

# زبان فنی

کاوه حقیقی

# The CPU

## The Central Presentation Unit

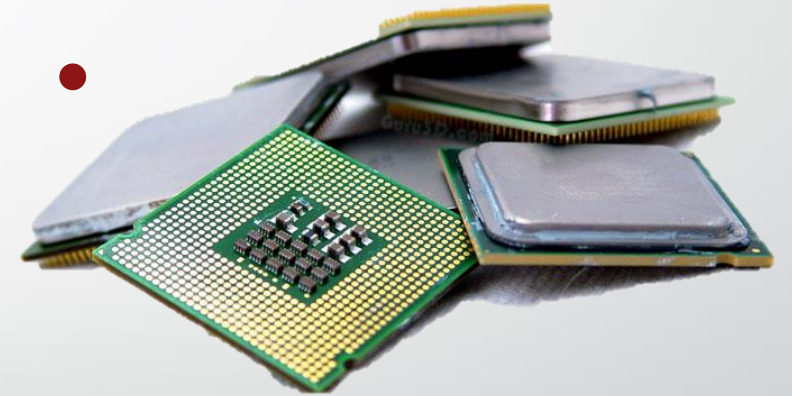
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Parts of the CPU •

1. Buses
2. The Control Unit
3. The Arithmetic Logic Unit
4. Program counter
5. Instruction Register
6. Memory Data Register
7. Memory Address Register





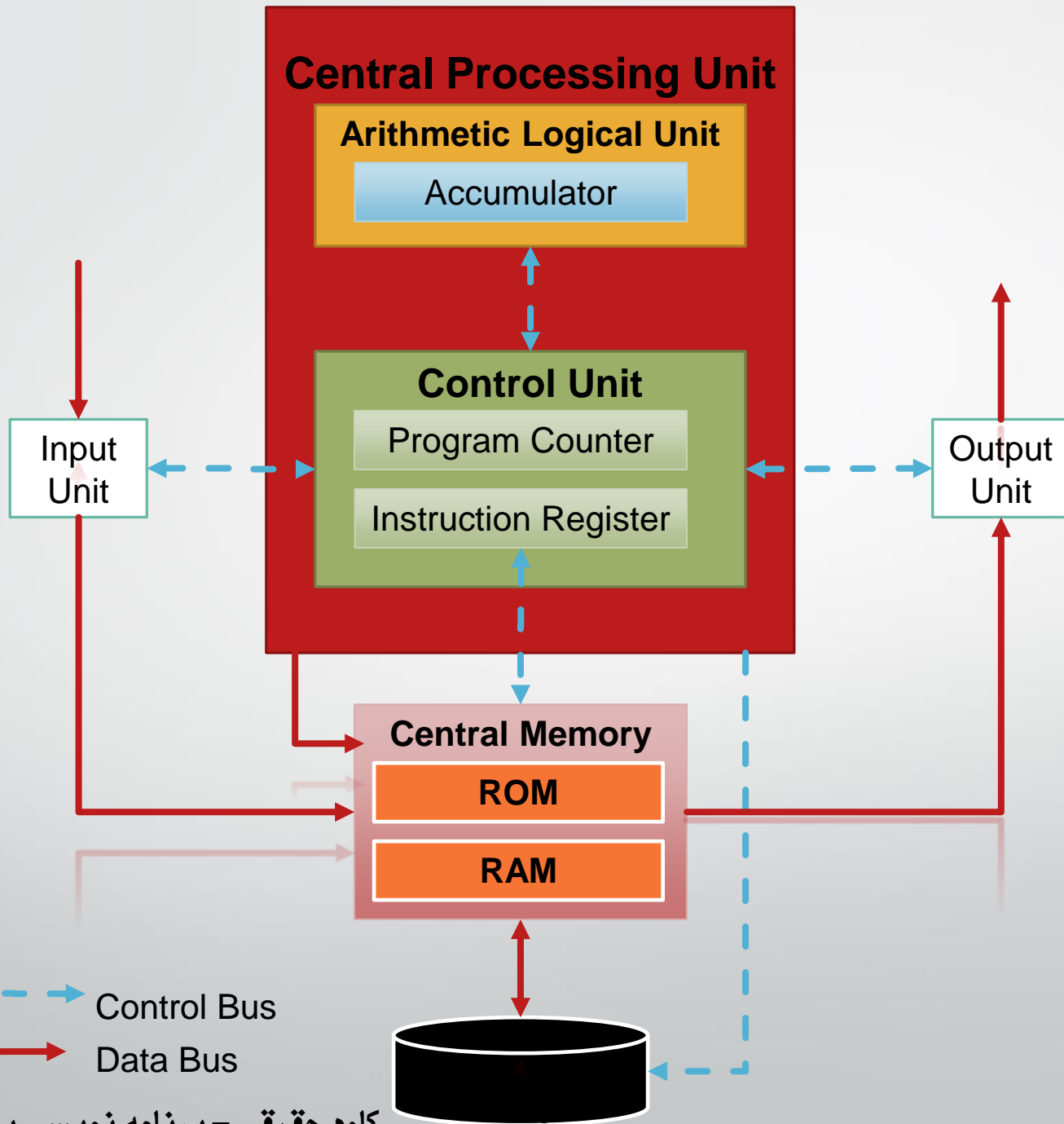
# What is the CPU?

- The CPU is short for the Central Processing Unit
- It is the main part of the computer where instructions are processed
- The central processing unit includes the main memory
- Now a day's most computers have more than one CPU to provide better speed

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# Structure of the CPU

- The CPU is made up of many components such as
  1. Registers (Program counter and Instruction Register)
  2. Arithmetic logic unit
  3. Control unit
  4. Buses



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# Buses

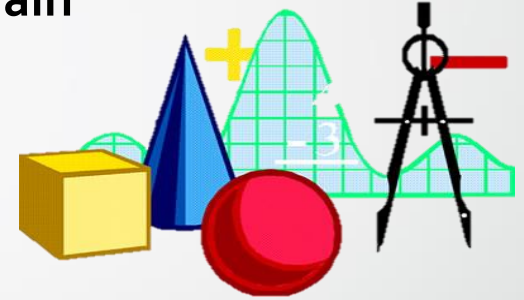
- All data traffic with the CPU takes place across the computer's bus
- A computer bus is a set of parallel electrical tracks connecting components within a computer
- The width of the data bus determines the word length
- The width of the address bus determines how many addresses the computer can send at a time

# Control Unit (CU)

- The CU is considered the manager of the CPU
- The CU's jobs are:
  - 1.** decode instructions within a computer,
  - 2.** Plan the reading and writing of data
  - 3.** control the order in which instructions are executed
  - 4.** control the operations performed by the ALU.
- In the CU you will find two registers;
  - 1.** Instruction Register: stores a copy of the current instruction being performed
  - 2.** Program Counter.

# The Arithmetic Logic Unit (ALU)

- The ALU is a part in the CPU where arithmetic and logic operations are carried out; in other words all mathematical calculations. The result of the calculations are sent to the main memory
- The ALU is capable of performing:
  1. Addition, Subtraction, Multiplication, Division
  2. Greater Than ( $>$ ), Smaller Than ( $<$ ), Equal ( $=$ ), Greater Than or Equal To ( $\geq$ ), Smaller Than or Equal To ( $\leq$ ), Not Equal ( $\neq$ )
  3. AND, NOT, OR
- Within the ALU we will find the register known as the Accumulator. The accumulator stores the result of the current calculation.





# Program Counter (PC)



- The program counter is sometimes known as the instruction pointer
- The PC indicates where the computer is in its instruction set. If the instruction set has 5 steps the PC will point to which step the computer has arrived
- Depending on the device the PC could hold
  1. The address of the instruction being executed, or
  2. The address of the next instruction to be executed.
- The program counter is automatically incremented (increased by 1) after each step (instruction cycle)

# Instruction Register (IR)

- The instruction register (IR) is also found with the control unit
- The IR is used to store a copy of the current instruction being performed
- This instruction is stored in the form of operator and operand (covered later on)
- Also known as CIR (Current Instruction Register)

# Memory Data Register (MDR) Or Memory Buffer Register (MBR)

- The Memory Data Register in the central processor stores the data being transferred to and from the access store.
- It acts as a buffer allowing the central processor work independently without being affected by differences in operation.

# Memory Address Register (MAR)

- The Memory Address Register in the central processor stores the address of the memory location currently in use.
- When the CPU is fetching data the MAR would store the address of the instruction being loaded
- When the instruction is being executed the address of the data being used is stored.

# Main Memory

- The main memory is where most of the results are temporarily stored;
- Main memory is much faster than the hard disk this is why it is used
- Each result is stored in a location in the main memory and each location has an address, this way the CPU can store and retrieve information which is stored in the main memory easily and faster.
- When the CPU writes information to the main memory two things are supplied
  1. the address section: passes through the address bus
  2. the data section: passes through the data bus

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