Q: What distinguishes ChatGPT's semantic analysis from traditional methods?

iClicker

A. It relies solely on syntax and semantic rules.

B. It uses deep learning models to understand meaning in context.

C. It cannot handle structural ambiguities.

D. It focuses only on parsing sentence structure.

E. It relies solely on the input's context

CPSC 100

Computational Thinking

Computers: Back to basics

Instructor: Parsa Rajabi
Department of Computer Science
University of British Columbia

Agenda

- Course Admin
- Hardware, Memory, Transistors
- Moore's Law
- Take-home activity

Learning Goals

Learning Goals

After this lecture, you should be able to:

- Distinguish the difference between **hardware**, **applications**, and the **operating system**.
- Differentiate between the **different forms of computer memory**.
- Describe **Moore's law** and explain its impact on computing.
- Discuss the **implications** of consumerist approach to hardware development on developing nations

Course Admin

Post-Class Quiz

- First post-class quiz to be released tonight
  - To be completed individually via Canvas, 60 mins, 1 attempt
  - Due on Sunday, Jan 26
- Based on concepts discussed thus far
  - Algorithms
  - Artificial Intelligence

Lab 2

- Attend your registered lab section
  - Find and finalize your group members (if not already)
- Lab 2
  - Due on Thursday, Jan 23 at 11:59pm
  - Algorithms + Artificial Intelligence
  - Wednesday's lecture notes will be posted ahead of time
    - Read and review **BEFORE** attending lab

Metacognition Activity

Metacog. Activity (2 mins)

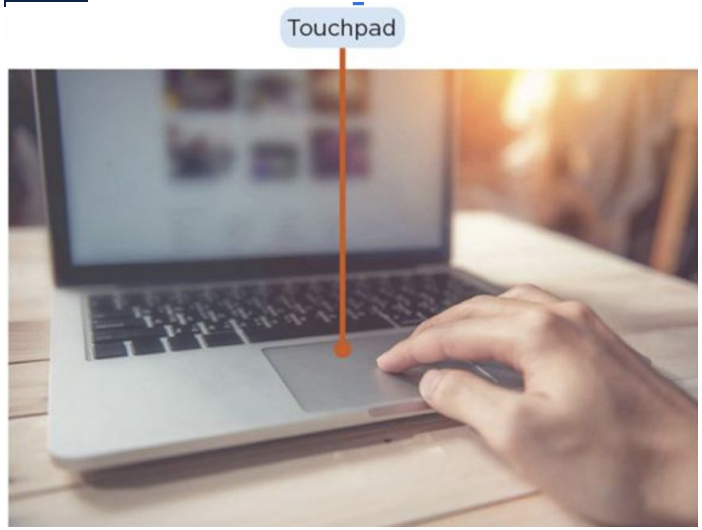
Write out your answers to the following questions:

- When you use a calculator app on your computer, **where** is the data stored?
- What are the different **types of storage** that exist on your computer?
- What is the **relationship** between an app on your phone and an algorithm?

Hardware, Memory and Transistors

Computer Hardware

Common Input Devices



Common Output Devices

Computer Software

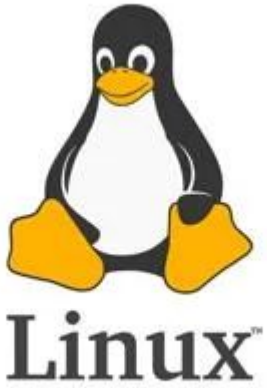
Software (then)

DVD™ VIDEO

Software (now)

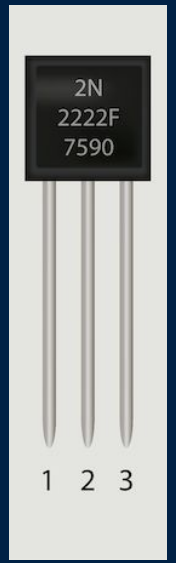
How does a Software operate?

Operating Systems



How does an operating system work?

Transistors!



Transistors

Semiconductor device that can amplify, control, and generate **electrical signals**.

Transistors

Semiconductor device that can amplify, control, and generate **electrical signals**.

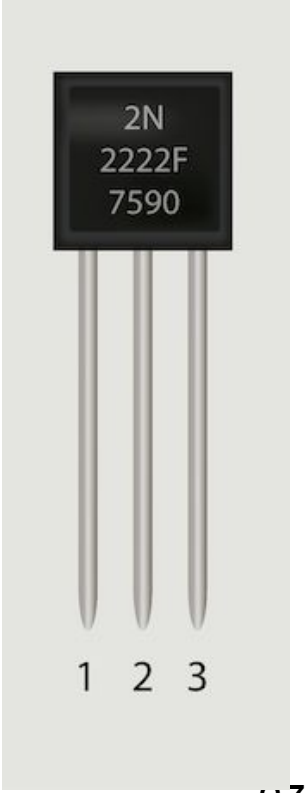
Transistors are usually made from **silicon**, a semiconductor material that can conduct electricity under certain conditions.

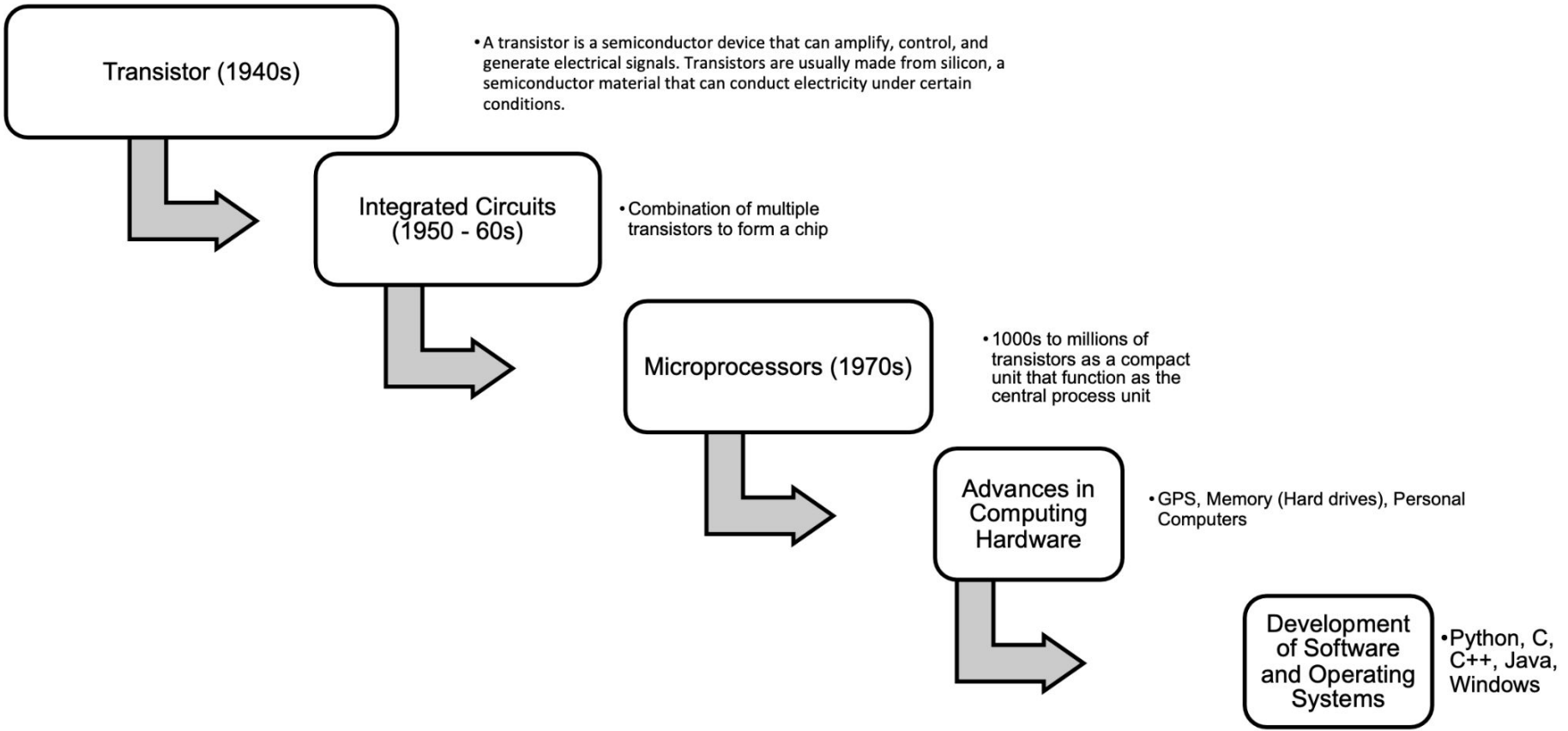
Transistor: Explained

Typically have three terminals (numbers correspond to image):

1. Emitter
2. Base
3. Collector

The flow of electric current between the collector and emitter is controlled by the **current at the base**.

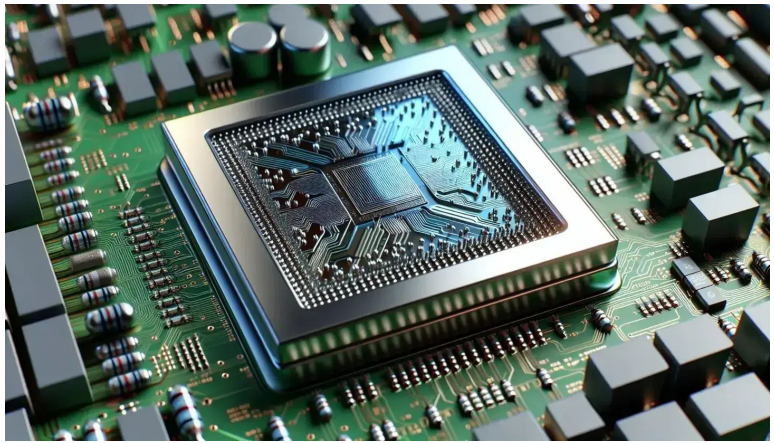


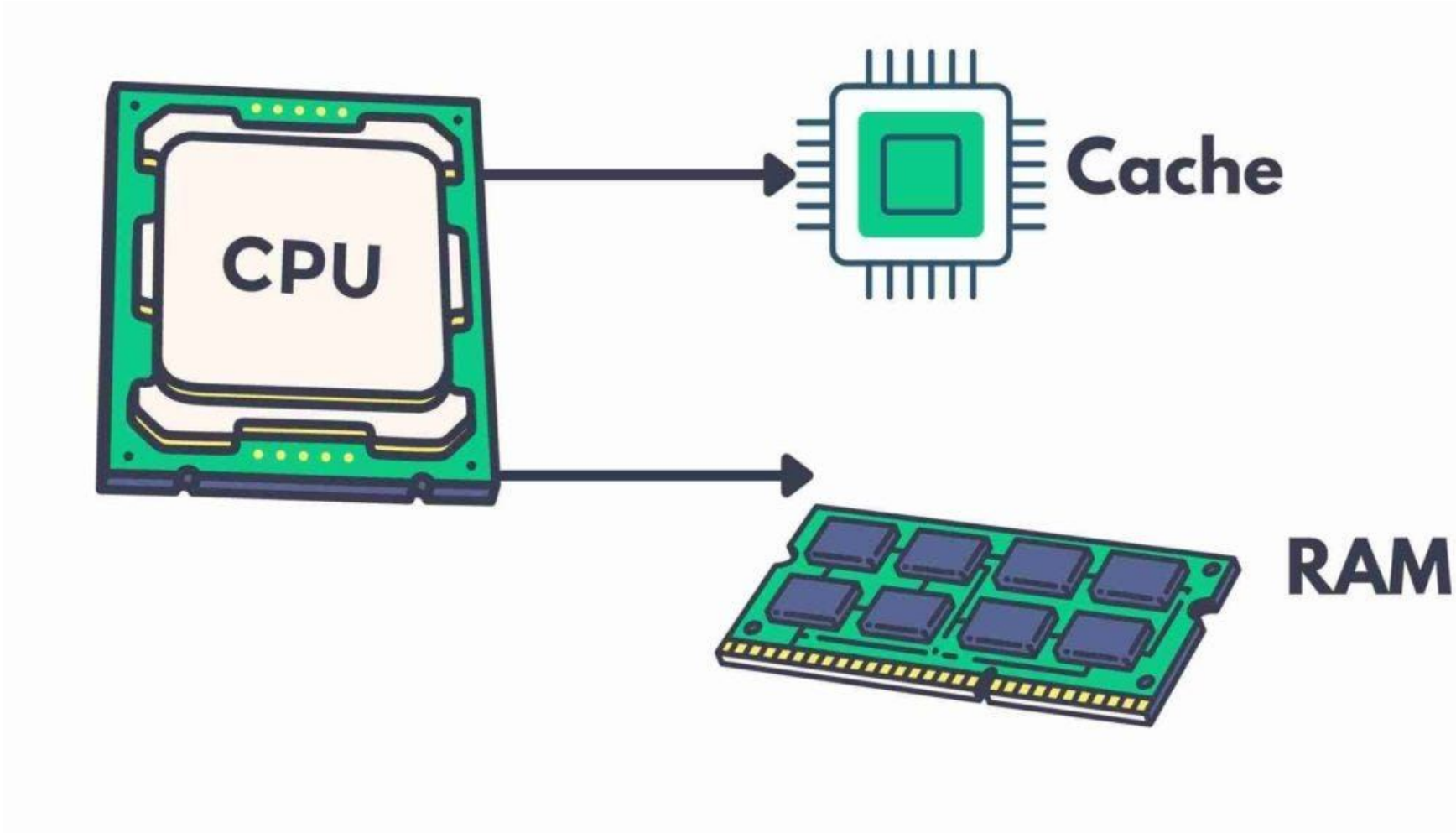

Transistor (1940s)
• A transistor is a semiconductor device that can amplify, control, and generate electrical signals. Transistors are usually made from silicon, a semiconductor material that can conduct electricity under certain conditions.
Integrated Circuits (1950 - 60s)
• Combination of multiple transistors to form a chip
Microprocessors (1970s)
• 1000s to millions of transistors as a compact unit that function as the central process unit
Advances in Computing Hardware
• GPS, Memory (Hard drives), Personal Computers
Development of Software and Operating Systems
• Python, C, C++, Java, Windows

Computer Memory: Registers

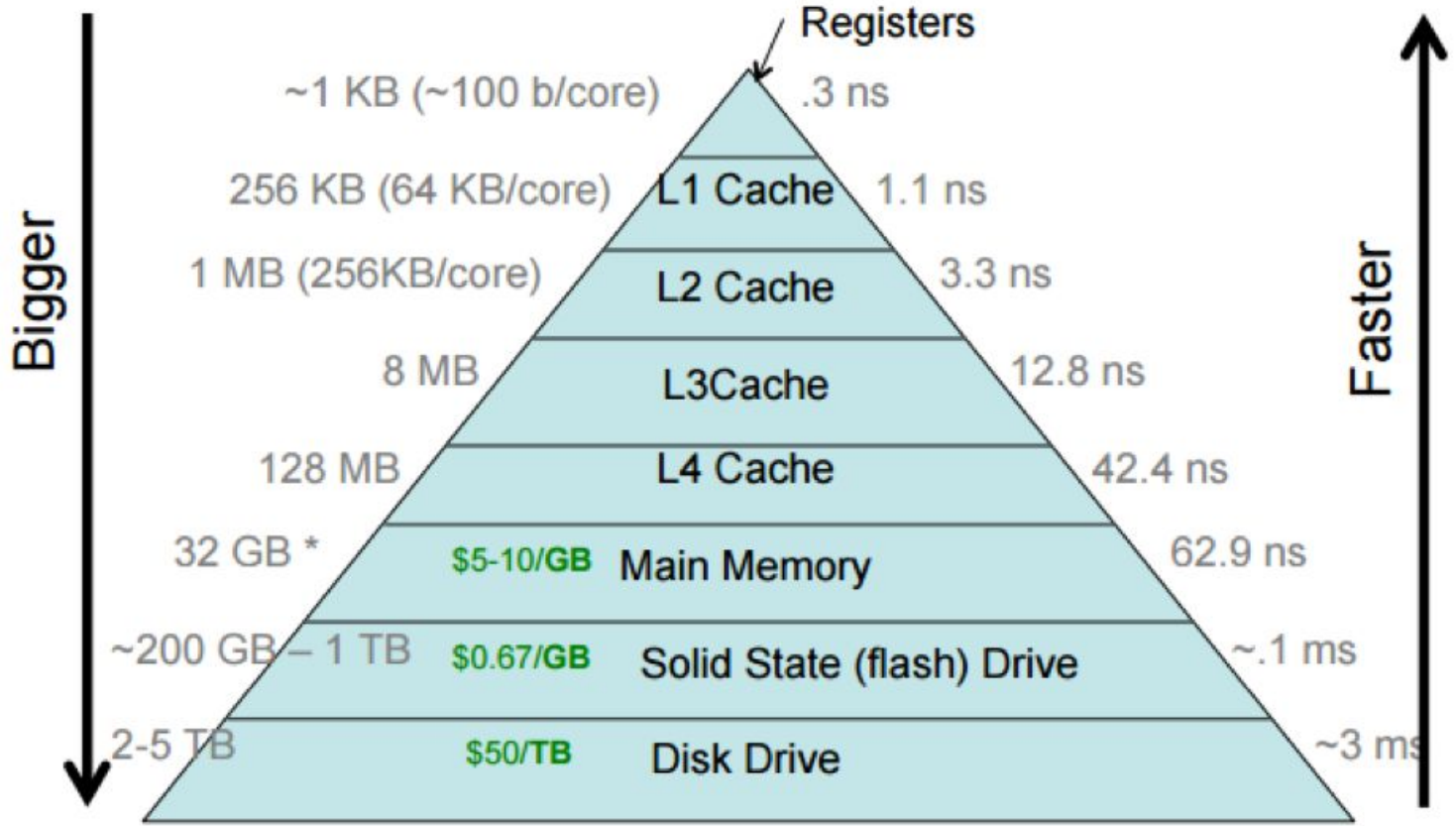
The CPU/“chip” actually does most of the work

- It includes registers,which hold the data that the computer is actively working with
- It’s very small, very fast to access




CPU
Cache
RAM

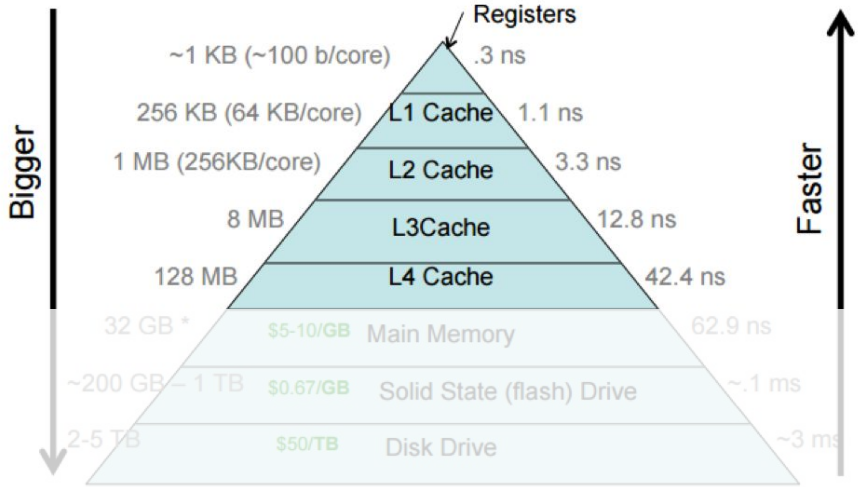
Computer Memory

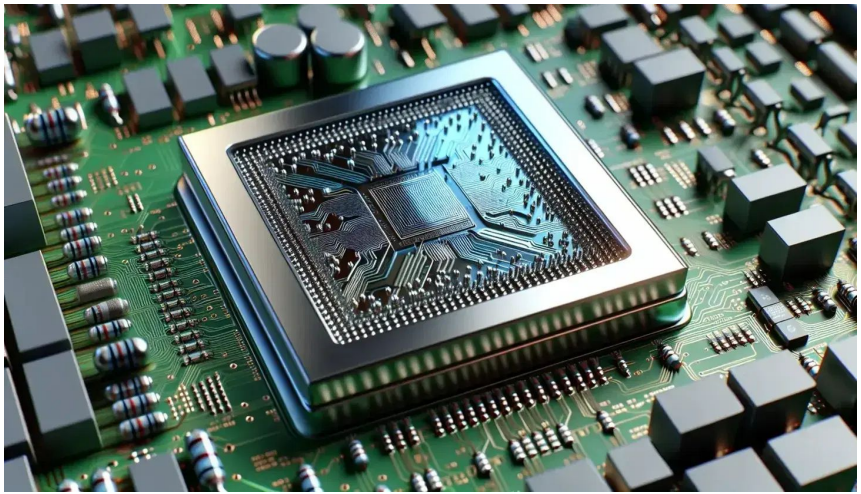


Computer Memory: Caches

The CPU also has several **layers of caches** – fast memory that is actually on the chip

- It helps speed up tasks and make processing faster!

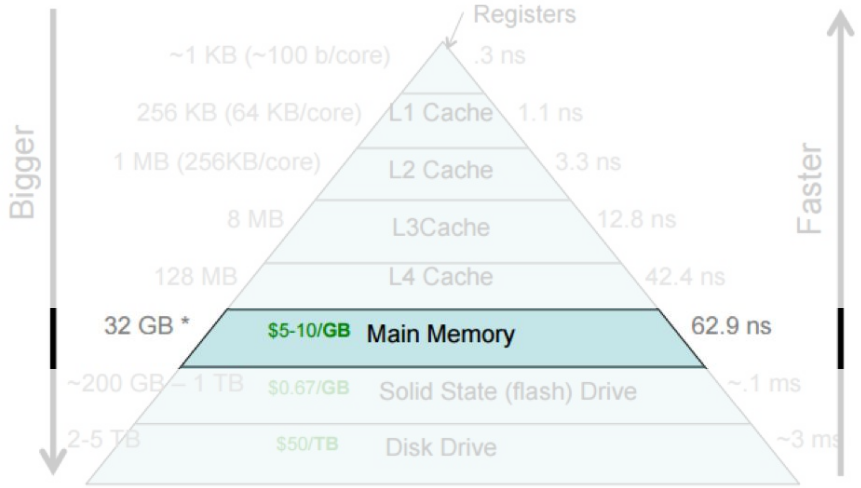


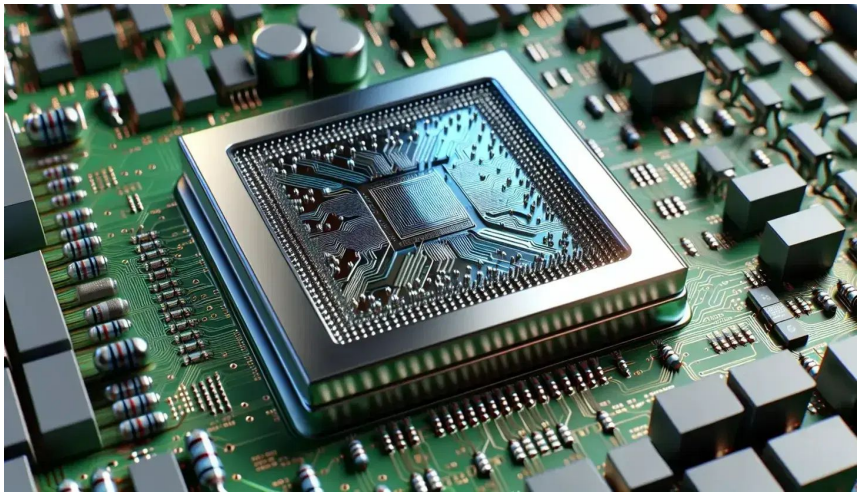


Computer Memory: RAM

The computer also has a **RAM**. It's not on the chip, but is on the motherboard.

- This is **slower** to access than the cache and a bit bigger

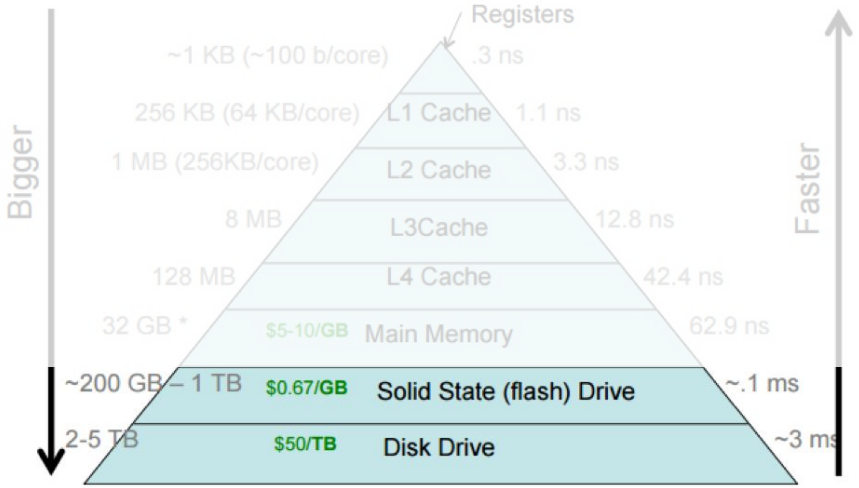


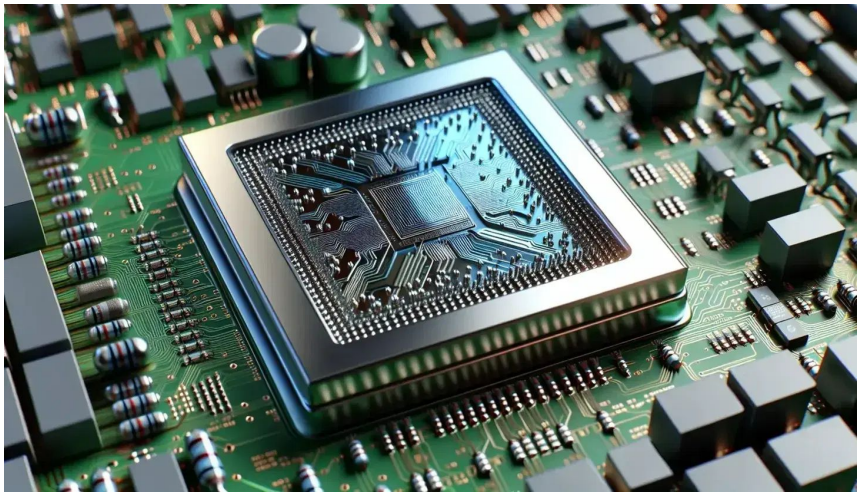


Computer Memory: Drives

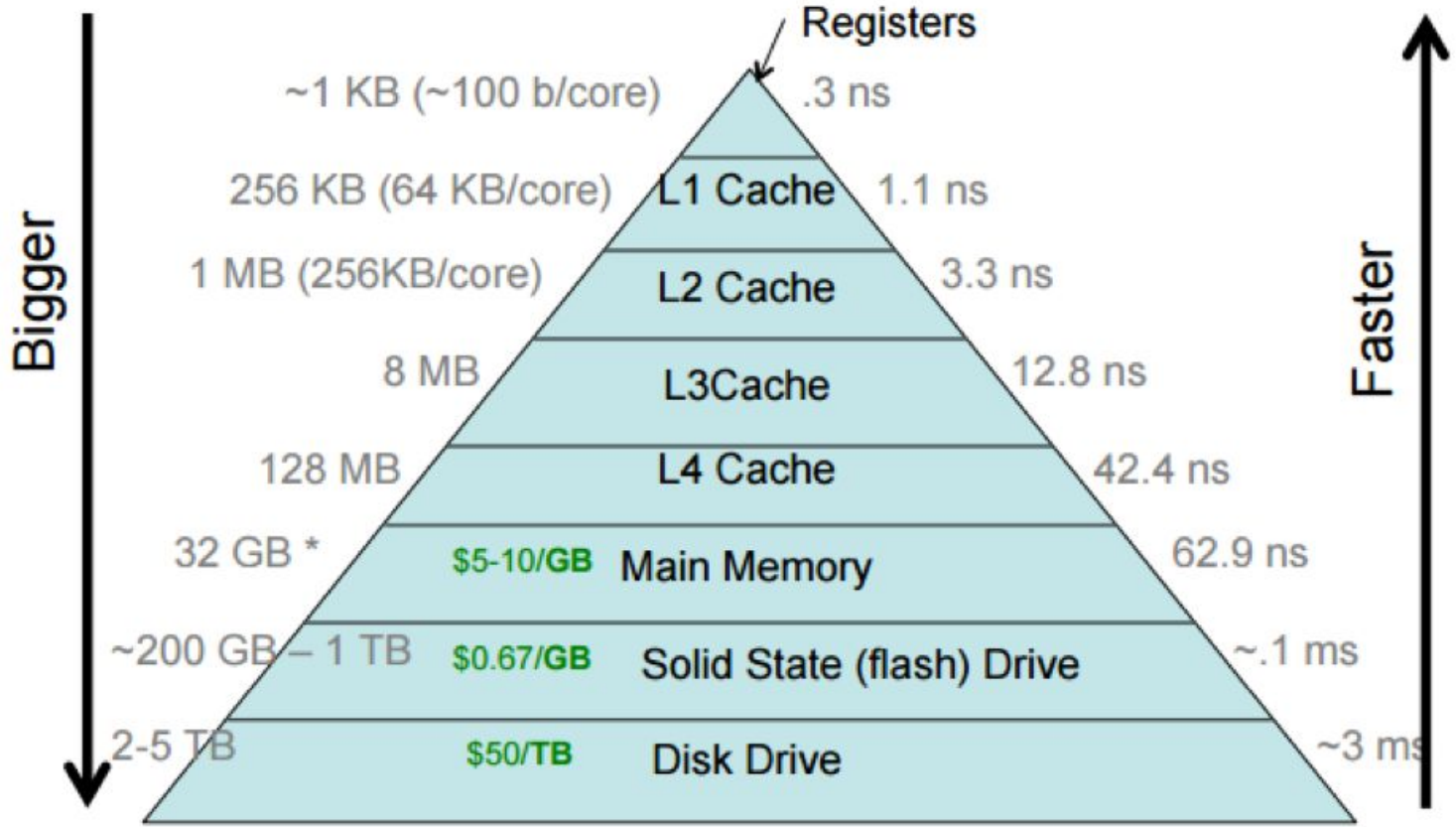
The computer also has a **hard/solid state drive (HDD/SSD)**

- This is very slower to access than the cache/RAM, but much bigger





Computer Memory



Moore's Law

Moore's law

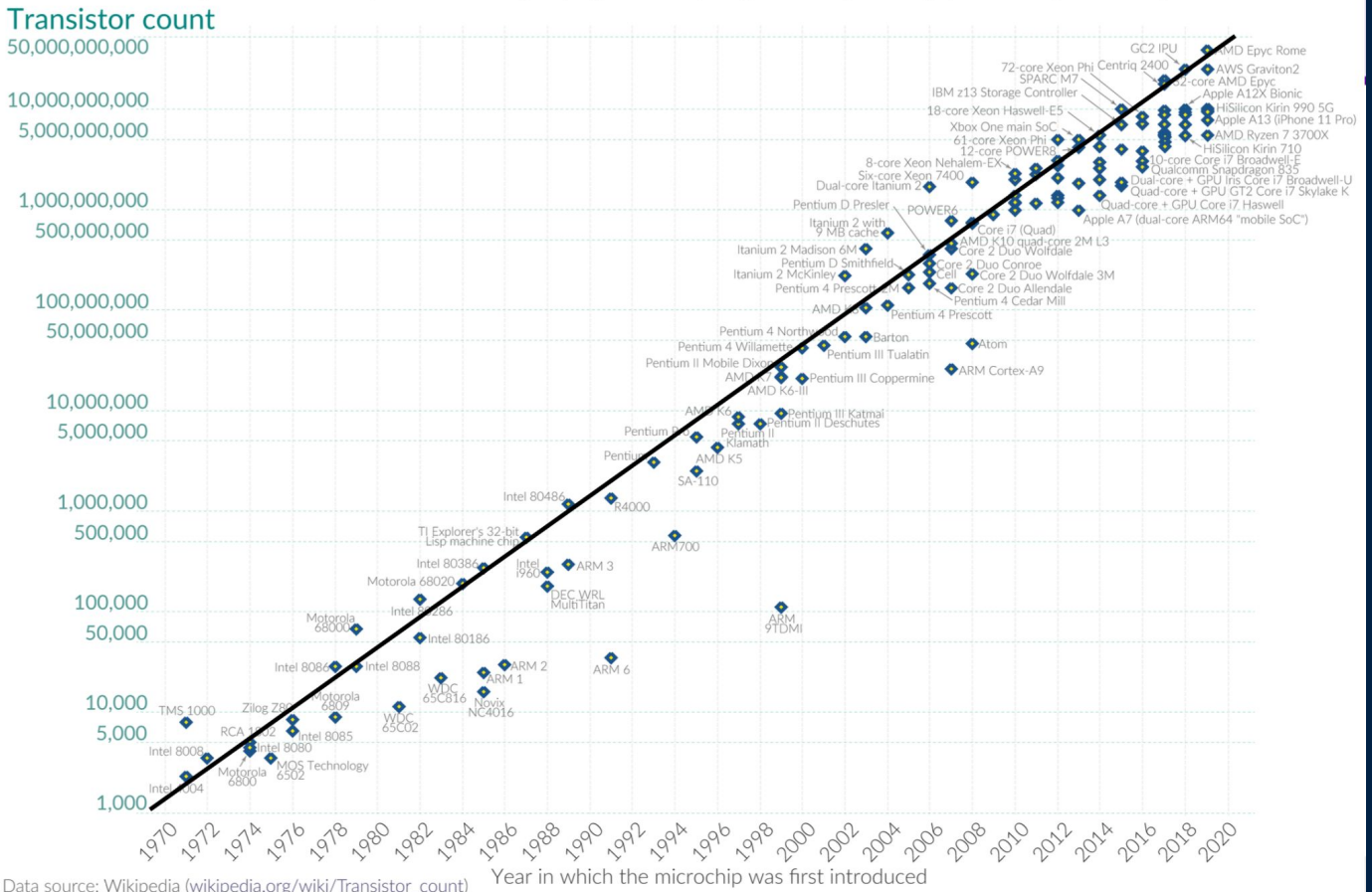
"Intel cofounder Gordon Moore observed in 1965 that every year twice as many [transistors] could fit onto a chip, and in 1975 adjusted the pace to a doubling every two years"

Computer speed and memory on a chip will double every 18 months to 2 years.

Moore's Law: The number of transistors on microchips doubles every two years

Our World in Data

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important for other aspects of technological progress in computing – such as processing speed or the price of computers.



Data source: Wikipedia (wikipedia.org/wiki/Transistor_count)

OurWorldinData.org – Research and data to make progress against the world's largest problems.

Does Moore's Law still hold/valid?

Wrap up

Wrap Up

- Review Wednesday's lecture notes before lab
  - Attend your registered lab section
- Post-class quiz #1
  - Due Sunday, Jan 26
- Complete group contract by Jan 24
  - Find group members in your lab

Take Home Activity

Implications of Technology

Research and discuss the following:

- What are the implications of Apple releasing an iphone every year on people living in the Democratic Republic of Congo?

Metacog. Activity (2 mins)

Reflect on your answers, what did you learn?

- When you use a calculator app on your computer, **where** is the data stored?
- What are the different **types of storage** that exist on your computer?
- What is the **relationship** between an app on your phone and an algorithm?