Brain of Artificial Intelligence –CPU

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Abstract- "A CPU (central processing unit) is the "brain" of the computer; it follows the instructions of the software to manipulate data into information." The CPU executes logic and arithmetic processes, controls instruction processing, and controls the overall operation of the computer. The main components of the CPU are the CU (control unit) and the ALU (arithmetic/logic unit). The CPU also has registers which temporary store data during processing, and buses that act as roadways which transmit bits of data within the CPU and to other components on the motherboard.

In the brief of this research project I want to explain about the deep structure of a central processing unit, which includes :

- **ALU(Arithmetic logical unit)**
- **Register**
- **Bus**
- **CU(Contorl Unit)**
- **Design**

I. INTRODUCTION

Sometimes denoted to purely as the *central processor*, but more commonly called *processor*, the CPU is the brains of the computer where most scheming take place. In terms of computing power, the CPU is the most important element of a computer system.

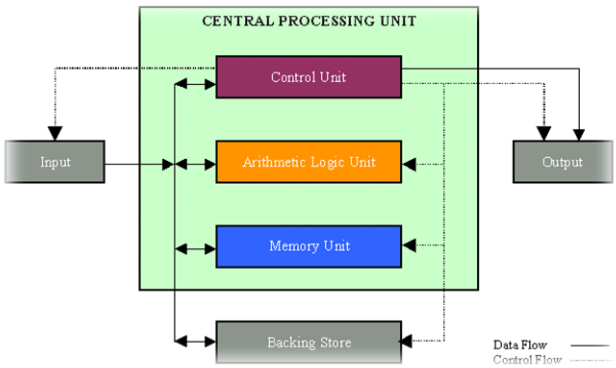
The world's first CPU was presented by Intel in 1971. The Intel 4004 was a 4-bit CPU, clocked at 740 KHz and capable of executing up to 92,600 commands per second. Five months after the

On large machines, the CPU requires one or more printed circuit boards. On personal computers and

Small workstations, the CPU are housed in a single chip called a *microprocessor*. Since the 1970's the microprocessor class of CPUs has almost completely overtaken all other CPU operations.

The CPU itself is an core module of the computer. Modern CPUs are small and square and contain multiple metallic connectors or pins on the underside. The CPU is inserted directly into a CPU socket, pin side down, on the motherboard.

II. STRUCTURE OF CPU



The simplified model consists of five parts, which are:

Arithmetic & Logic Unit (ALU)

The part of the central processing unit that treaties with actions such as addition, subtraction, and multiplication of integers and Boolean operations. It accepts control signals from the control unit telling it to carry out these actions.

Control Unit (CU)

This controls the movement of instructions in and out of the processor, and also controls the operation of

the ALU. It consists of a decoder, control logic circuits, and a clock to ensure everything happens at the correct time. It is also responsible for performing the instruction execution cycle.

Register Array

This is a small amount of internal memory that is used for the quick storage and retreival of data and instructions. All processors include some common registers used for specific functions, namely the program counter, instruction register, accumulator, memory address register and stack pointer.

System Bus

This is comprised of the control bus, data bus and address bus. It is used for connections between the processor, memory and peripherals, and transferal of data between the various parts.

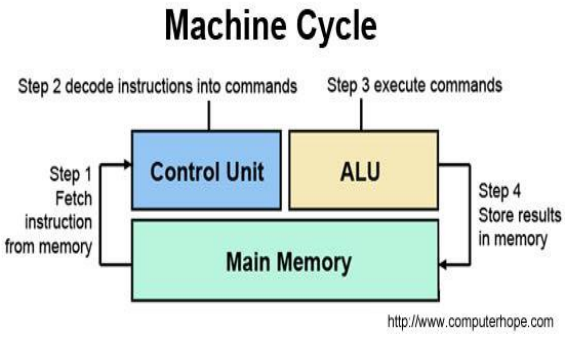
Memory

The memory is not an actual part of the CPU itself, and is instead housed elsewhere on the motherboard. However, it is here that the program being executed is stored, and as such is a crucial part of the overall structure involved in program execution

III. ARITHMETIC LOGIC UNIT

Short for **Arithmetic Logic Unit**, **ALU** is one of the many components within a computer processor. The ALU performs mathematical, logical, and decision operations in a computer and is the final processing performed by the processor. After the information has been processed by the ALU, it is sent to the computermemory.

In some computer processors, the ALU is divided into an AU and LU. The AU performs the arithmetic operations and the LU performs the logical operations.



IV. REGISTERS

In a computer, a register is one of a small set of data holding places that are part of a computer processor . A register may hold a computer instruction , a storage address, or any kind of data (such as a bit sequence or individual characters). Some instructions specify registers as part of the instruction. For example, an instruction may specify that the contents of two defined registers be added together and then placed in a specified register. A register must be large enough to hold an instruction - for example, in a 32-bit instruction computer, a register must be 32 bits in length. In some computer designs, there are smaller registers - for example, *half-registers* - for shorter instructions. Depending on the processor design and language rules, registers may be numbered or have arbitrary names.

V. SYSTEM BUS

A **computer bus** is a subsystem of the computer that makes these transfers happen. In early computer systems all transfers used actual cables. Large bundles of wires were organized using 'bus bars,' which is where the term **bus** comes from.

Cables are still used in present-day computer systems, in particular to connect external devices. The most common type of connection is a Universal Serial Bus (USB). Many **peripheral devices**, such as printers and scanners, use a USB connection. Transfers between internal components of a computer can also use cables, but some types have been replaced by integrated electronic circuitry, such as those found on a **motherboard**.

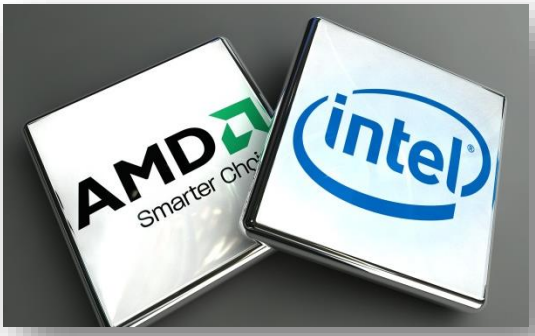
The most critical connection of any computer system is the **system bus**. This is a single computer bus that controls the transfers between the CPU, the main memory, and the input/output devices.

VI. Control Unit

A **control unit** in general is a central (or sometimes distributed but clearly distinguishable) part of the machinery that controls its operation, provided that a piece of machinery is complex and organized enough to contain any such unit. One domain in which the term is specifically used is the area of computer design. In the automotive industry, the control unit helps maintain various functions of the motor vehicle.

VII. Market Of CPU

Basically there are two major companies producing CPU`s
Intel
AMD
Although Intel dominates the market with its high-end, coming-of-age processor technologies like the well-received Core i series and the fresh and upcoming Ivy Bridge range, AMD is not far behind and occupies considerable mindshare due to high performance processors at economical price ranges.



VIII. CONCLUSION

For answering the big question, which is best - Intel or AMD - it is often difficult to decide for yourself because it's rare to find two similarly priced laptops or PCs with identical features - motherboard, graphics card, RAM, hard drive, etc - yet one with an Intel chip and the other with AMD. Should you happen upon such a situation, it's usually best to choose the one with an Intel processor.
The thing is, AMD processors tend to be cheaper so if outright performance isn't your top priority, you might find that a computer with an AMD processor has additional features (more RAM or a larger SSD, for example) over an Intel-based one at the same price. In that case, it's all down to what you want from a PC or laptop. With a laptop, you're more likely to be concerned about weight, battery life and screen quality than processor power.

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