

Lecture-1

Topics:

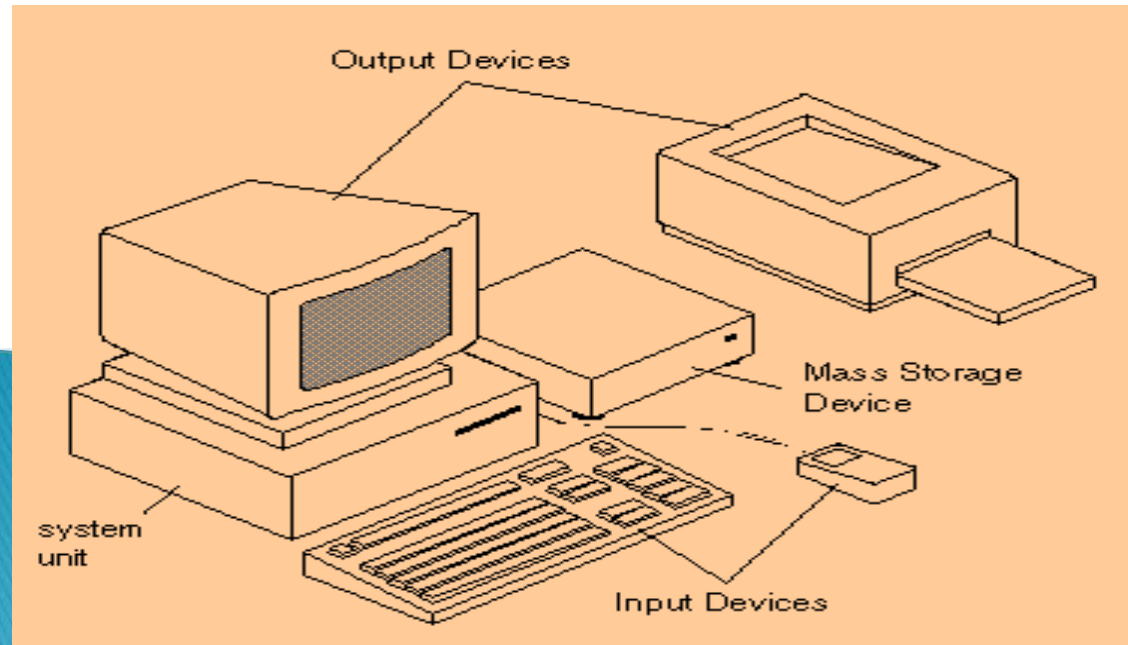
- Evaluation of computers
- Hardware organization of a computer

Topic1:Evaluation of computers

What is Computer ?

A programmable machine.

which responds to a specific set of instructions in a well-defined manner



What is a Computer?

A computer is an electronic device, operating under the control of instructions stored in its own memory unit,

- that can accept data (input),
- process data arithmetically and logically,
- produce results (output), and store the results for future use.

Components of a computer

Basic Components

- Input Devices
- System Unit
- Output Devices
- Storage Devices

Other Components

- Peripheral Devices
- Communication Devices



Strengths of Computers

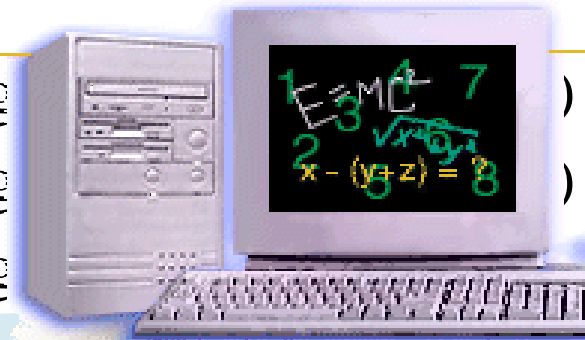
- Speed.
- Storage
- Accuracy
- communication/Connectivity
- Processing

Generations of Computers

This term is also used in the different advancements of computer technology. With each new generation, the circuitry has gotten smaller and more advanced than the previous generation before it.

5 generations of computer

- I. First generation
- II. Second generation
- III. Third generation
- IV. Fourth generation
- V. Fifth generation (1980 onwards)



First generation(1946-1959)

Vacuum Tubes

The first computers used vacuum tubes for circuitry and magnetic drums for memory

Main Features

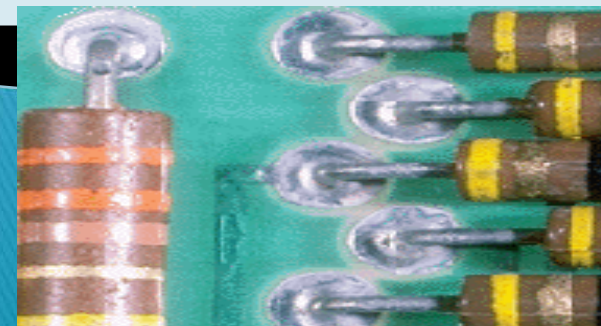
- ❑ They were very expensive
 - ❑ Non portable
 - ❑ Huge size
- ❑ Supported machine language
 - ❑ Very slow speed
- ❑ Consumed lot of electricity
- ❑ Generated a lot of heat
- ❑ SLOW I/O

Second generation(1959-1965) Transistors

Transistors replaced vacuum tubes and ushered in the second generation of computers.

Main Features

- Use of transistors
- Small size as compare to first generation
- Generate less heat as compare to first generation
 - Faster than first generation
 - Still very costly
- Support machine and assmebly languages

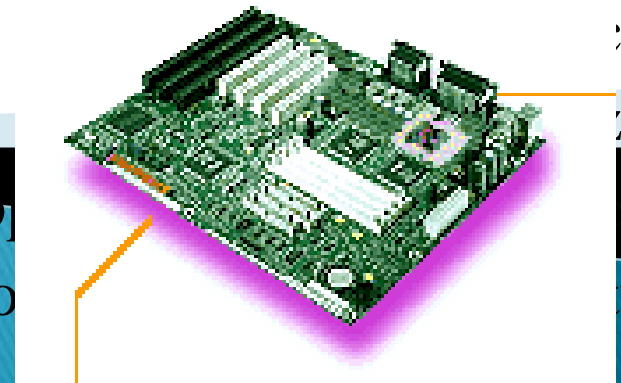


Third generation (1965-1971) Integrated Circuits

The development of the integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers.

Main Features

- IC used
- More reliable
- Still costly
- Faster



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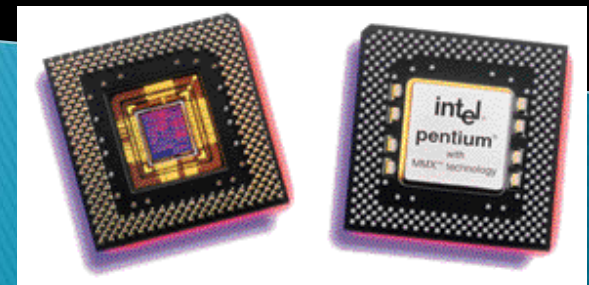
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Fourth generation(1971-1980) microprocessor

The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip.

Main Features

- ❑ VLSI technology
- ❑ Very cheap
- ❑ Portable and reliable
- ❑ Increased capabilities of I/O
- ❑ Concept of internet was introduced



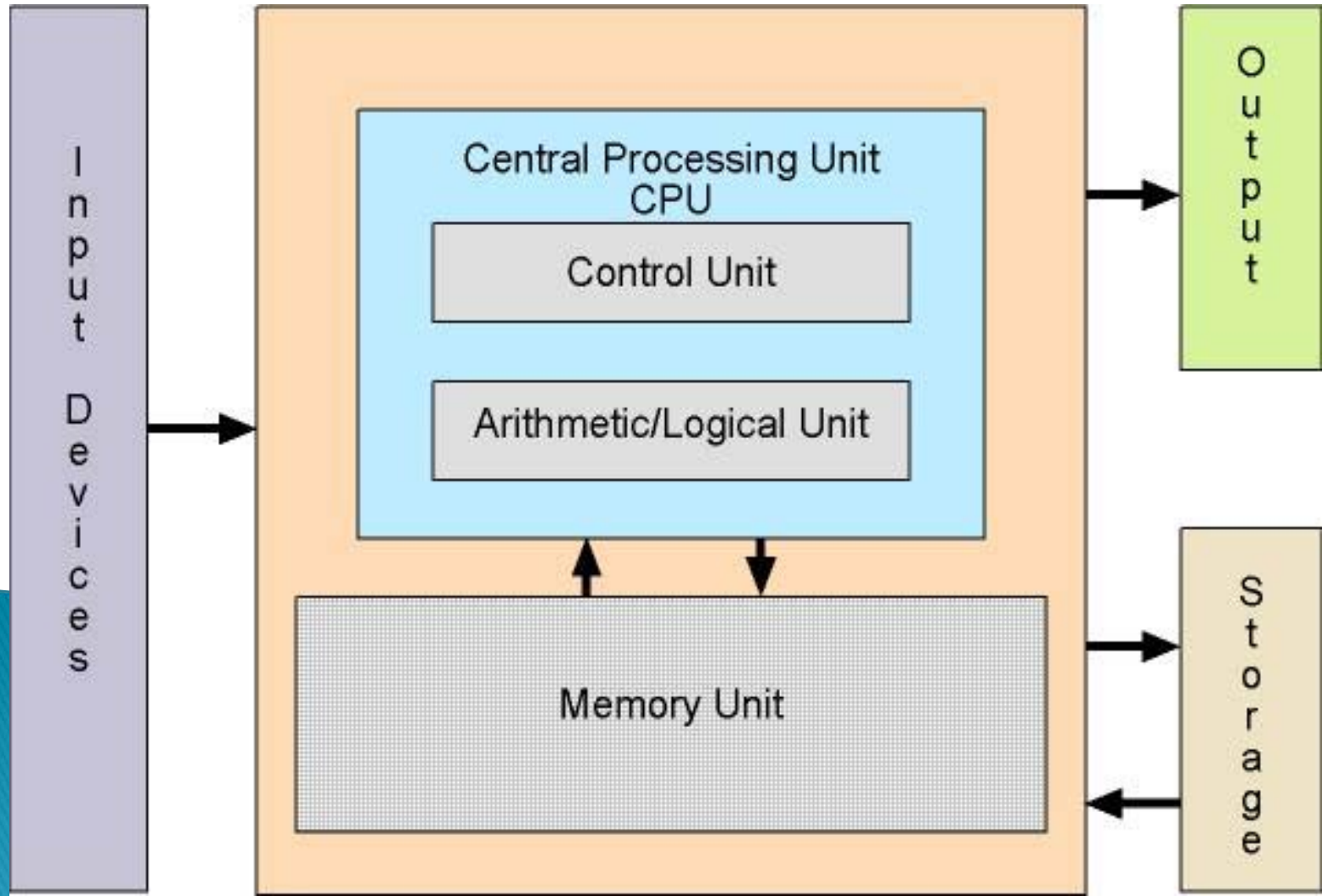
Fifth generation(1980 onwards) Artificial Intelligence

- ❑Fifth generation computing devices, based on artificial intelligence, are still in development.
 - ❑though there are some applications, such as **voice recognition**, that are being used today. The use of **parallel processing and superconductors** is helping to make artificial intelligence a reality.
- ❑The goal of fifth-generation computing is to develop devices that respond to **natural language** input and are capable of learning and self-organization.



Topic 2: Hardware organization of a computer

Basic Computer Components

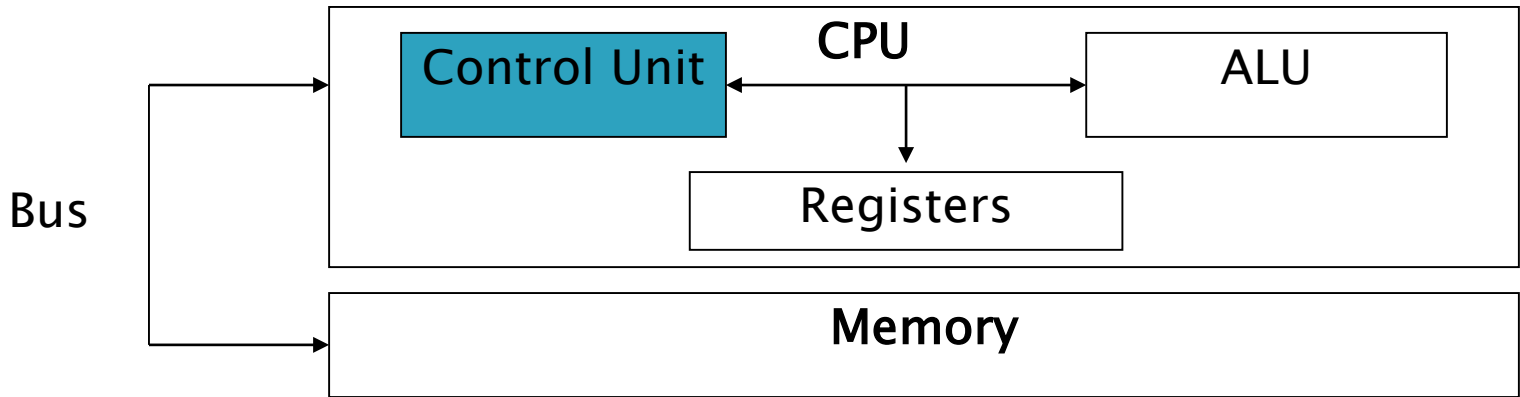


The Central Processing Unit

- It is the brain of a computer system
 - The CPU:
 - ✓ receives input.
 - ✓ interprets instructions provided by programs.
 - ✓ directs other components of the system to act.
 - ✓ processes data.
 - ✓ controls output.



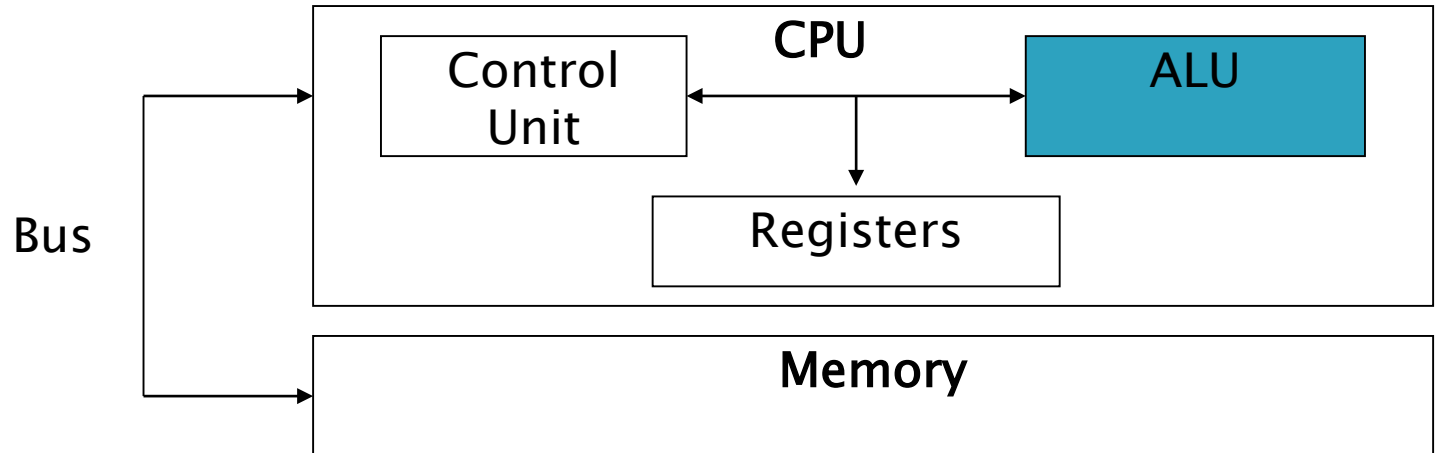
Unit



Control Unit: The control unit controls the computer by repeating 4 operations, called the machine cycle. The 4 operations are:

1. fetching program instructions from memory
2. decoding the instructions into commands that the computer can process
3. executing the commands
4. storing the results in memory

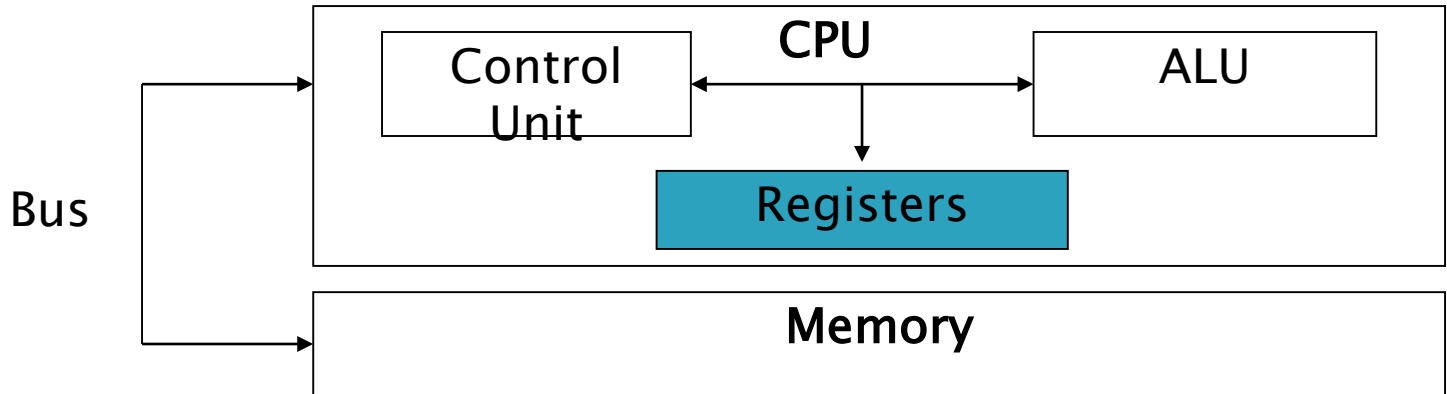
The Central Processing Unit



Arithmetic and Logic Unit (ALU)

It performs calculations and comparisons of data.

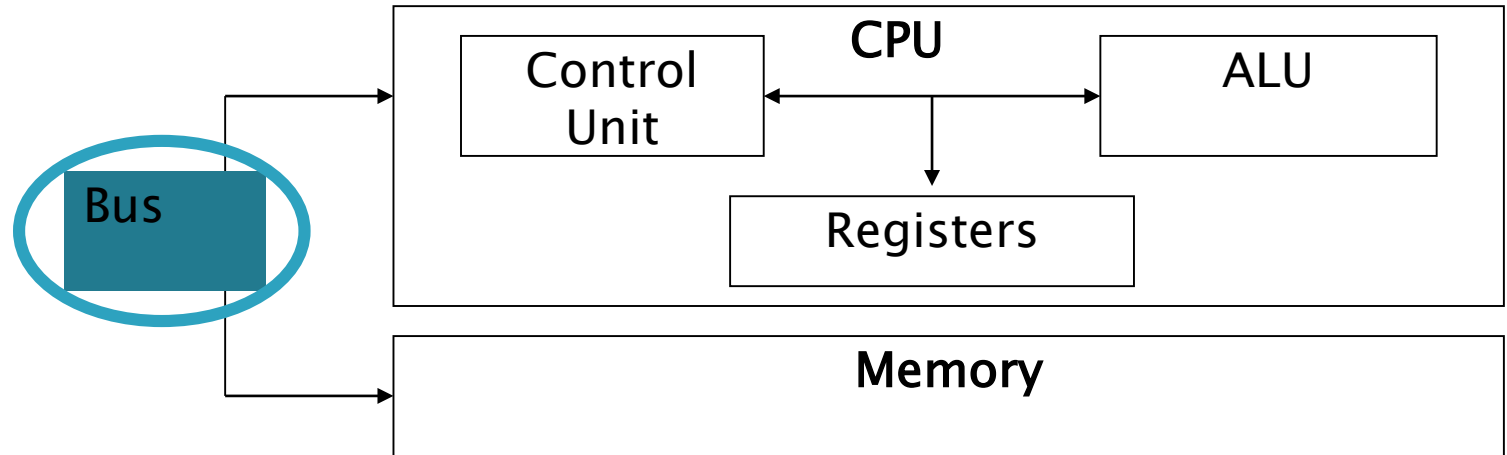
The Central Processing Unit



Registers

They hold program instructions, data values, and memory locations as the computer executes a program.

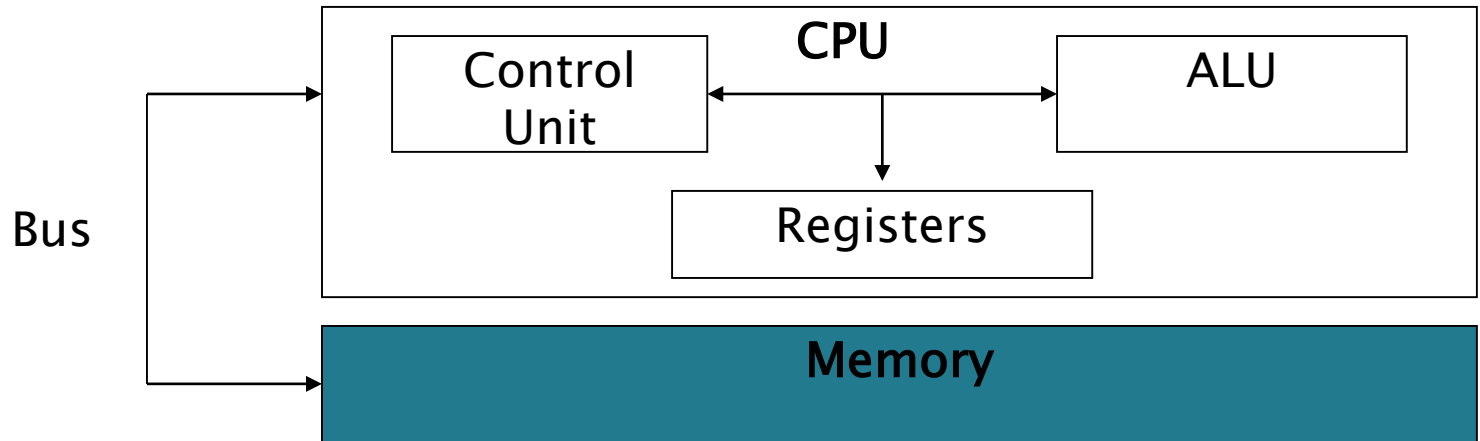
The Central Processing Unit



Buses

They are electrical pathways that carry signal (bits) between a CPU's components and other parts of the system.

Processing Unit



Memory

- ✓ accepts and holds program instruction and data
- ✓ acts as the CPU's source for data and instructions and as a destination for operation results
- ✓ holds the final processed information until it can be sent to the desired output or storage devices, such as printer or disk drive