

Programming Thinking

Hardware

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Plan for this session

- Learn a bit about hardware

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- Learn a bit about hardware
- Try the Spyder editor

CPU



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

CPU

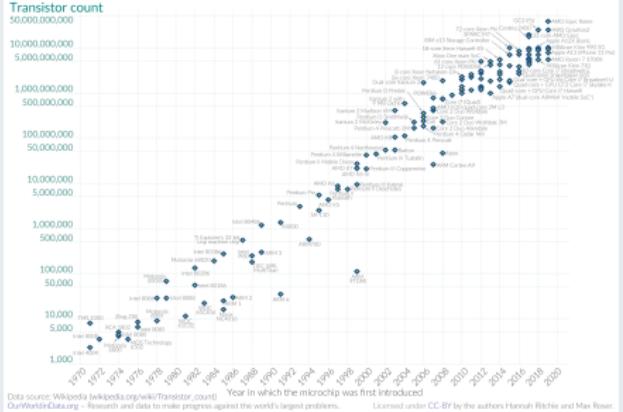


- It's the part of the computer capable of *computing*.
- Speed measured in hertz

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: The number of transistors on microchips doubles every two years
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 (https://en.wikipedia.org/w/index.php?title=Transistor_count)
OurWorldInData.org - Scatter plot data to make progress against the world's largest problems

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!



RAM

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- Not persistent. *if computer is powered down, contents are lost*



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- Think of it like a big shared blackboard
- Divided in addresses
- Not persistent. *if computer is powered down, contents are lost*
- Fast (Random Access)



HDD / SSD

- Hard Disk Drives or Solid State Drives are the long term storage of the computer

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HDD / SSD

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- Slower than RAM



HDD / SSD

- Hard Disk Drives or Solid State Drives are the long term storage of the computer
- Persistent
- Slower than RAM
- Higher capacity than RAM

Spyder



Spyder is the editor we're going to use to develop Python programs.

Spyder

Using Spyder

Spyder lets you edit source code files, and run them. Let's see how to use it!



Recap. What happens when Spyder runs a file?

Whiteboard

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



Review

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- **RAM** is used for the runtime of our programs to hold volatile data

Review

- **CPU** is the *computing* part of our computer
- **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>)