Computers, Programming, & JavaScript

A gentle introduction
Day 1

What is a computer?

What is a computer?

"A machine that stores and manipulates information under the control of a changeable program"

We put info into a computer >>
the computer transforms info into useful forms >>
outputs/displays for us to interpret/use/enjoy
(any examples?)

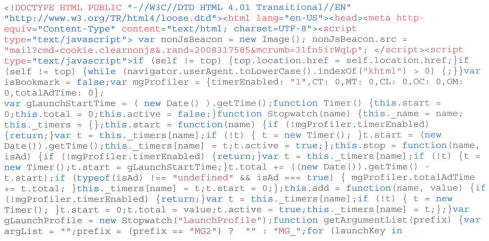
designed to perform a specific task

We provide a set of instructions telling a computer what to do >> the computer executes these instructions (**set of instructions = a program**)

*A computer = a machine for executing **programs***

Programs & programming languages

Programs are like spells: they are carefully composed from symbolic expressions in arcane and esoteric **programming languages** that describe the tasks we want the computer to perform

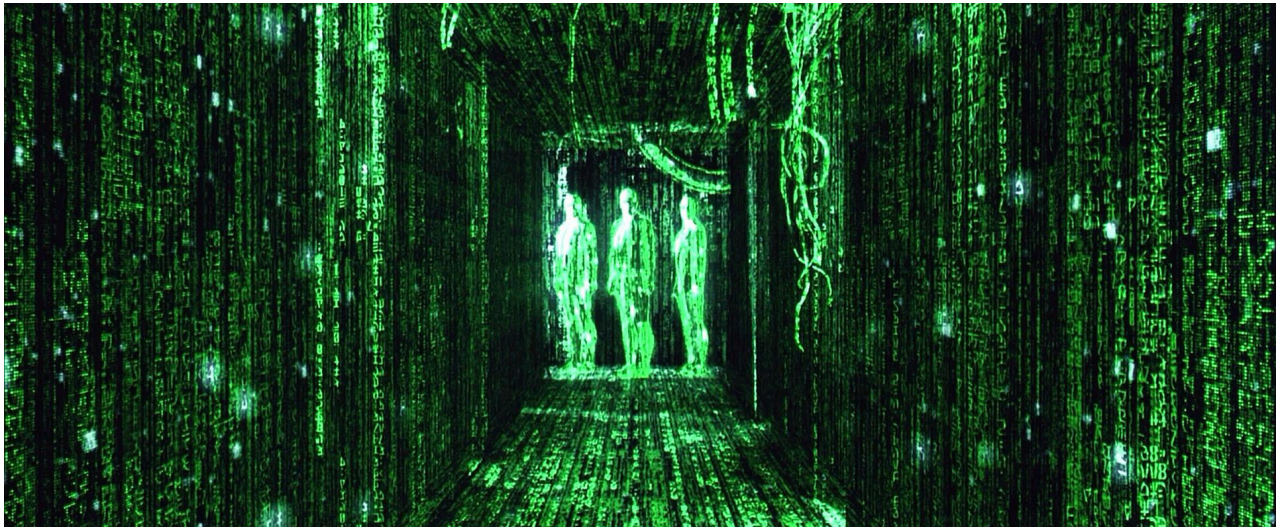


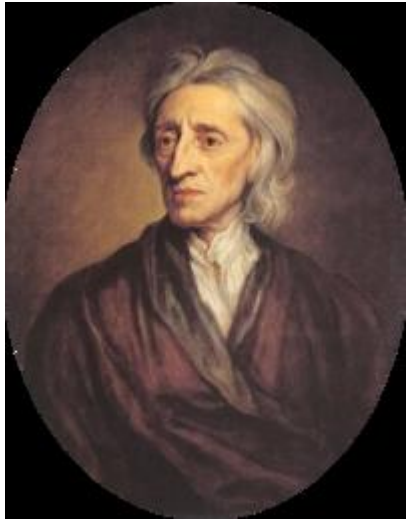
But a programming language is more than just a means for instructing a computer to perform a sequence of tasks...

Programming

Programs represent our ideas...

...What ideas can we express through our code? What kind of ideas?





John Locke, *An Essay Concerning Human Understanding* (1690)

“The acts of the mind, wherein it exerts its power over simple ideas, are chiefly these three:

1. Combining several simple ideas into one compound one, ***and thus all complex ideas are made***.

2. The second is bringing two ideas, whether simple or complex, together, and setting them by one another so as to take a view of them at once, without uniting them into one, ***by which it gets all its ideas of relations***.

3. The third is separating them from all other ideas that accompany them in their real existence: this is called abstraction, ***and thus all its general ideas are made***.”

So what is a programming language?

A programming language is ***a framework within which we organize ideas*** *(about a sequence of tasks)*, and we do that by ***combining simple ideas to form complex ideas***. *We do that with the help of:*

- **primitive expressions**, which represent the simplest entities that language is concerned with
- **means of combination**, by which compound elements are built from simpler ones, and
- **a means of abstraction**, by which compound elements can be named and manipulated as units.

Everything else is just syntax!

Programming = managing complexity

Why do we need programming languages?

Can’t we just use English, Russian, Chinese, or any other *natural language*?

We can’t. Natural language is ambiguous and imprecise.

I saw the man in the park with the telescope

Why do we need programming languages?

I made her duck

1. I cooked waterfowl for her benefit (to eat)
2. I cooked waterfowl belonging to her
3. I created the (plaster?) duck she owns
4. I caused her to quickly lower her head or body
5. I waved my magic wand and turned her into undifferentiated waterfowl

Why do we need programming languages?

- We share a vast sense of common knowledge and experience - which is why we (usually) understand each other
- Computers do not share with us that common knowledge and experience
- Hence, we use special notation: programming languages:
  - **Precise form** (syntax)
  - **Precise meaning** (semantics)
  - *...which is why attention to detail is so important!*
- It is like a “secret” code!
- So we refer to programming as coding or writing code

...to be continued...