4. Hardware and Software

Difference between Hardware and Software:

Hardware	Software
Circuits	Code
Chips	Operating Systems
Plugs	Applications
Wires	Games
Speakers	Websites

CPU (Central Processing Unit)

> *Master chip the controls all the other parts of the computer*

The CPU has circuits to:

- Do simple math & logic
- Send and Receive information to and from different parts of the computer.

The CPU receives simple commands that tell it which circuit to use

- For example, the ADD command tells the CPU to use a specific circuit to calculate a new number
- Another example: STORE command tells the CPU to use a different circuit to save that result into memory

All these commands and values sent into the CPU are represented into binary numbers. The way it works is that the binary commands are stored into the memory, and the CPU fetches and executes the sequence one after the other.

Technical Example in Assembly Code

```
    number1 dw 5
    number2 dw 3
    result dw 0

_start:
    mov ax, [number1]
    add ax, [number2]
    mov [result], ax
```

0. In memory, we have the number 5 assigned into the *number1* memory section, and 3 in the *number2* memory. The *result* memory is empty with the number 0.
1. The CPU is instructed to move the value of *number1* onto the *ax* register
2. The CPU is instructed to add the value of *number2* onto the existing value of the *ax* register which is 5. This results to $5 + 3 = 8$ in the *ax* register.
3. Finally, the CPU is instructed to move the value of the *ax* register into the *result* memory

Software

> *Software tells the CPU what to do*

Operating System

> *The master program that manages how software uses the hardware of a computer*

- It lets you install new programs by loading them into your computer's memory
- It decides when a program is run by the CPU, and whether that program can access the computer's INPUT and OUTPUT devices

See Also:
2. Circuits and Logic
6. Computer Hardware
7. What is the purpose of the CPU