

Philip Pesic

Week 2

January 29 2023

Week 2 Lecture 3 Notes

Hardware

Hardware is a physical component of a computer. This can include things like SSD for storage, GPU for graphics displays, etc. Many pieces of hardware converge to make a functioning, modern computer.

Eg: Graphics card/chip, CPU, RAM, HDD/SSD, Motherboard, etc.

The switch

The transistor is an electronic switch that can have an on or an off state. These states can represent binary code, and are the basis of relaying and storing information.

Eg: A transistor that flickers on, off, on can represent the decimal number 5

Moore's Law

Moore's law is an observation that shows that the power of new computers will double roughly every 18 months.

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Eg: If a computer can process 18000000 bits a second, a computer made in 18 months would likely be powerful enough to process 36000000 bits a second.

Physical Implementations for Computer Hardware

There are a number of forms of computers. The current hierarchy of common computers looks like this:

All in one - a desktop and monitor in one

Modular Desktop - a separate computer and monitor system

Portable Laptop - a computer, display, and peripherals powered by a portable battery Tablet - A smaller, touchscreen pad made up of a display and computer

Smartphone - An even smaller touchscreen tablet that typically has cellular capabilities

The unit of measure of data

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Computers store data in bytes, which are sequences of 8 bits. These bytes are also abbreviated based on how large the amount is. The prefix kilo means thousand - so a kilobyte is roughly 1000 bytes.

Eg: Kilo - 1 thousand, Mega - 1 million, Giga - 1 Billion, Etc. A megabyte is 1024 kilobytes, which is 1024 bytes

Input devices

Input devices are devices that manipulate computer data. The two most common are the keyboard and mouse.

Keyboard - a device with letter keys that can be pressed to represent letters on the display

Mouse - a device that can manipulate a cursor, or icon, that aids in interacting with a computer in a user-friendly way

Process hardware

The CPU (Central Processing Unit) is a piece of hardware that receives information, processes it, and gives instruction to other parts of the computer.

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Eg: The CPU might receive binary code from the RAM, process it into the letter “A”, and instruct the GPU to represent the character

Output hardware

Output hardware are peripherals that receive data from the computer in order to output something to the user. The two most common output peripherals are monitors/displays and speakers/headphones.

Display - A screen that gets computer instruction to change the color of pixels, or little dots with RGB values, in order to display information in a user-friendly format.

Speaker/headphones: A device that receives information from the computer to output digital audio. Although not as useful as a display, it is still one of the most important output devices.

Storage hierarchy

The storage hierarchy is a pyramid that represents the capacity of different storage hardware compared to the speed. An Example is shown below.

Eg: Cache is near the top of the pyramid because it processes data extremely quickly, but is generally very small and expensive.