



# 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?)

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



designed to perform  
a specific task

*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

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd"><html lang="en-US"><head><meta http-
equiv="Content-Type" content="text/html; charset=UTF-8"><script
type="text/javascript"> var nonJsBeacon = new Image(); nonJsBeacon.src =
"mail?cmd=cookie_clear&nonce=200831758&scrnum=31fns1r9qtp"; </script><script
type="text/javascript">if (self != top) {top.location.href = self.location.href;}if
(self != top) {while (navigator.userAgent.toLowerCase().indexOf("khtml") > 0) {}}var
isBookmark = false;var mgProfiler = {timerEnabled: "1",CT: 0,WT: 0,CL: 0,OC: 0,OW:
0,totalADTime: 0};
var gLaunchStartTime = (new Date()).getTime();function Timer() {this.start =
0;this.total = 0;this.active = false;}function stopwatch(name) {this_name = name;
this_timers = {};this.start = function(name) {if (!mgProfiler.timerEnabled)
{return;}var t = this_timers[name];if (!t) {t = new Timer();};t.start = (new
Date()).getTime();this_timers[name] = t;t.active = true;};this.stop = function(name,
isAd) {if (!mgProfiler.timerEnabled) {return;}var t = this_timers[name];if (!t) {t =
new Timer();};t.start = gLaunchStartTime;t.total += (new Date()).getTime() -
t.start;if (typeof(isAd) != "undefined" && isAd == true) {mgProfiler.totalADTime
+= t.total;};this_timers[name] = t;t.start = 0;};this.add = function(name, value) {if
(!mgProfiler.timerEnabled) {return;}var t = this_timers[name];if (!t) {t = new
Timer();};t.start = 0;t.total = value;t.active = true;this_timers[name] = t;};var
gLaunchProfile = new Stopwatch("LaunchProfile");function getArgumentList(prefix) {var
argList = "";prefix = (prefix == "MG2" ? "" : "MG_");for (launchKey in
```



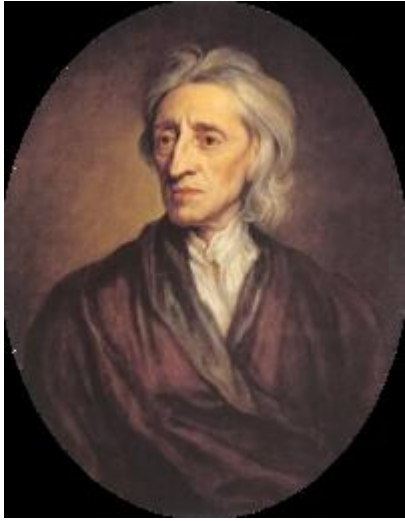
But a programming language is more than just a means for instructing a computer to perform a sequence of tasks...

# 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...*