Week 1: Understanding Computers, Hardware, and Software

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What is a Computer?

A computer is an electrical device used to process and store data for further use. It can save information, retrieve it, and process it.

Hardware vs Software

Definition

- **Hardware**: the physical components of a computer
- **Software**: the programs that run on a computer

Tangibility

- **Hardware**: tangible
- **Software**: intangible

Categories

- **Hardware**: input, output, processing, and storage devices
- **Software**: operating systems, applications, programming software

Transferring methods

- **Hardware**: can be transferred physically
- **Software**: can be transferred electronically

Replacement methods

- **Hardware**: can be replaced
- **Software**: can be reinstalled

Understood programming languages

- **Hardware**: only understands machine language
- **Software**: can be written in any programming language

Windows Vs Mac

Windows

Pros:

- Affordability
- Hardware flexibility
- Customizability
- Widely available support and software

- More options for compatible accessories
- Easier to repair
- More common

Cons:

- Lower resale value
- More prone to viruses
- Some configurations are less stable and/or reliable

Mac

Pros:

- Stability and reliability
- Aesthetic appeal
- User-friendly design
- Potential long-term savings
- Less prone to malware
- Strong resale value
- Seamless integration with other Apple products

Cons:

- High upfront price
- Software is less readily available
- Harder to fix

CPU

- **CPU**: Central Processing Unit, the brain of the computer

Features of a CPU

- **Speed**: measured in GHz
- **Cores**: the number of cores in a CPU
- **Cache**: the amount of memory in a CPU
- **Bandwidth**: the amount of data that can be transferred in a given time
- **Compatibility**: the ability of a CPU to work with other components
- **Multithreading**: the ability of a CPU to execute multiple threads at the same time

CPU Sockets

- **CPU Socket**: the part of the motherboard that holds the CPU

Types:

- **PGA**: Pin Grid Array
  - used by AMD
  - pins are on the CPU
  - It lowers the cost of the Motherboard
  - pins are easily damaged
  - pins are easily fixed
  - Mobile devices may benefit from pga socket's small size
- **LGA**: Land Grid Array
  - used by Intel
  - pins are on the motherboard
  - It lowers the cost of the CPU

  - reduced electrical leakage
  - capable of having larger surface area
  - safer than PGA
- **BGA**: Ball Grid Array
  - used in mobile devices, game consoles, and other small devices
- **ZIF**: Zero Insertion Force

Types of Computer Cables

- **VGA**: Video Graphics Array
  - has 15 pins divided into 3 rows
  - only carries analog signals
- **DVI**: Digital Visual Interface
- **HDMI**: High Definition Multimedia Interface
- **DisplayPort**: DisplayPort
  - can use more than one monitor
- **USB**: Universal Serial Bus

Expansion Cards

- **Expansion Card**: a circuit board that can be inserted into an expansion slot to add functionality to a computer

Types

- **Video Card**: used to connect the computer to a monitor
- **Sound Card**: used to connect the computer to speakers
- **Network Card**: used to connect the computer to a network
- **Modem**: used to connect the computer to the internet
- **TV Tuner**: used to connect the computer to a TV