Scripting Languages

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`sed -e 's/hello/goodbye/'`
Substitutes `goodbye` for occurrences of `hello` in its input

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Or streamed data, so you don't have it in a file

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More general is *awk*, but better is *Perl*

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We'll have a quick look at some Perl code as an exercise in looking at an unfamiliar language

Scripting Languages

Perl

```
open IN, '<', 'infile';
open OUT, '>outfile';
$count = 0;
while (<IN>) {
  s/world/everybody/ if (/hello/);
  print OUT;
  $count++;
}
close IN;
close OUT;
print "$count lines\n";
```

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- and false at end of file
- it assigns to the variable `$_`

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- `s///`: if the string contains `world`, replace it by the string `everybody` (again, using the default `$_`)
- `$count++;` lots of C-like features (as are the `{}` and `;` and `while`, etc.)

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- flexibility over `()` around function arguments

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- and a *lot* more

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Exercise Read about Perl 6, which was such a large step forward(?) from Perl 5 they changed the name of the language to *Raku*

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Exercise Compare

```
$count = "99"; $count++;
```

and

```
$count = "cat"; $count++;
```

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There are several very fat books on Perl

Scripting Languages

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Exercise Read about *PHP*, a language derived from Perl for specifically generating Web pages

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Like many languages, it has grown and adapted over the years

But, still, it not terribly well suited for pure computation, e.g., numerics

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But what about the thousands of people who write Python code to do numerical analysis and machine learning?

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Exercise Compare Python features with Perl features

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Web applications are coded using JavaScript

Scripting Languages

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Standard warning:

> Java and JavaScript are **very different** languages

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But you shouldn’t take this analogy too far

Scripting Languages

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function inc(n) { return n+1; }
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We need to be aware of both syntax and semantics when thinking about programming languages

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- JScript: Microsoft
- ActionScript: Adobe

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- JScript: Microsoft
- ActionScript: Adobe

Ecma: formerly *European Computer Manufacturers Association*, now just "Ecma International", is a standards body

Scripting Languages

JavaScript

```
function getdoc()
{
   var input = document.getElementById("num");
   var num = input.value;

   if (parseInt(num) == num && num > 0 && num < 5000) {
     document.location = "http://www.rfc-editor.org/rfc/rfc"
                         + num + ".txt";
   }
   else {
     alert("Not a valid RFC number!");
     input.value = "";
   }
   return false;
}
```

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- functions declared by `function`, no type annotations
- variables declared by `var` or `let`, no type annotations
- any variable can hold items of any type
- syntax reminiscent of Java (and C and so on)

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Exercise Have a look at *asm.js*, a subset of JavaScript that limited the worst excesses of JavaScript (now deprecated)

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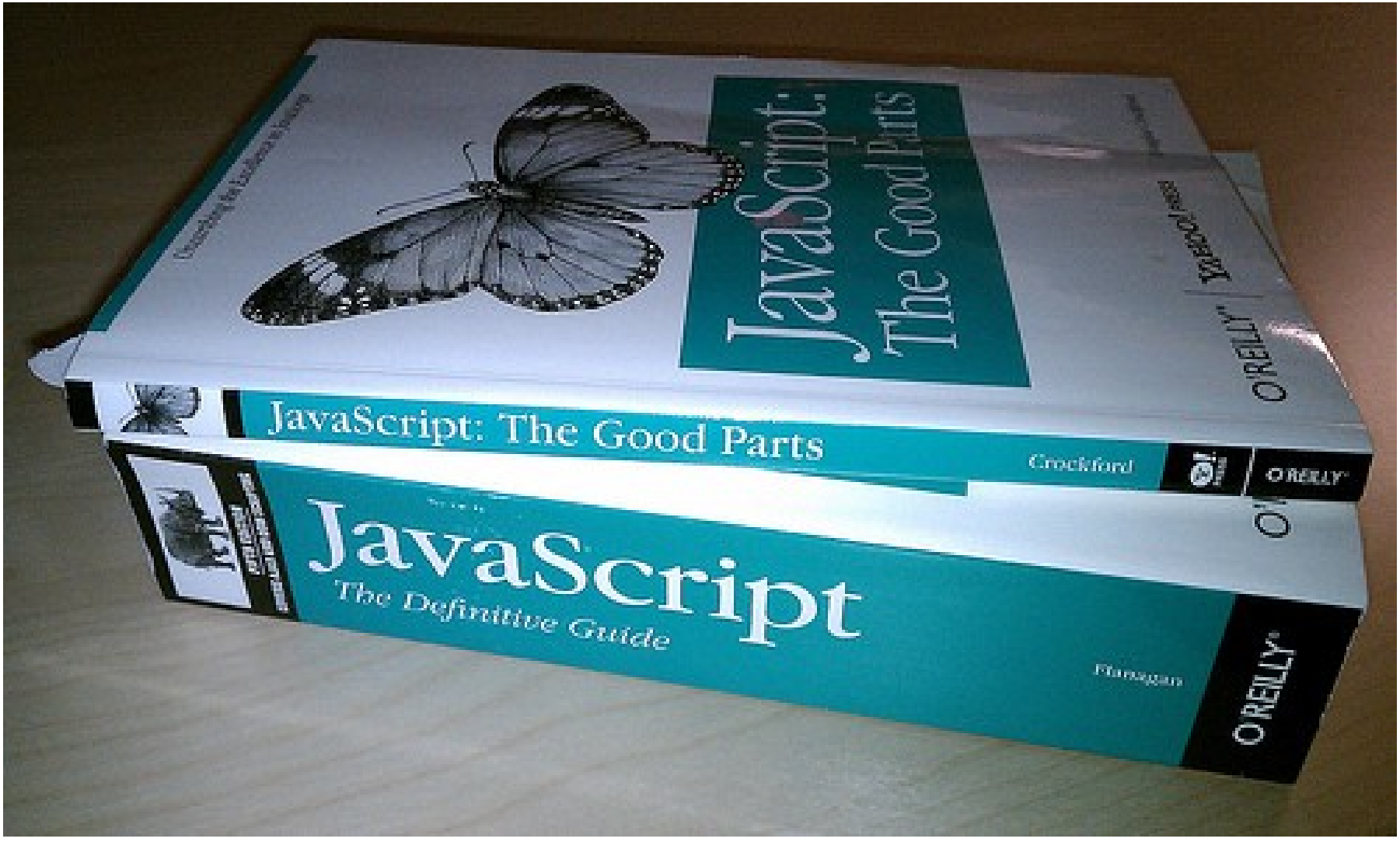
We shall be talking more about JavaScript when we examine OO in detail, but, for example, JavaScript does not have classes

Scripting Languages



JavaScript books; source: Filip Sufitchi

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source	$\longrightarrow$	WASM	$\longrightarrow$	machine code
	compiler	delivery	compiler	executed

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Exercise This that a good idea?

The future of the Web may not be with JavaScript!

Event Driven Languages

Purpose: interactive systems

Examples: Visual Basic, Simula, SPICE, Java Swing, Tcl/Tk, Qt, GTK, . . .

NB: most of these are event-driven libraries used by existing languages

Notable features: based on the idea of having code executed as a consequence of something (an event) happening, rather than in some pre-specified order

Event Driven Languages

Feet

- Visual Basic: You do a Google search on how to shoot yourself in the foot. You find seventeen completely different ways to do it, none of which are properly structured. You paste the first example into the IDE and compile. It brushes your teeth

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- Visual Basic: You do a Google search on how to shoot yourself in the foot. You find seventeen completely different ways to do it, none of which are properly structured. You paste the first example into the IDE and compile. It brushes your teeth
- Visual Basic (2): You'll really only *appear* to have shot yourself in the foot, but you'll have so much fun doing it that you won't care.

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E.g., Facebook's React library

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Typically the code contains a *main loop* that waits for events (key presses, mouse clicks, temperature limits reached, data packets arriving, clock timeouts, etc.) which then chooses which chunk of code (*event handler*) to run in response

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```
while (FAMNextEvent(&fc, &fe)) {
    if (fe.code == FAMExists || fe.code == FAMEndExist)
      continue;
    t = time(NULL);
    tm = localtime(&t);
    strftime(buf, 32, "%H:%M:%S", tm);
    printf("%s %s: %s\n", buf, trim(fe.filename),
                          event[fe.code]);
}
```

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Also very important in *simulation*

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These events trigger some behaviour, e.g., molecules change direction of travel, tanks explode

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These events trigger some behaviour, e.g., molecules change direction of travel, tanks explode

Widely used in a huge variety of situations

So there are lots of simulation specific languages, e.g., Simula, SPICE, and so on