Literate Programming

why it matters, and how to make it easy

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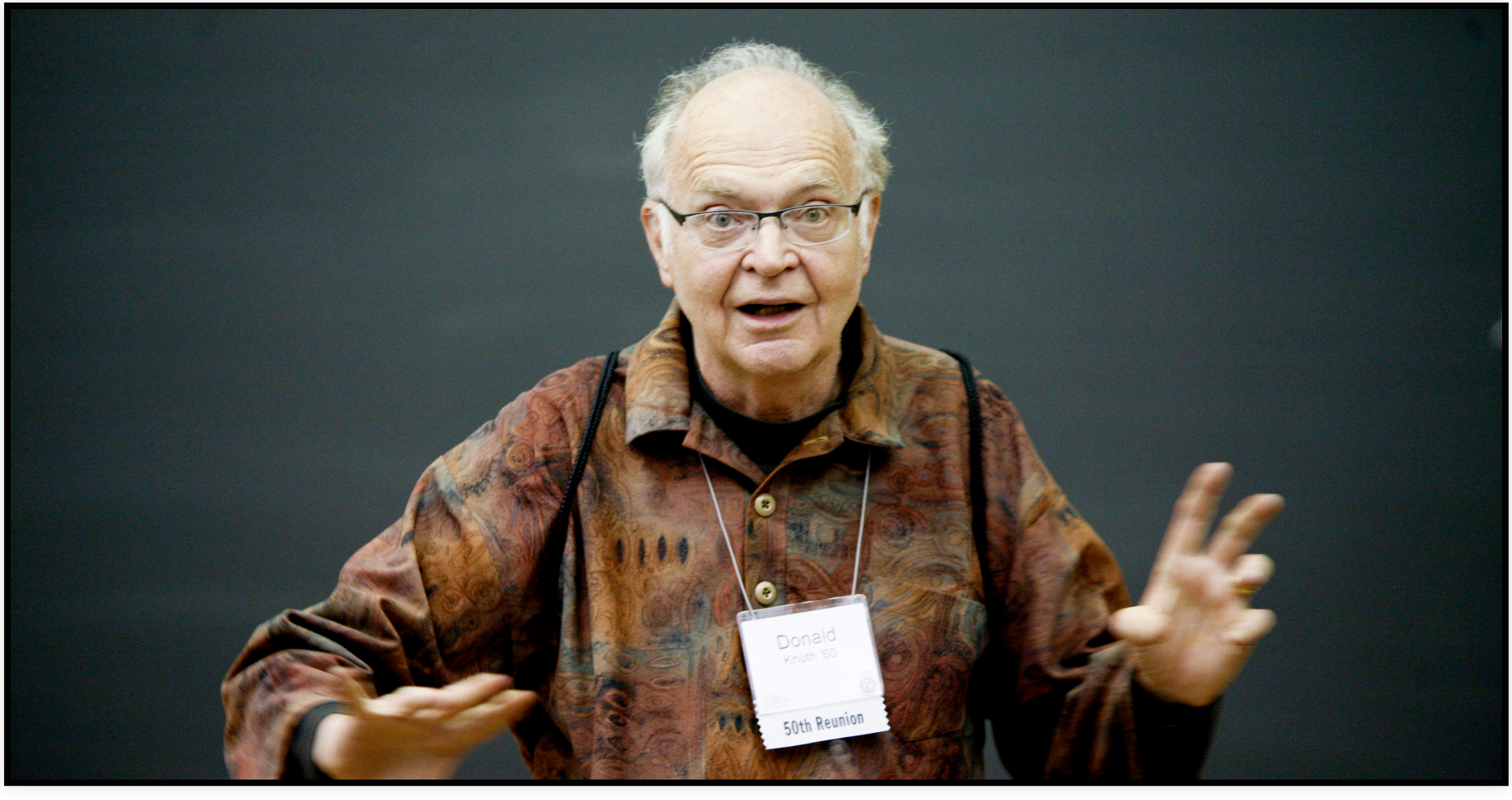
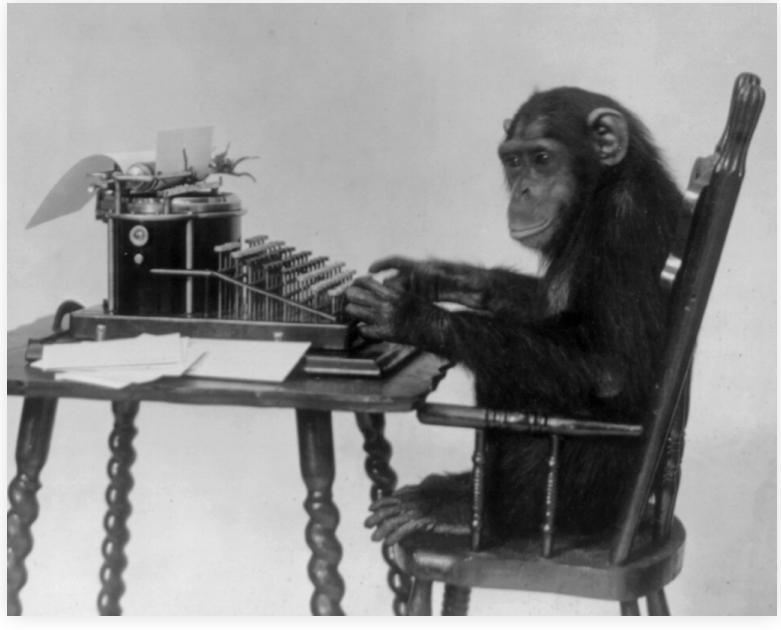
Literate Programming

Donald Knuth



Donald Knuth

Why *Literate programming*?



... nobody wants to admit writing an illiterate program ...

Motivation

scientific rigour

Should extend to **software** → “Open Science”

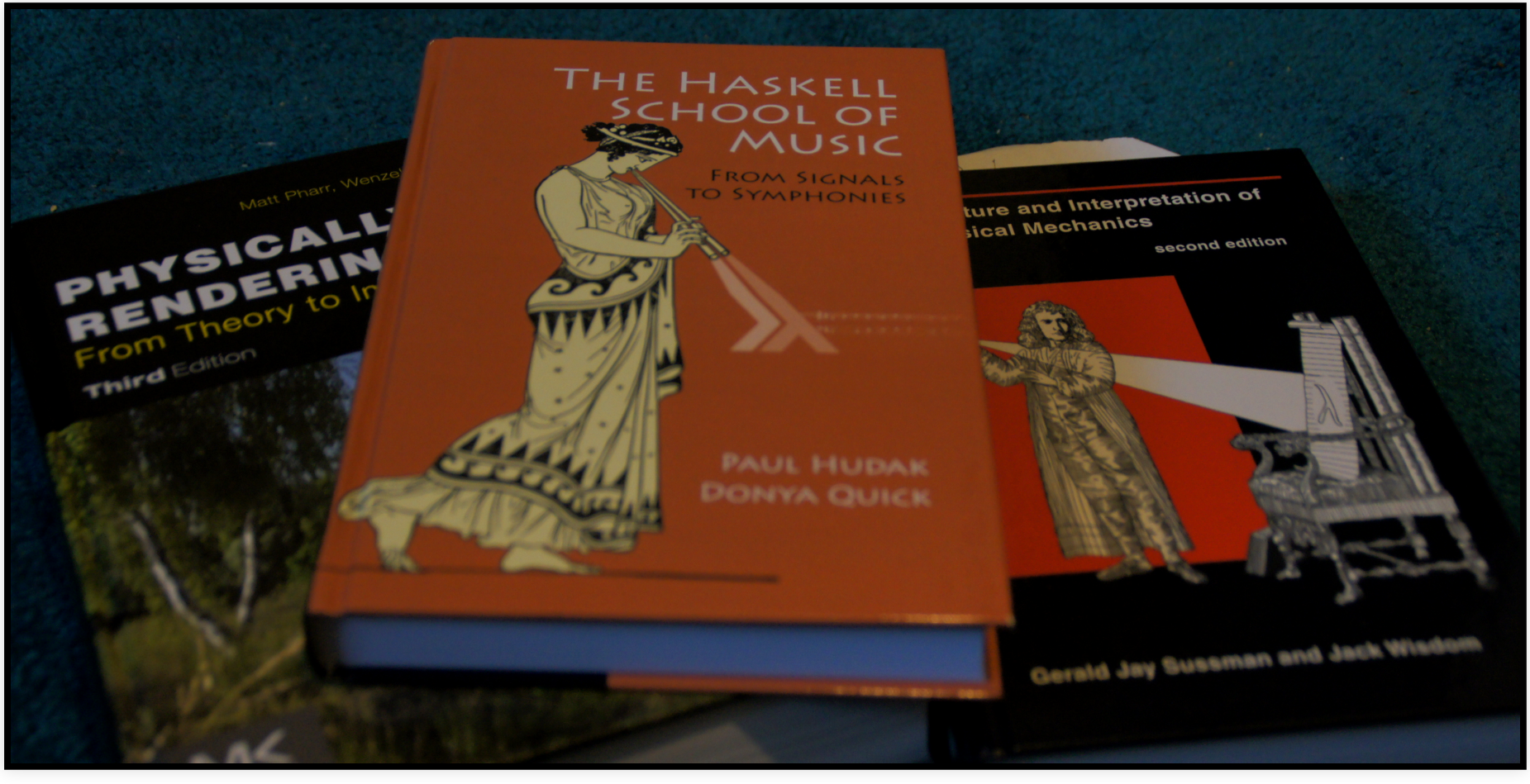
epistemology

Explain it to a six-year old

programming literacy

Read other people’s code

Books



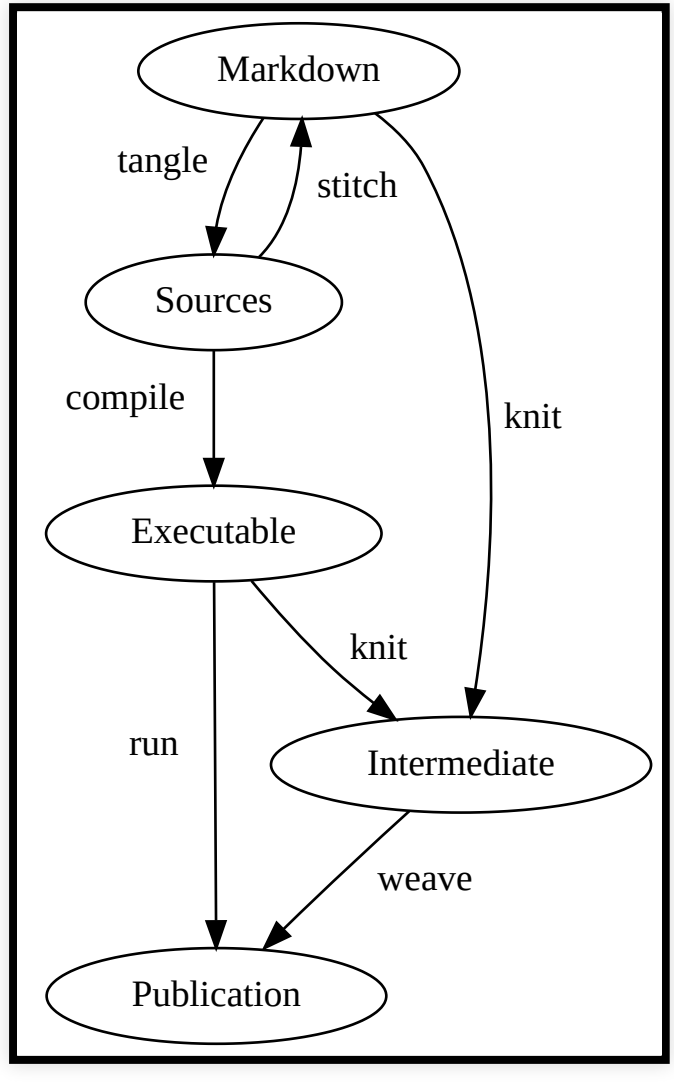
A sample of books using LP

Existing tools

- Noweb
- Emacs Org-mode
- KnitR
- Jupyter

Tools and workflow

- Pandoc
- Lua filters
- Entangled



Hello, World!

Introduction

- This example is written in a style of *literate programming* (Knuth 1984).
- We use a system of references known as *noweb* (Ramsey 1994).

References

- References inside code blocks: **<<...>>**

file: «hello_world.cc»=

```
#include <cstdlib>
#include <iostream>

<<example-main-function>>
```

References

- Code-blocks have names

«example-main-function»=

```
int main(int argc, char **argv) {
  <<hello-world>>
}
```

«hello-world»=

```
std::cout << "Hello, World!" << std::endl;
```

References

- And can be appended to

«hello-world»=+

```
return EXIT_SUCCESS;
```

Tangling

- Code blocks are *tangled* into source files.

file: «hello_world.cc»=

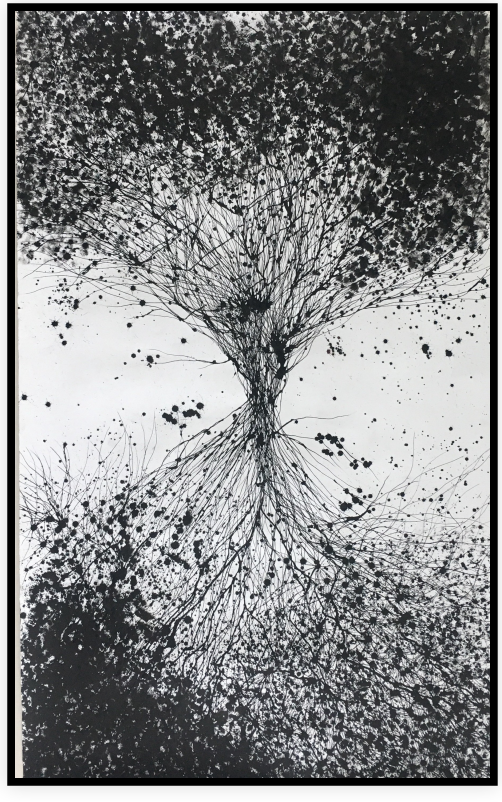
```
#include <cstdlib>
#include <iostream>

int main(int argc, char **argv) {
    std::cout << "Hello, World!" << std::endl;
    return EXIT_SUCCESS;
}
```

Entangled

Entangled

- Tangle and stitch
- Editor independent
- Language independent
- jhidding.github.io/enTangleD



Bibliography

Knuth, Donald Ervin. 1984. “Literate Programming.” *The Computer Journal* 27 (2): 97–111.

Ramsey, Norman. 1994. “Literate Programming Simplified.” *IEEE Software* 11 (5): 97–105.