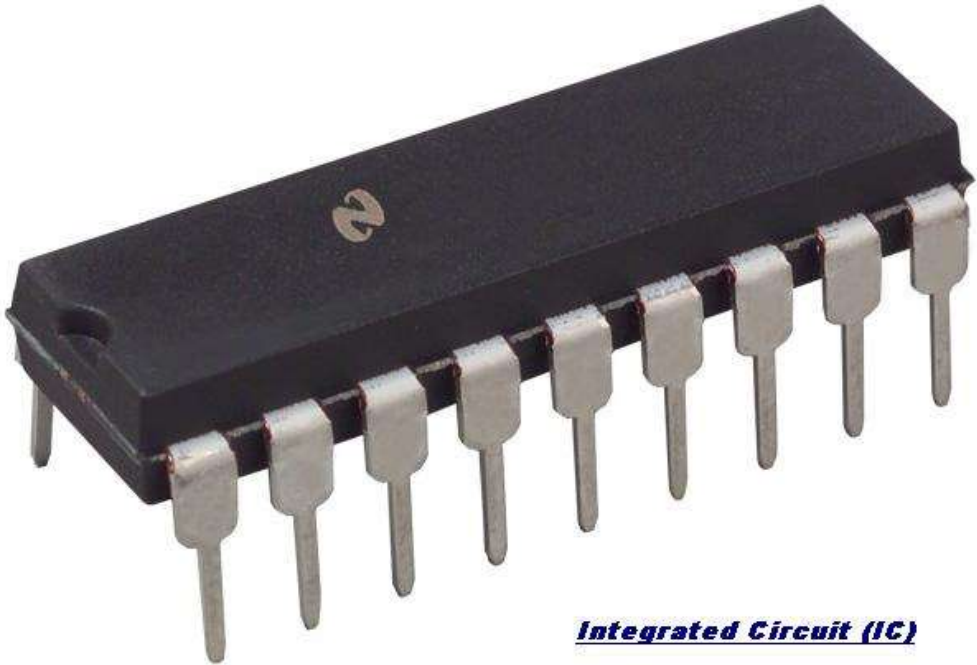# Third Generation (1964-1971) Integrated Circuits

- The development of the <u>integrated circuit</u> was the hallmark of the third generation of computers. Transistors were miniaturized and placed on <u>silicon chips</u>, called <u>semiconductors</u>, which drastically increased the speed and efficiency of computers.
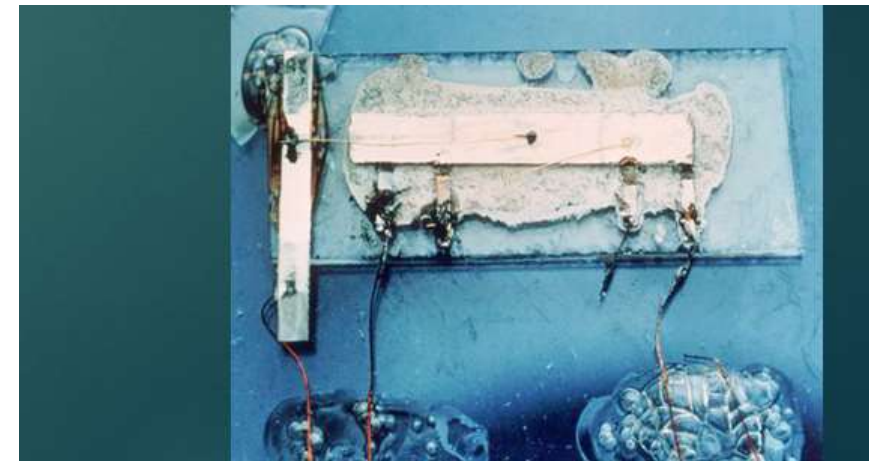
First Integrated Circuit

- Instead of punched cards and printouts, users interacted with third generation computers through <u>keyboards</u> and <u>monitors</u> and interfaced with an <u>operating system</u>, which allowed the device to run many different <u>applications</u> at one time with a central program that monitored the memory. Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

- Ada, Basic, C, C++, Java, Pascal, Smalltalk Languages are used in this generation.it called as "High Level Languages".

Integrated Circuit (IC)

Fourth Generation (1971-Present) Microprocessors

- The <u>microprocessor</u> brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. What in the first generation filled an entire room could now fit in the palm of the hand. The Intel 4004 chip, developed in 1971, located all the components of the computer—from the <u>central processing unit</u> and memory to input/output controls—on a single chip.

- In 1981 <u>IBM</u> introduced its first computer for the home user, and in 1984 <u>Apple</u> introduced the Macintosh. Microprocessors also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors.

- As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet. Fourth generation computers also saw the development of <u>GUIs</u>, the <u>mouse</u> and <u>handheld</u> devices.

- This generation Computers use "Very High Level Languages"
- Example: - Maple, Mathematica, Postscript, SPSS, SQL, MySQL etc…

Microprocessor

Fifth Generation (Present and Beyond)
Artificial Intelligence
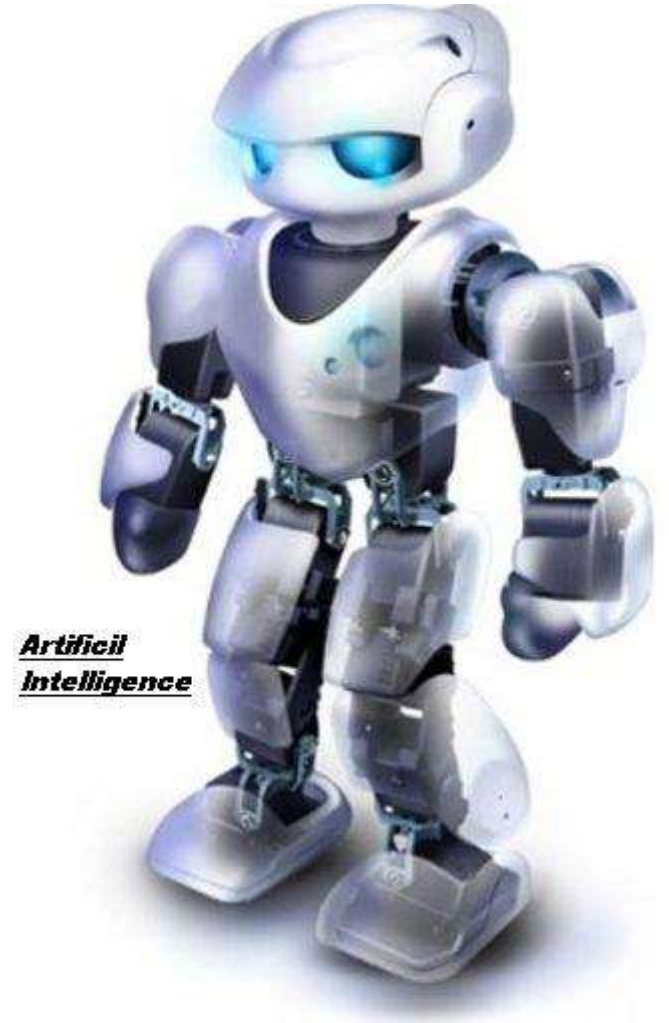
- Fifth generation computing devices, based on <u>artificial intelligence</u>, are still in development, though there are some applications, such as <u>voice recognition</u>, that are being used today. The use of <u>parallel processing</u> and <u>superconductors</u> is helping to make artificial intelligence a reality. <u>Quantum computation</u> and <u>molecular</u> and <u>nanotechnology</u> will radically change the face of computers in years to come. The goal of fifth-generation computing is to develop devices that respond to <u>natural language (Ex-Prolog)</u> input and are capable of learning and self-organization.

Summary ....

➢ **1940 – 1956 : First Generation – Vacuum Tubes**

➢ **1956 – 1963 : Second Generation – Transistors**

➢ **1964 – 1971 : Third Generation – Integrated Circuits**

➢ **1972 – Present: Fourth Generation – Microprocessors**

➢ **Present - Beyond: Fifth Generation – Artificial Intelligence**

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THANK YOU