

Optional Reading: Hardware and Software

You will not be tested on the slides below.

It may help you to read them so that when we use these terms you know what we are talking about.

Input/Output

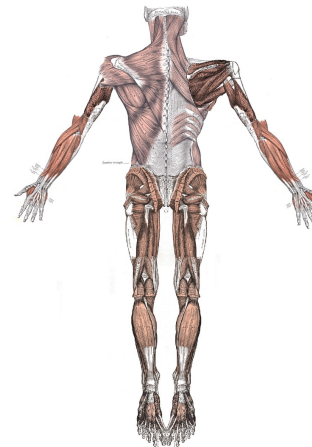
I/O (stands for input/output)

- What are examples for human?

input: senses



output: muscles, voice



<https://jasperproject.github.io/>

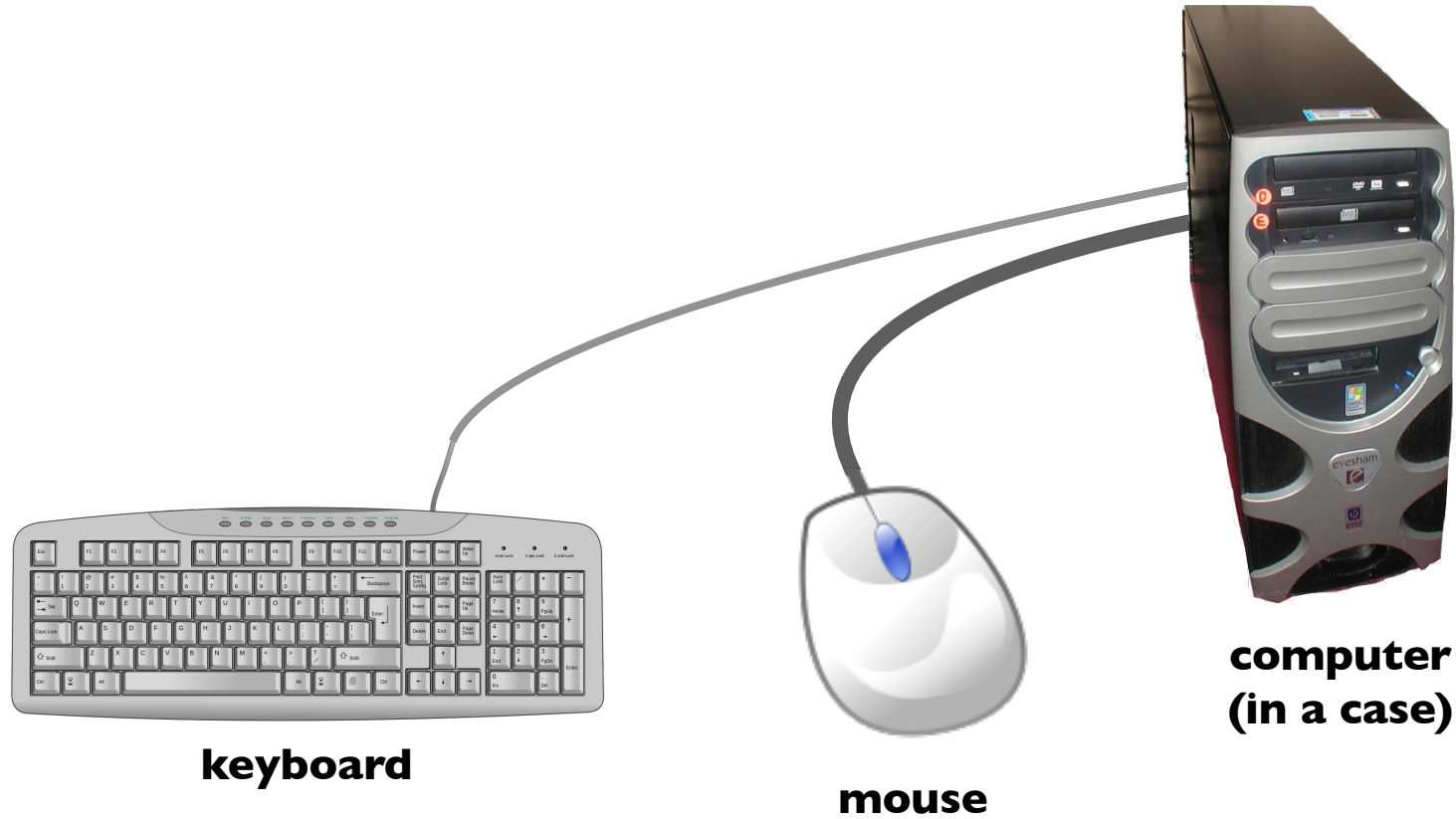
Computer Input/Output

what are some common compute inputs?



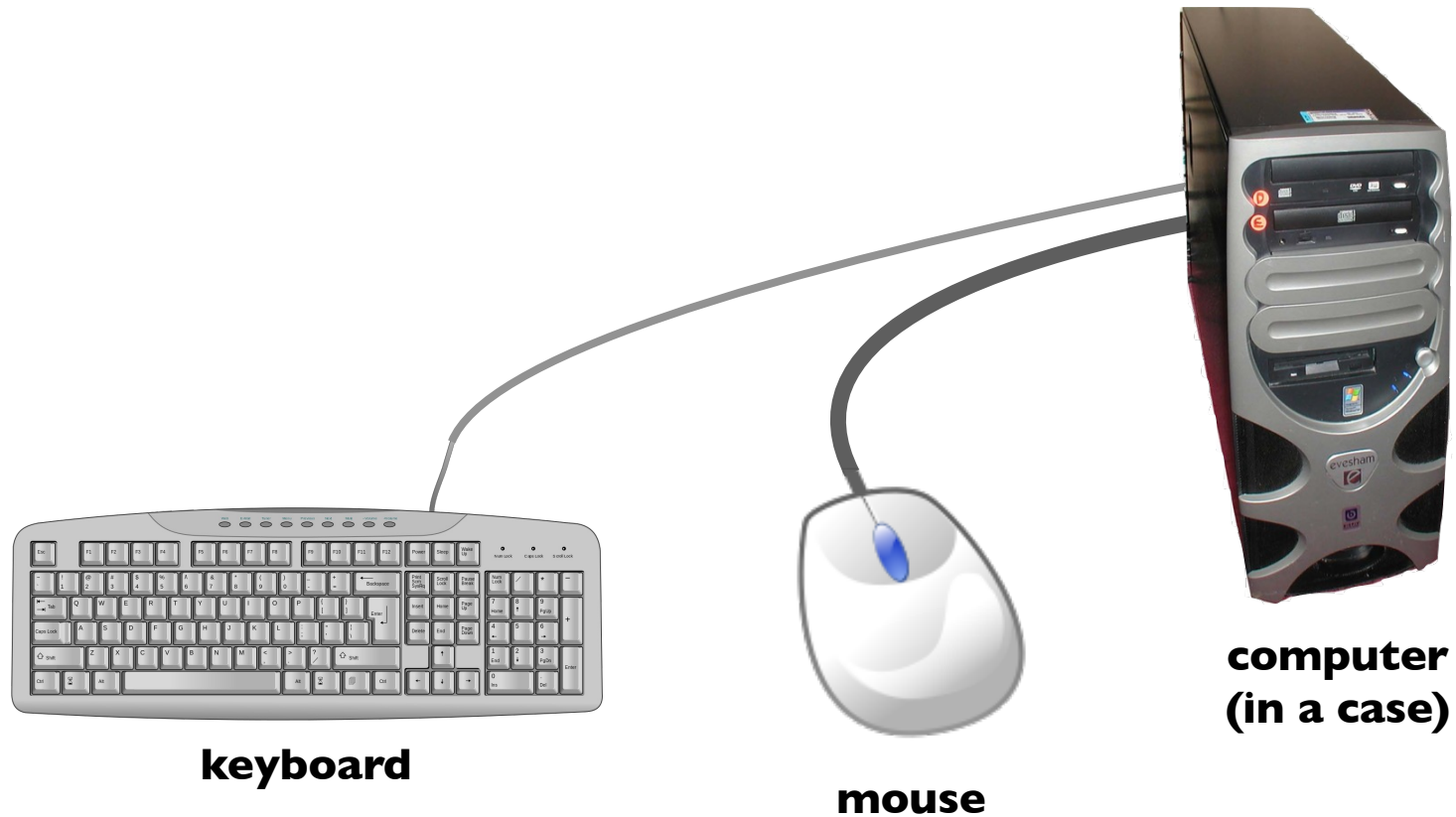
**computer
(in a case)**

Computer Input/Output



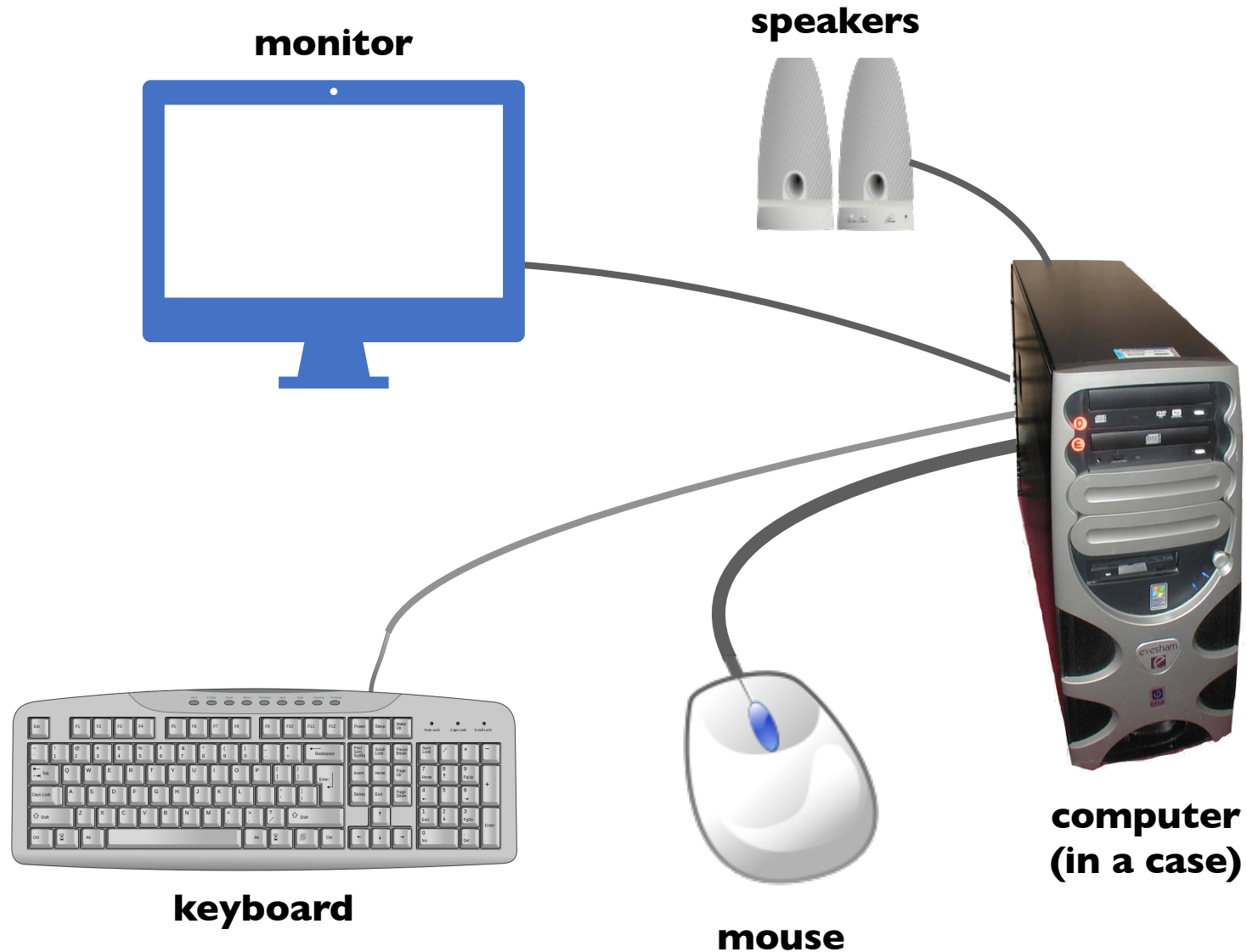
Computer Input/Output

what are some common compute outputs?



Computer Input/Output

**I/O devices attach
via “ports” (e.g. USB)
in back of computer**

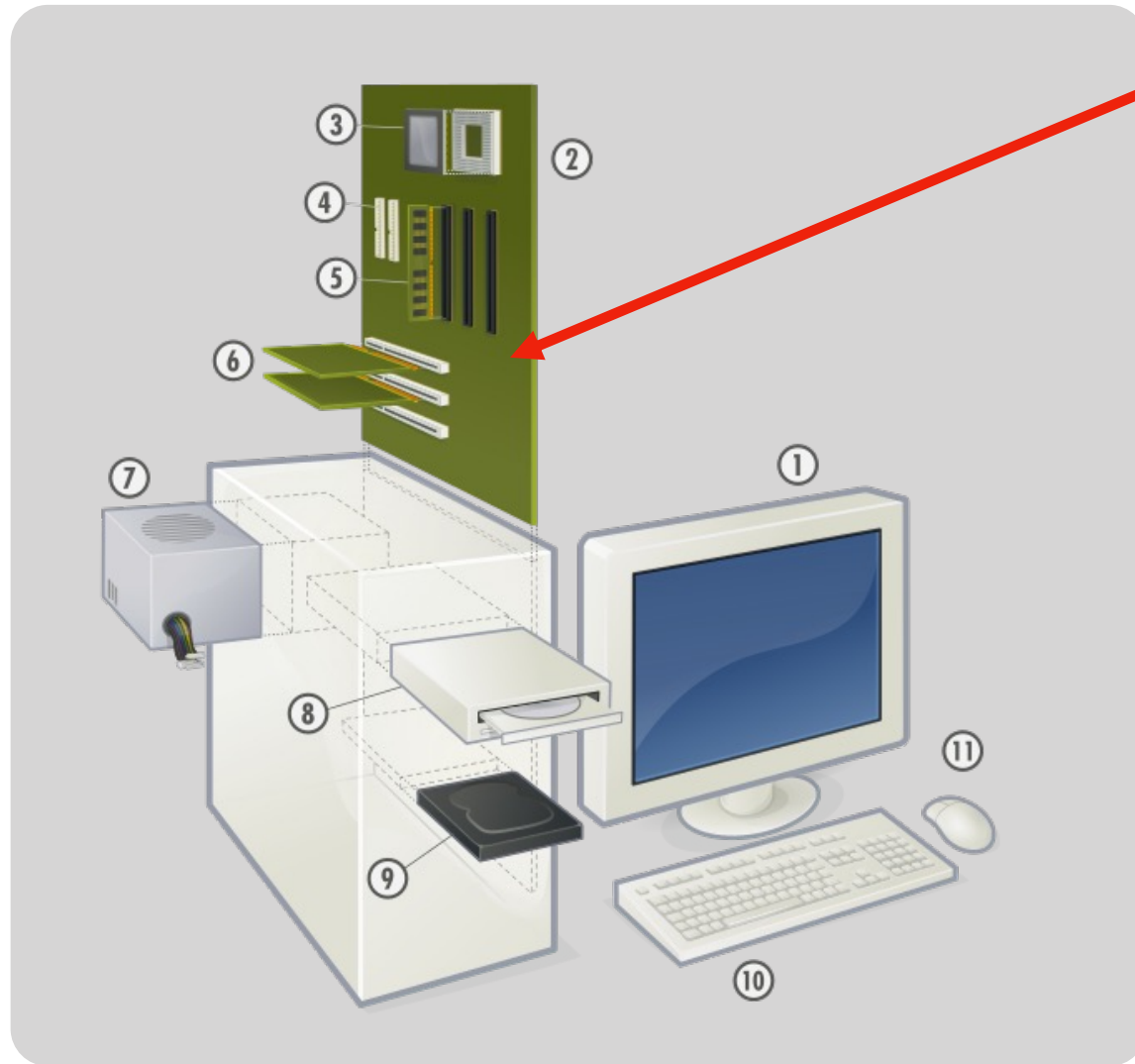


Computer Input/Output

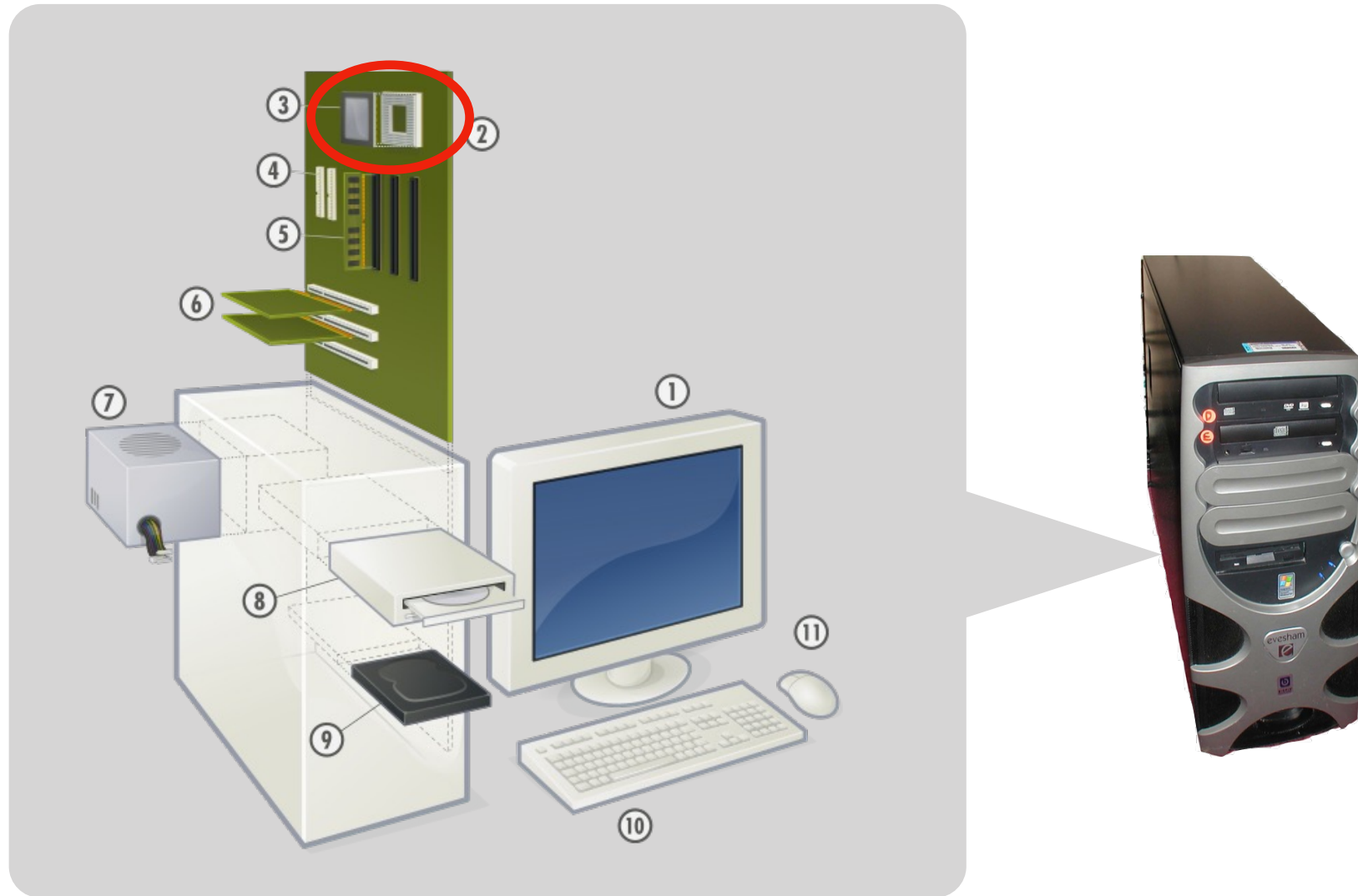


Computer Internals

Motherboard: main circuit board to which other components connect, via sockets/slots



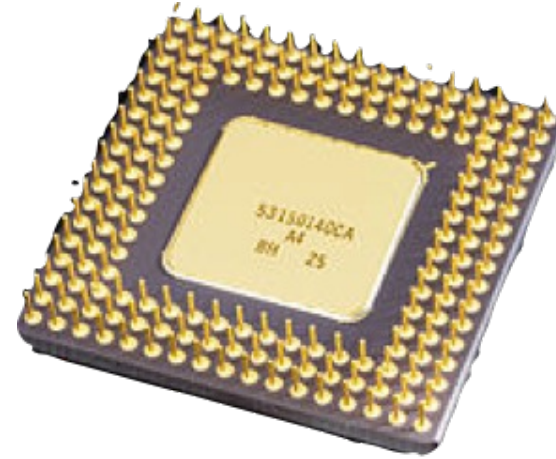
Central Processing Unit (CPU)



CPU

Responsible for computation

- Runs code
- Performs addition, other math
- Compares numbers, text
- Receives input, sends output
- Some compare it to a “brain”



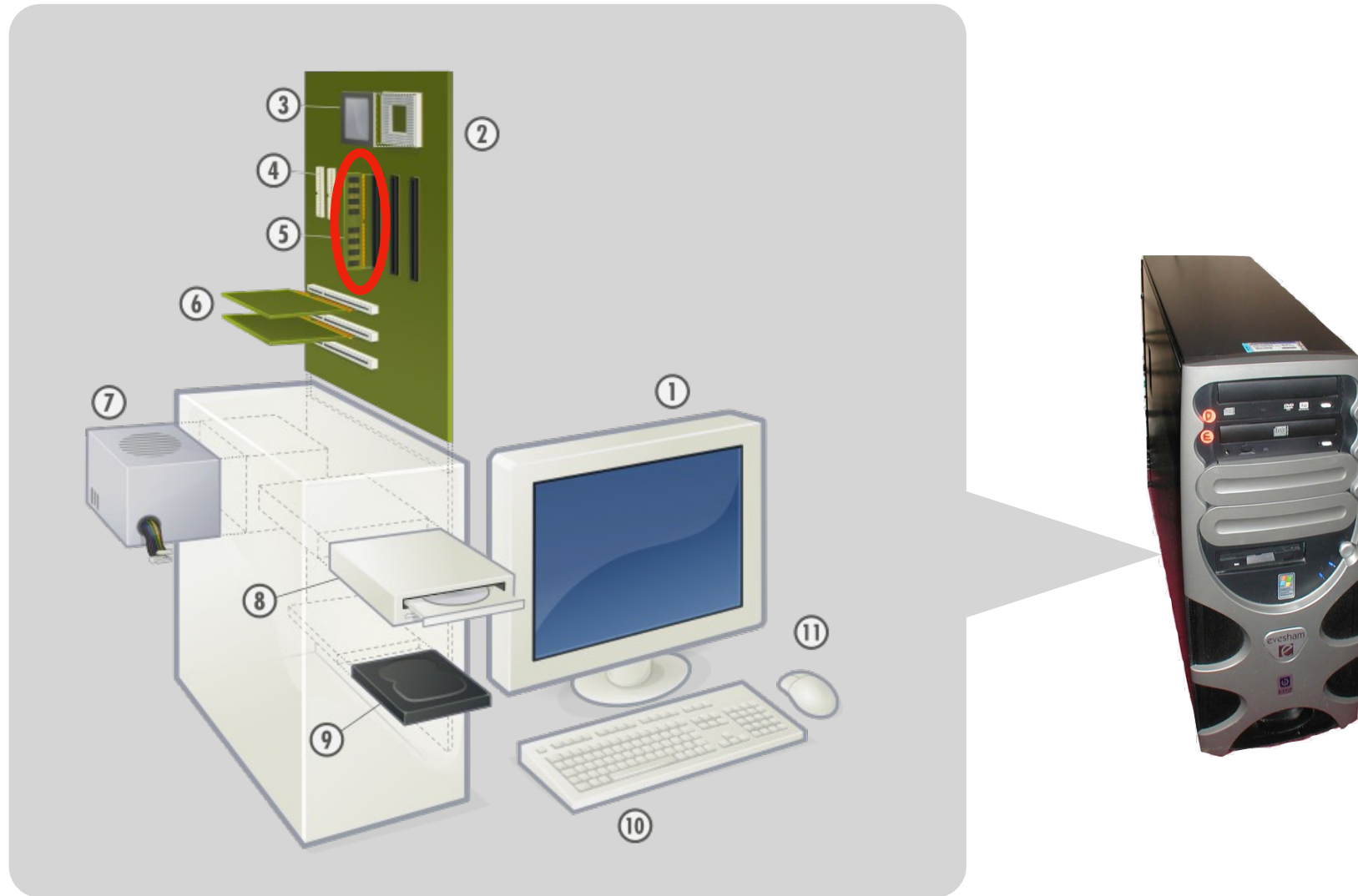
Runs on a clock

- Typically a couple GHz (i.e., billions of ticks per second)
- High-speed makes CPUs hot, require fans/cooling

Computers often have multiple CPUs

- Motherboard may have multiple sockets
- Single chip may contain multiple CPUs
- Allows computers to do more things simultaneously

Random Access Memory (RAM)



Memory

Memory stores data for short term

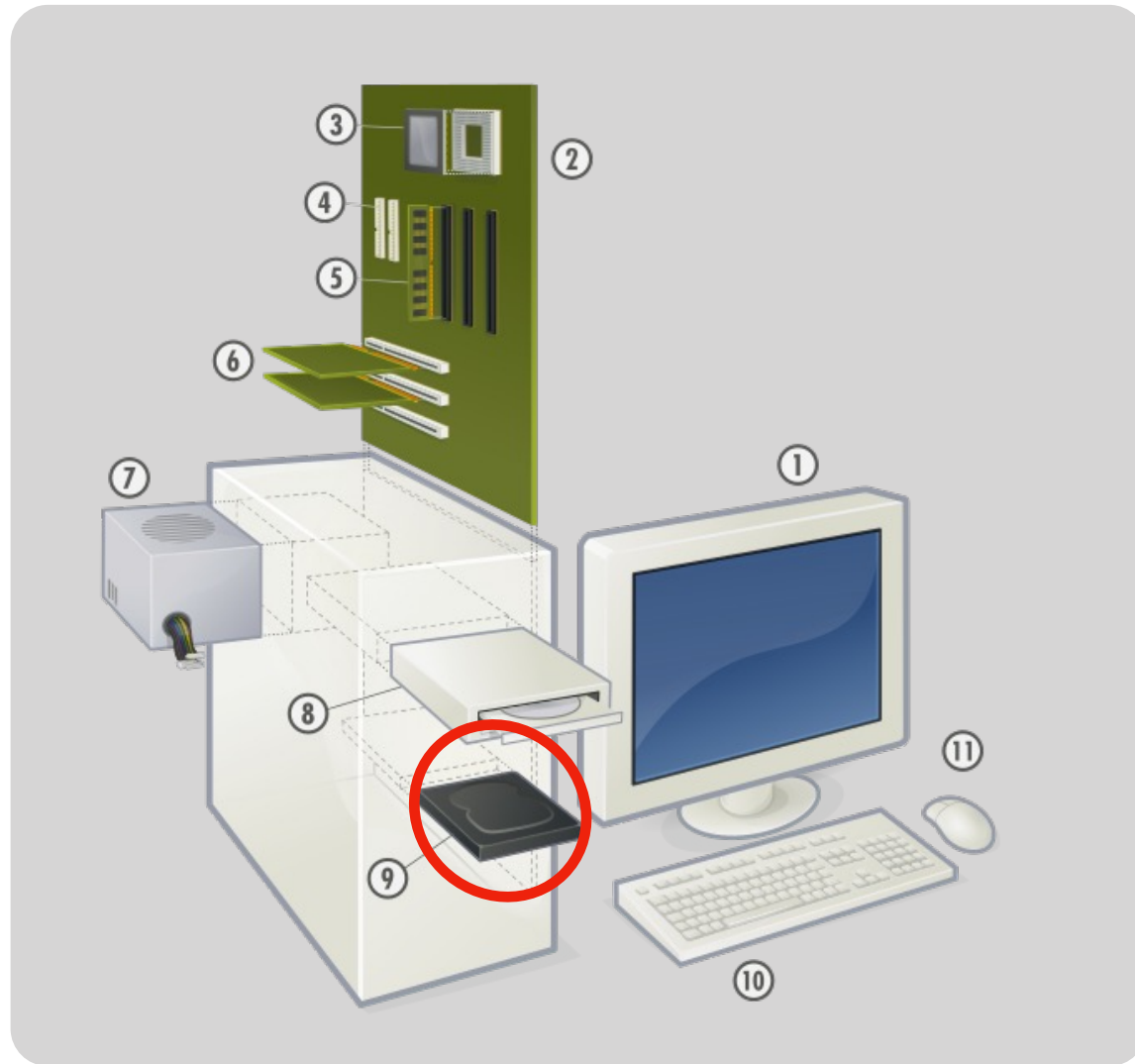
- **RAM** is most common form today (don't worry about specifics)
- CPU sends data to/from memory
- Accessing it is very fast
- It is **"volatile"** — meaning you lose this data when you power off your computer
- You don't save "files" in memory, otherwise they would be gone!

Stores bytes of data

- One byte \approx one letter
- The text "hello" requires 5 bytes
- Typical personal computer has few to **tens of gigabytes** (billion bytes) of memory



Storage Drives



Storage Drives

Two common devices

- HDD (hard disk drive), has moving parts, cheap, slow
- SSD (solid state drive), no moving parts, expensive, fast
- Both much slower than RAM...

Storage devices used to save data after power down

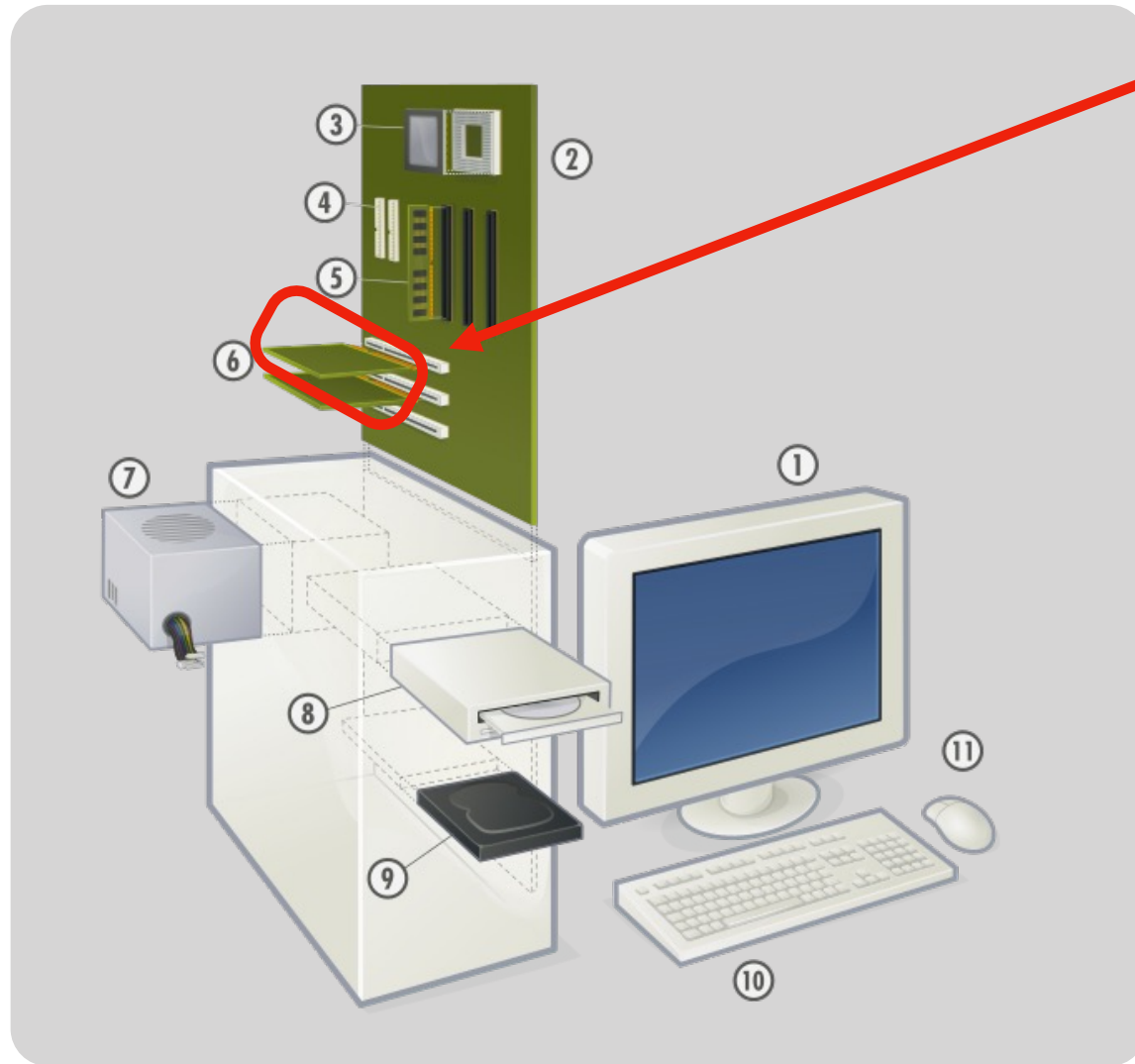
- **Persistent** medium, in contrast to **volatile** RAM
- Typical capacity: hundreds of gigabytes

When you make a directory/folder or **save a file**, that data is ultimately getting recorded to your storage device

- Sometimes computers save to RAM first, and only to the device later; power down cleanly to avoid losing your data!!!

Network Interfaces

Network: often based on extension card or built into the motherboard itself



Networking

NIC (Network Interface Controller)

- Provides computer communication to other computers, and the Internet

Wired vs. Wireless

- Wired ethernet is common for cable-based connection
- Wi-Fi is common for radio-based wireless connection

Terminology

- **Server**: program/computer that runs, waiting for incoming requests, to which it responds
- **Client**: program/compute that sends requests to a server

