Introduction to computers and programming

SF Free Coding Bootcamp

Before we start

- The goal of this bootcamp is to learn, help each other and make friends.
- It is useful to follow an alternative source of reading material as well, especially in the beginning. A couple of recommendations:
  - A Coursera course on Python (first two courses in this specialization are most relevant).
  - A flash card style learning app which also continually tests you called Sololearn (Thank you, Monty)
- Finally, you should give yourself time to learn.
  - Teach yourself programming in ten years, by Peter Norvig (Google Research).

About me

- I have been writing computer programs, initially only for fun, since 1994.
  - One of my favourite programs was the one which reproduced the telephone ring. I used it to prank my mom who thought that the real phone is ringing!
- My first computer was a 386, and had 0.5 MB of RAM, and 40 MB of Hard Drive space.
  - Your phone is about 10,000 times faster than my first computer
- My first job was at Google, where I developed ranking algorithms for Google News.
- Nowadays, I am learning to write chatbots, and some advanced machine learning concepts - which are required for my work at InMobi.
- I love to run long distances, and my wife claims I cook pastas better than many restaurants!

Computer is a machine

- A machine has buttons and levers. Based on what buttons you press or levers you operate, it does something for you.
- A mechanical computer: Babbage's Difference engine was used to calculate a mathematical function. https://vimeo.com/49080293
- A computer is ***programmable***.

Container Crane: An analogy

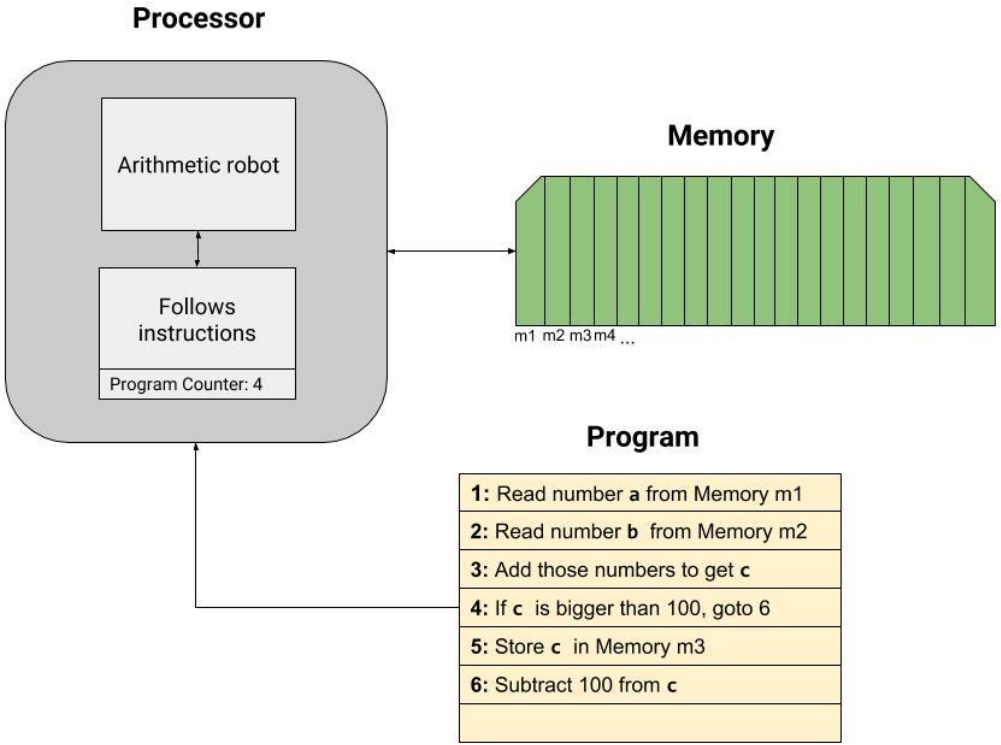
- A container crane is used at shipping docks to move containers to and from the ships.
- Each of the eight levers move the crane in a certain way, or pick up and drop the container.

Image credit: www.forsmw.com

Program to unload a ship’s containers

- Repeat for each container on the ship:
  - Using levers 1 and 2, move the hook on top of that container
  - Descend the hook till you reach the container using lever 3.
  - Attach the container to the hook.
  - Move the hook and the attached container back up using lever 3.
  - Move the hook on top of the space where container is to be placed using levers 1 and 2.
  - Use lever 3 to descend the hook until the container touches the ground or another container.
  - Release the container from the hook using button A.
  - Move the hook back up using lever 3.

A Simplified Computer



What is a modern computer made of?

Image credit: www.energicplus.com

Billions of switches

- A transistor acts as a switch.
  - Invented in 1947 at Bell Labs. It's inventors won the Physics Nobel Prize in 1956.
- A switch can be used to store 0s and 1s.
- A switch can also be used to implement logic circuits.
- Modern phone CPUs have 3 Billion transistors, each 20 nanometer in size. (human hair is 100,000 nanometers wide).
- Look inside a chip: https://www.youtube.com/watch?time_continue=40&v=Fxv3JoS1uY8
- Moore's Law: Transistor count in chips doubles every two years.
  - Gordon Moore was the co-founder of Intel Corporation.

Program

- An ordered list of instructions for the computer to follow.
- Programs can solve real life problems, or can be completely meaningless garbage.
- *Computer Programmers* write programs for computers to run.
- Ada Lovelace (1815 - 1852), an English mathematician, is widely regarded as the first computer programmer.

Do computers speak English?

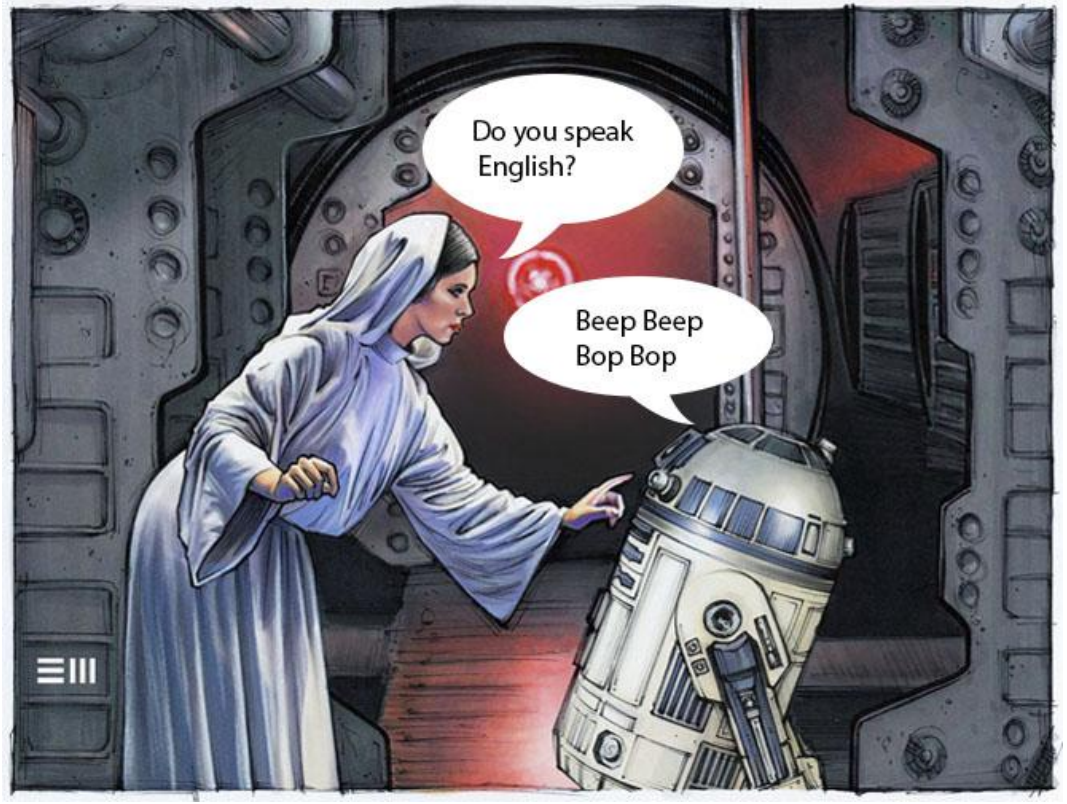


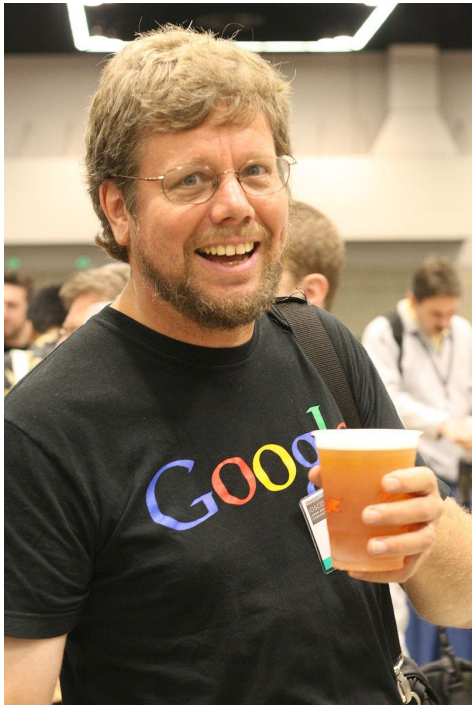
Image credit: Erik-Maell

Programming Languages

- What is a language?
  - the method of communication, either spoken or written, consisting of the use of words in a structured way.
- Computers *only* understand the machine language.
  - Research has shown that humans are bad at learning machine language. (j/k)
- Enterprising people have *designed* new languages which humans can be better at.
- They have also written translators to translate a human readable program to machine language.
- Different languages have different appeal and different sets of features.

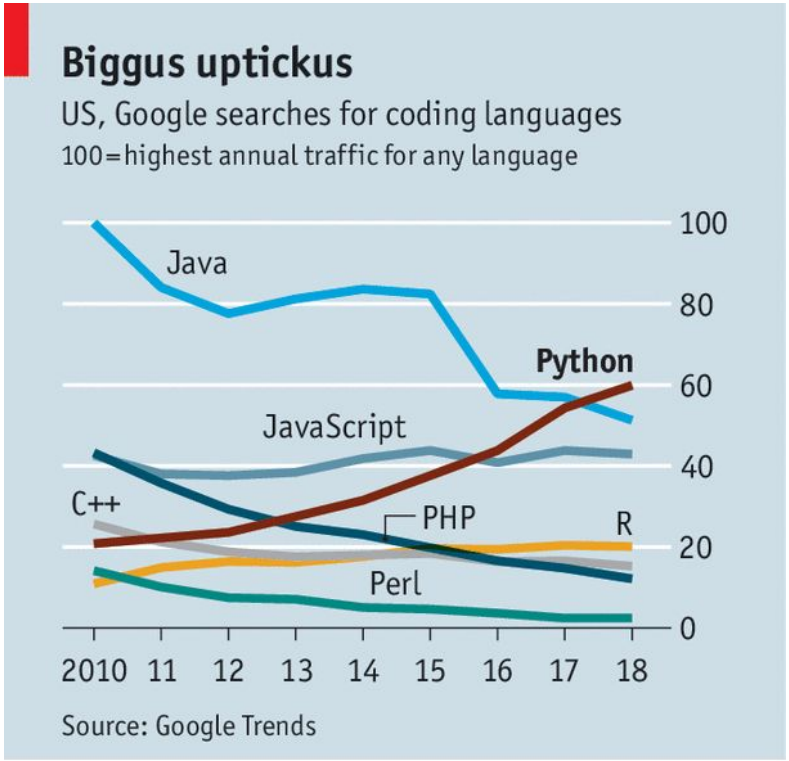
Python Programming Language

- Designed by Guido van Rossum and first released in 1991.
- It is easy to understand.
- Allows programmers to express concepts in fewer lines of code.
- Currently, the most popular language to introduce programming to beginners (I just made this up).
- The language has changed evolved over time, and we will use the latest version (Python 3.6).
- Python 2.x programs don’t work with Python 3.x programs, and vice versa.



Official Title
Benevolent Dictator for life, Python
(since 1995)

Even Economist is interested...



Economist.com

...in writing about the growing popularity of Python.