

# Programming Thinking

## Hardware

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# Plan for this session

- Learn a bit about hardware

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- Try the code editor

# CPU



- It's the part of the computer capable of *computing*.

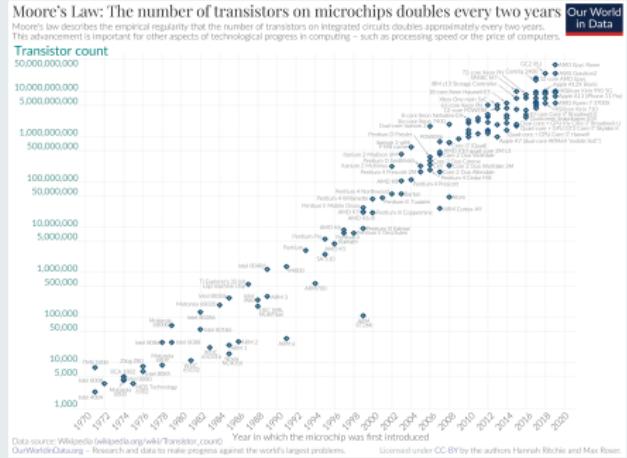
# CPU



- It's the part of the computer capable of *computing*.
- Speed measured in hertz

## Moore's law

*Moore's law is the observation that the number of transistors in a dense integrated circuit (IC) doubles about every two years. Moore's law is an observation and projection of a historical trend. Rather than a law of physics, it is an empirical relationship linked to gains from experience in production.*



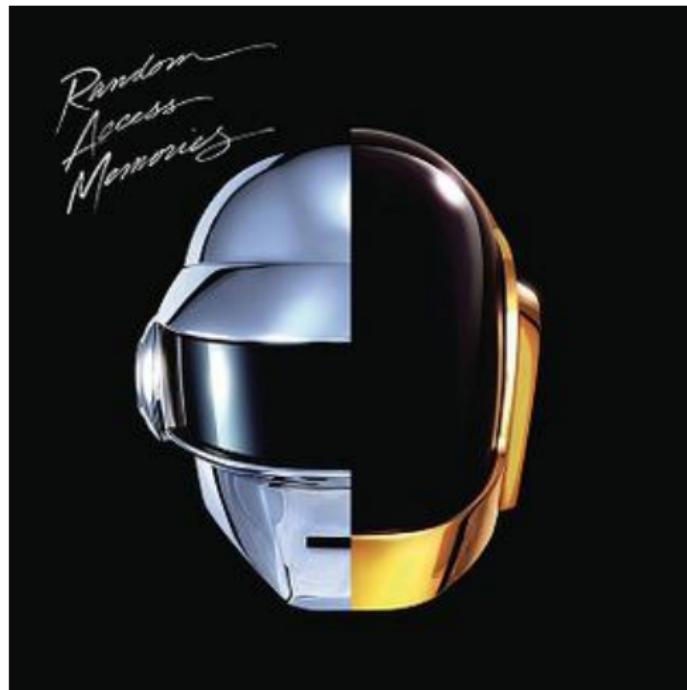
## Moore's law

Nowadays, although the number of transistors in chips is still increasing over the years, the pace has slowed down. The way we're achieving faster speeds nowadays is by having more cores working at the same time.

<http://www.gotw.ca/publications/concurrency-ddj.htm>

# RAM

Not this *Random Access Memories...*



# RAM

But **this** Random Access Memory!



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- Divided in addresses
- Not persistent. *if computer is powered down, contents are lost*
- Fast (Random Access)



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- Slower than RAM
- Higher capacity than RAM

# Recap. What happens when Spyder runs a file?

## Whiteboard

Let's understand what happens in under the hood of our computer when we run a Python file



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- **RAM** is used for the runtime of our programs to hold volatile data
- **HDD / SSD** stores non-volatile data, it's **way** slower than RAM.  
(<http://norvig.com/21-days.html#answers>)