

Software Development with C++

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Programming is in
top 5 most useful
skills gained by PhDs

A photograph of a modern university building's interior. The space is multi-story with glass railings. The walls are painted in a vibrant red color. The ceiling is white with exposed structural beams and lighting fixtures. The floor is made of polished tiles. In the background, there are rows of red chairs arranged in a lecture hall setting.

**“48% were employed
in universities.”**

- STFC PhD Careers

Our Aim: “mpags-cipher”

Develop a command line application using the C++ programming language to encrypt/decrypt simple text messages using classical ciphers.

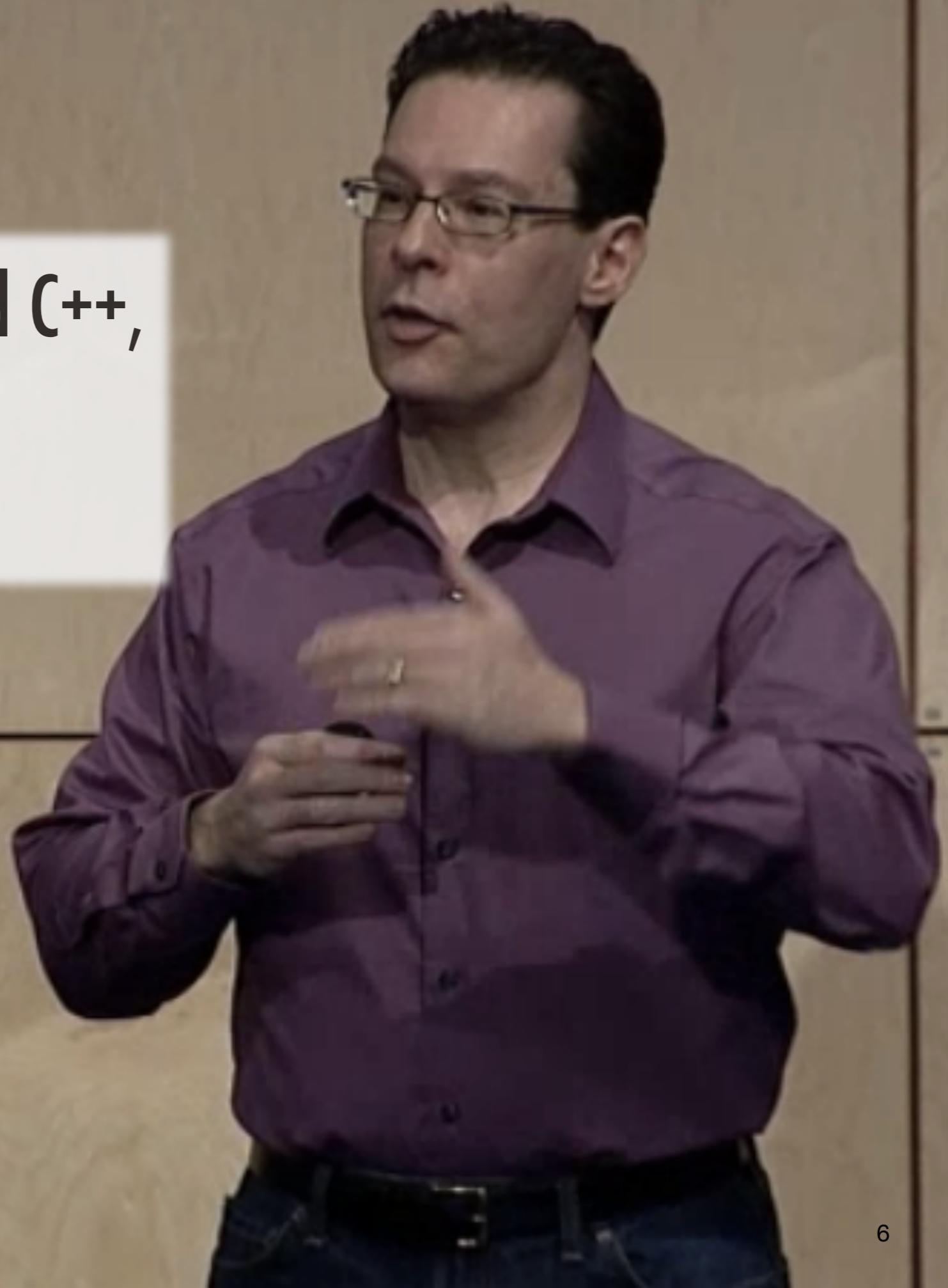
Requirements

- Read Plaintext from Keyboard or File
- User select of Cipher, Key and whether to Encrypt/Decrypt
- Provide Encryption/Decryption via
 - Caesar Cipher
 - Playfair Cipher
 - Vigenere Cipher
- Write cipher text to Screen or File



**“The world is built on C and C++,
did you know that?”**

- Herb Sutter



lambdas

`[]{foo();}`

`constexpr`

initializer lists

`regex`

C++11

`nullptr`

`std::shared_ptr<T>,
std::unique_ptr<T>,
std::weak_ptr<T>`

`auto i = v.begin();
for(x : collection)`

“Not Your Parents’ C++” - Herb Sutter

lambdas

□ {foo();}

constexpr initializer lists

regex

C++98

shared_ptr<T>,
unique_ptr<T>,
weak_ptr<T>

auto i = v.begin();
for(x : collection)

“Your Parents’ C++” - Existing Code

generic lambdas

[](auto x){foo(x);}

C

++

14

binary literals

auto bin = 0b0100;

digit separators

auto i = 1'000;

deduced return types

for(x i : collection)
auto myFunc();

“Your Children’s C++” - New Code

1. Procedural C++

2. Procedural C++ 2

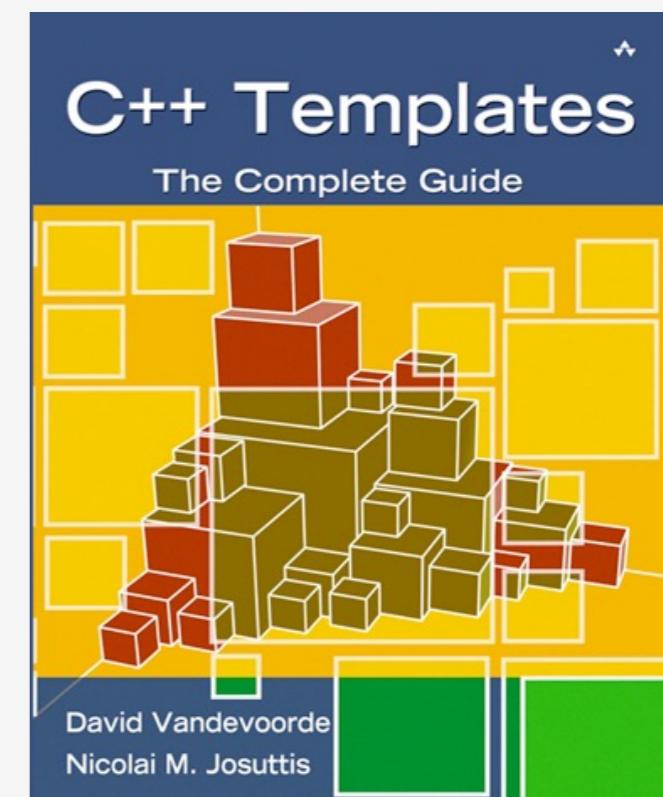
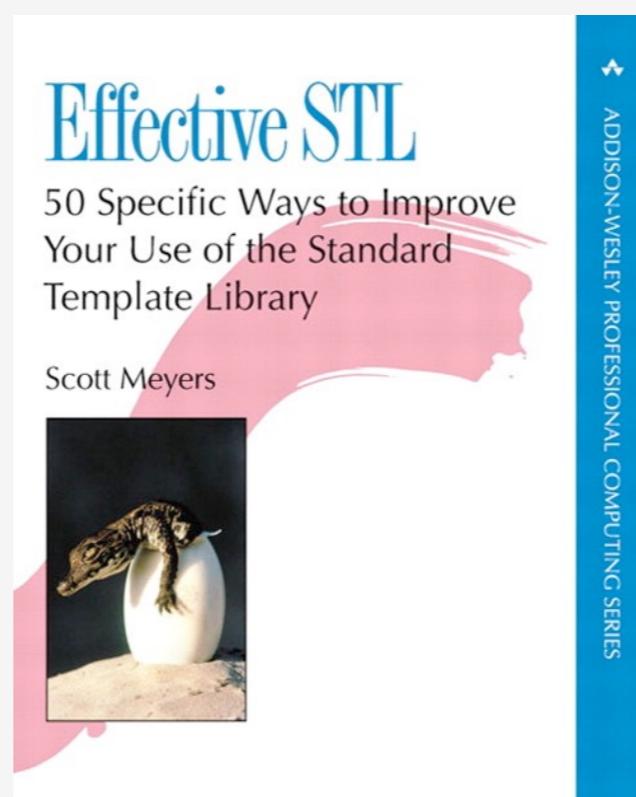
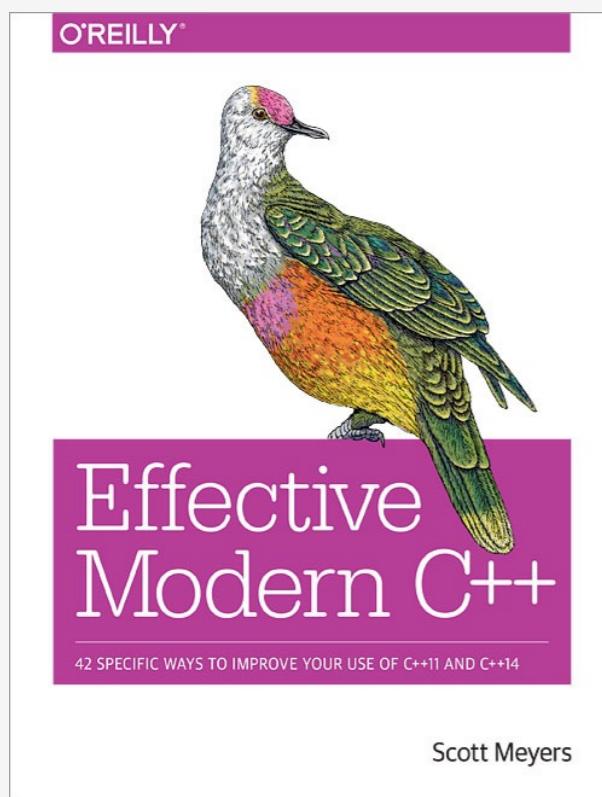
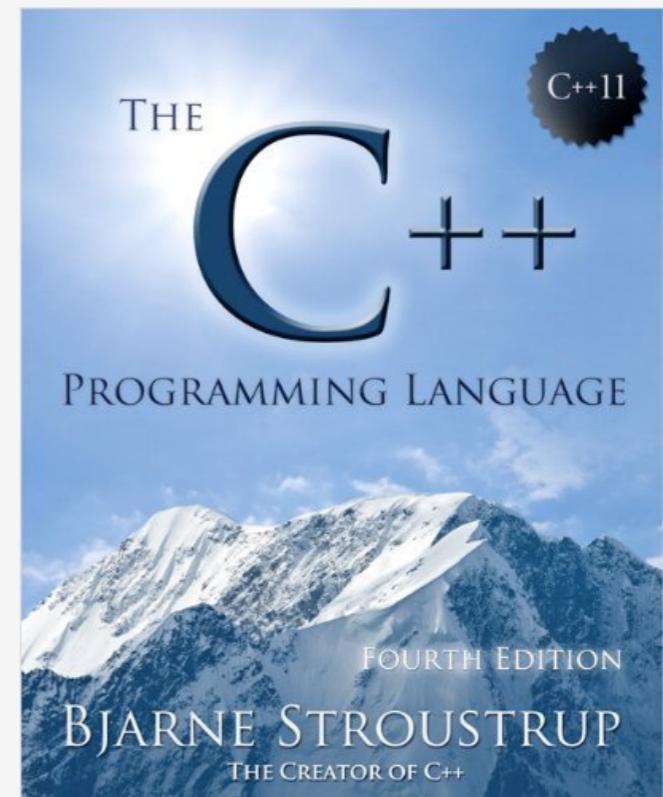
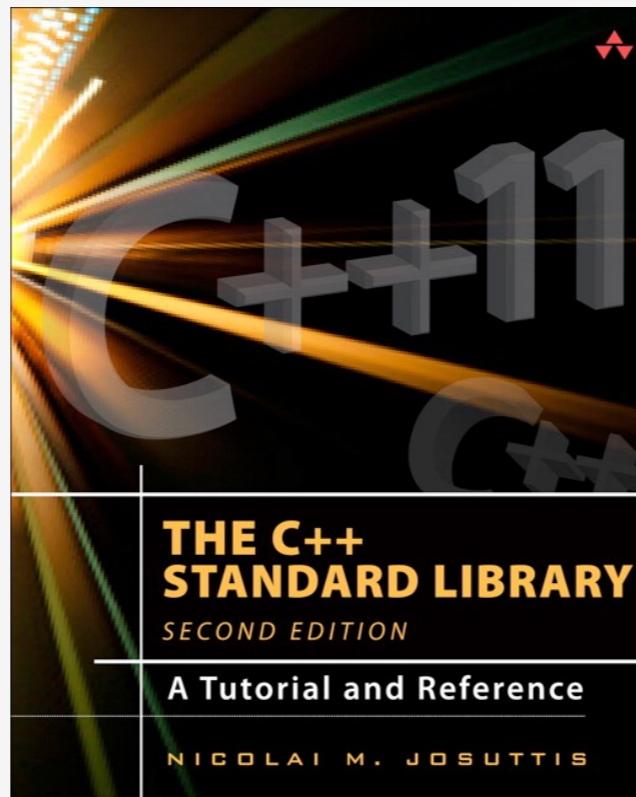
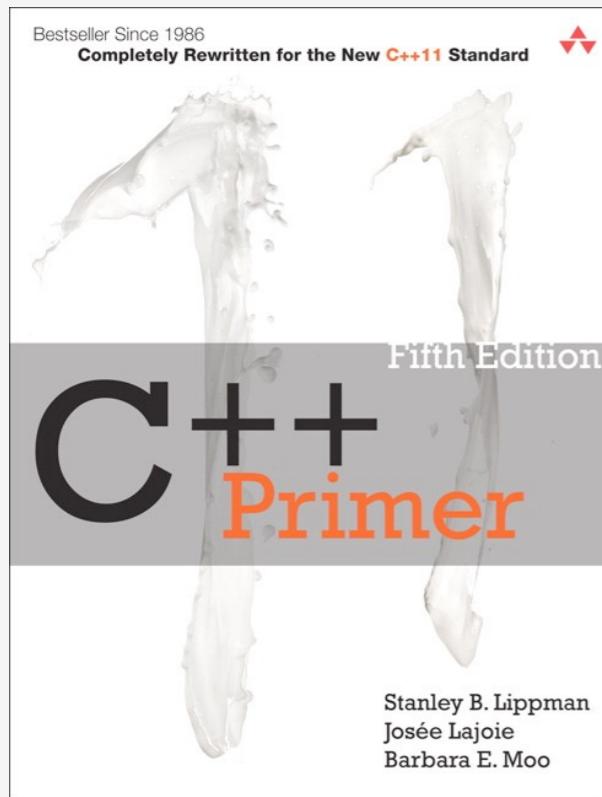
3. Object Oriented C++ 1

4. Generic C++ and the STL

5. Object Oriented C++ 2

```
int main(int argc, char *argv[])
{
    int result = calculate_foo();
    return 0;
}
```

```
int main(int argc, char *argv[])
{
    FooCalculator foo;
    int result = foo.calculate();
    return 0;
}
```



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News, Status & Discussion about C++

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Working Draft of the next standard

github

Current ISO C++ status

Upcoming ISO C++ meetings

Compiler conformance status

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C++ FAQ

Welcome to the C++ Super-FAQ!

What's "Super" about this FAQ? In part it's because this is a merger of two great FAQs: Marshall Cline's C++ FAQs, and Bjarne Stroustrup's C++ FAQ. And in part it's because this is a wiki being continuously updated for modern C++. There are some FAQ topics not yet updated; if you spot one, suggest an improvement using the link on the bar for that FAQ.

[cppreference.com](#)

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CppCon 2015
It's the annual, week-long face-to-face gathering for the entire C++ community. [Register now!](#)

C++ reference
C++98, C++03, C++11, C++14

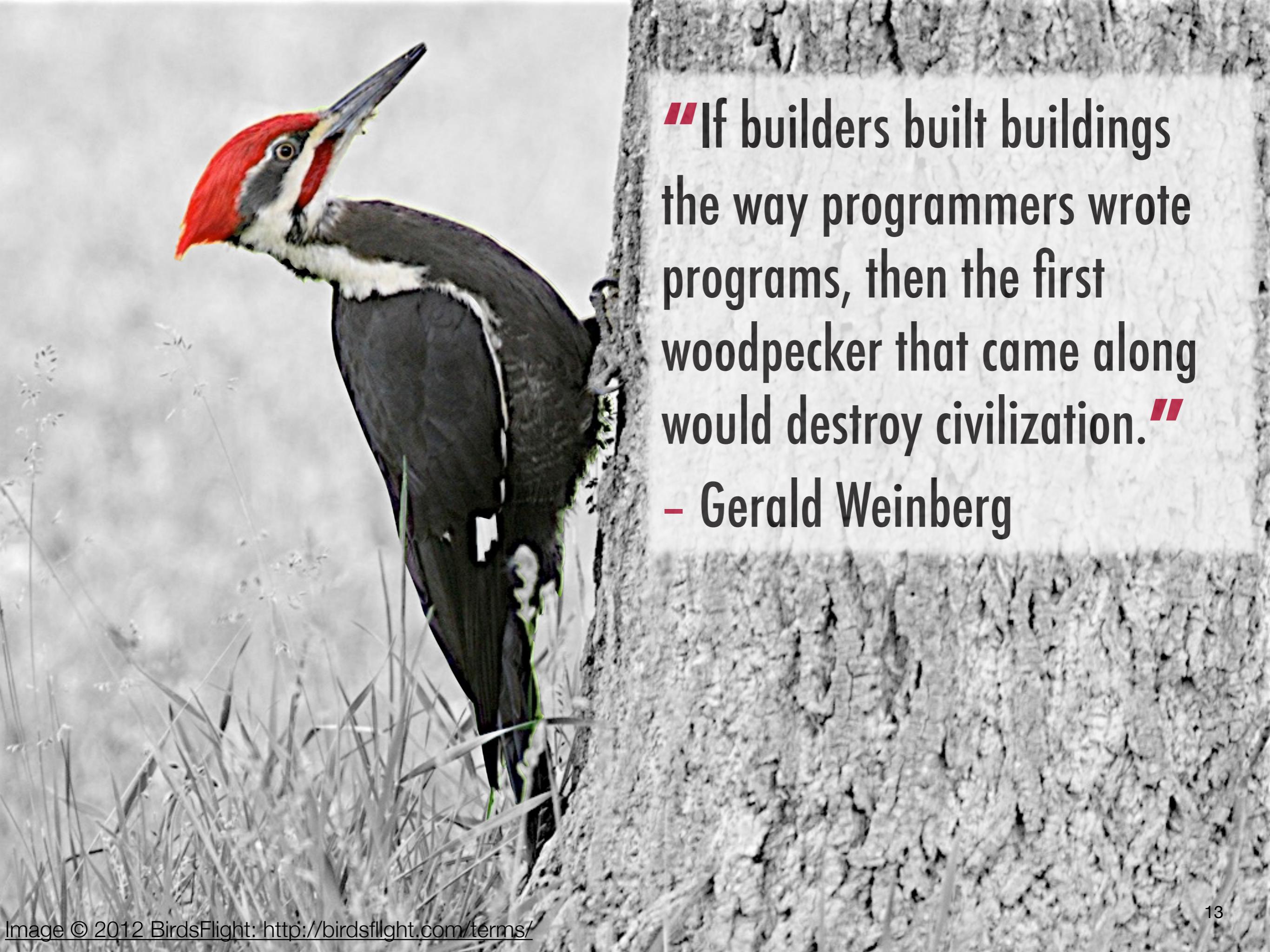
[Strings library](#) [Input/output library](#)



Programmers Q&A

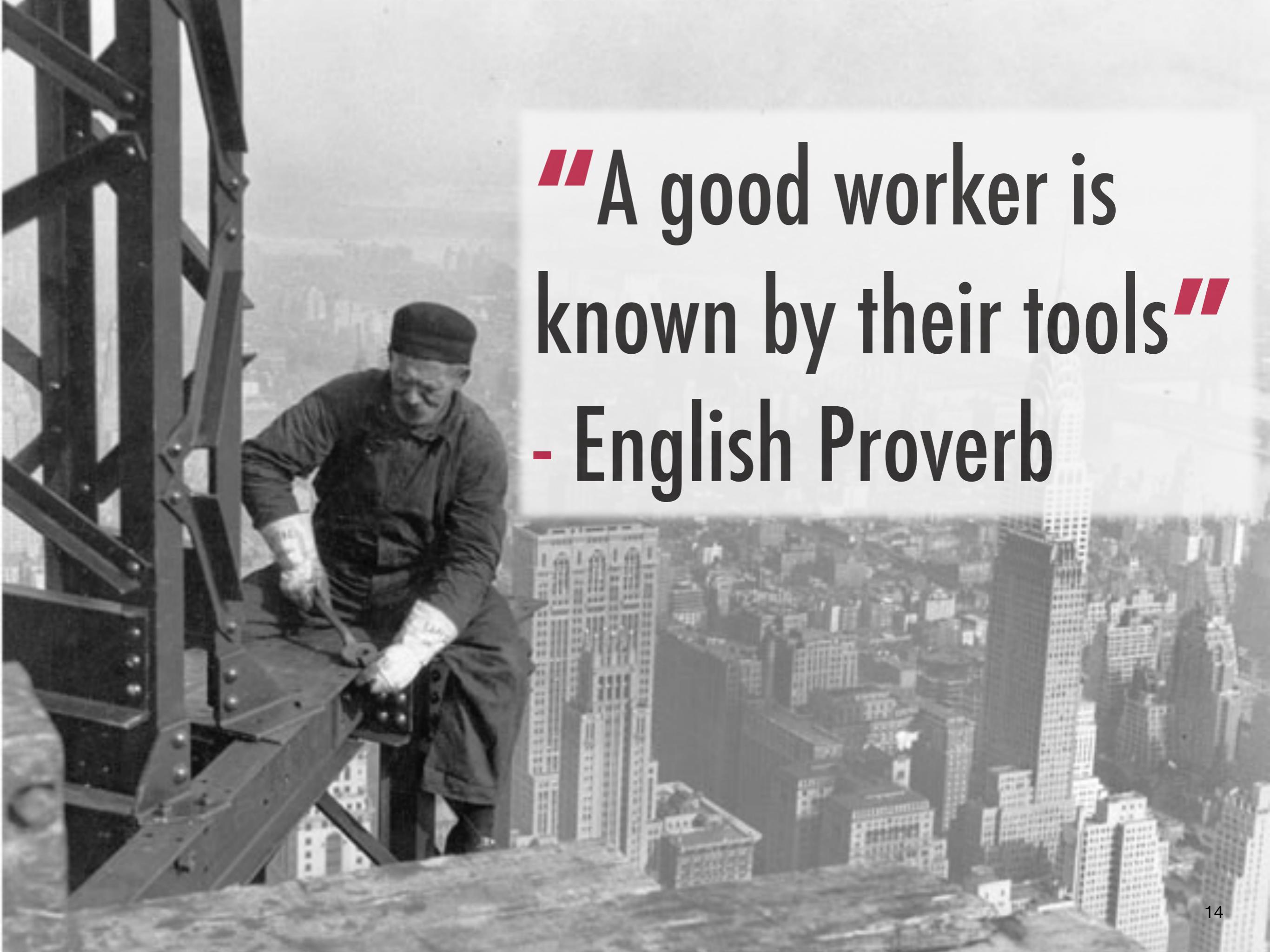


C++ Online Resources



**“If builders built buildings
the way programmers wrote
programs, then the first
woodpecker that came along
would destroy civilization.”**

– Gerald Weinberg



**"A good worker is
known by their tools"**

- English Proverb

1. Storing code and changes
(Git/Design)



2. Automating builds
(Compiler/CMake)

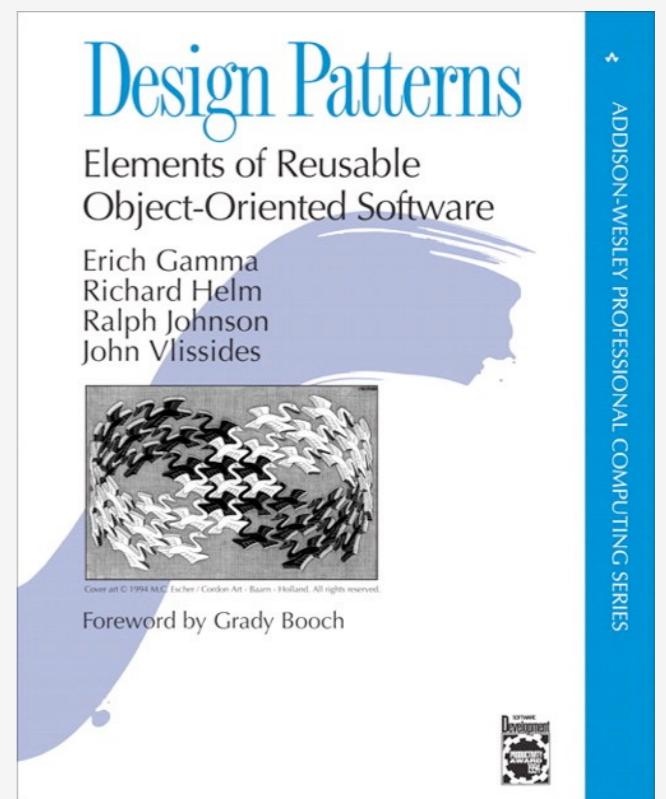
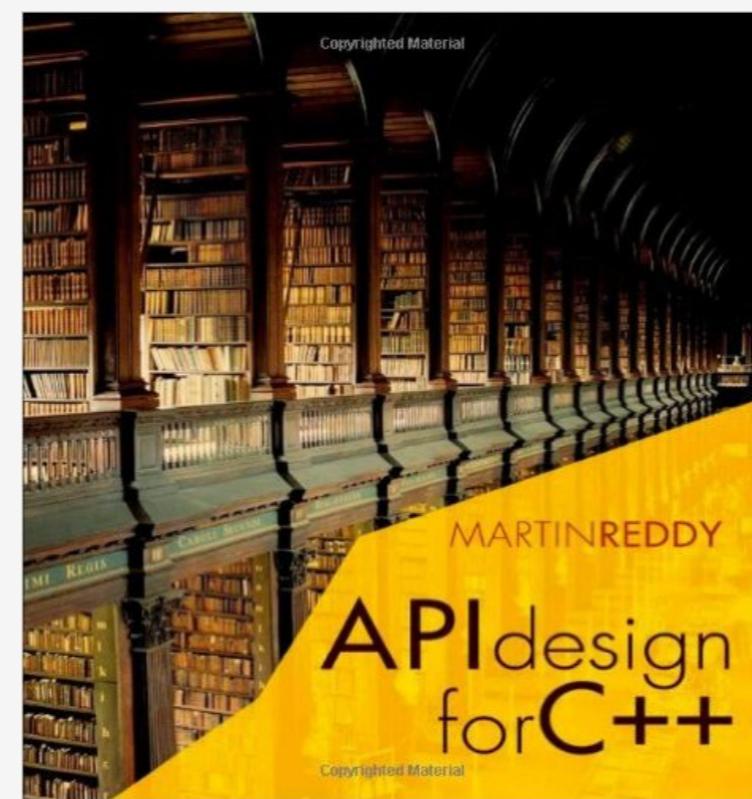
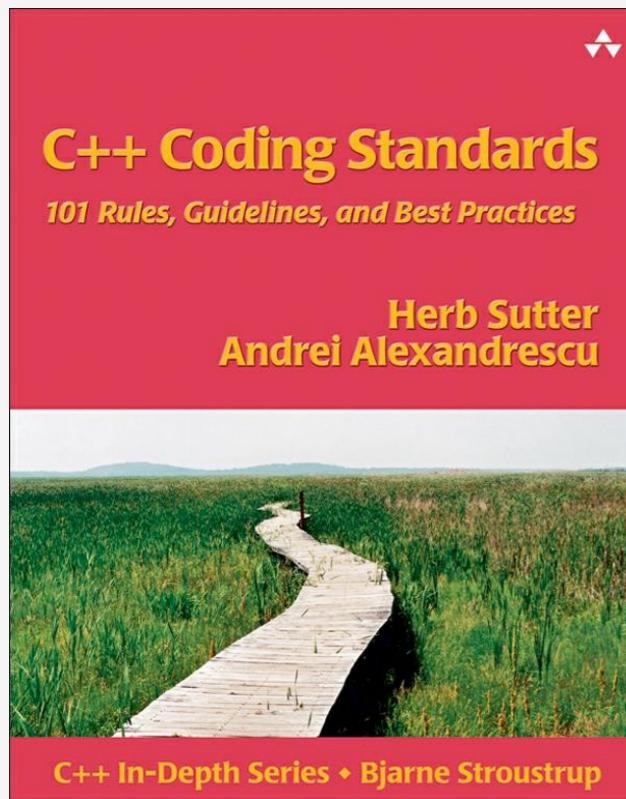
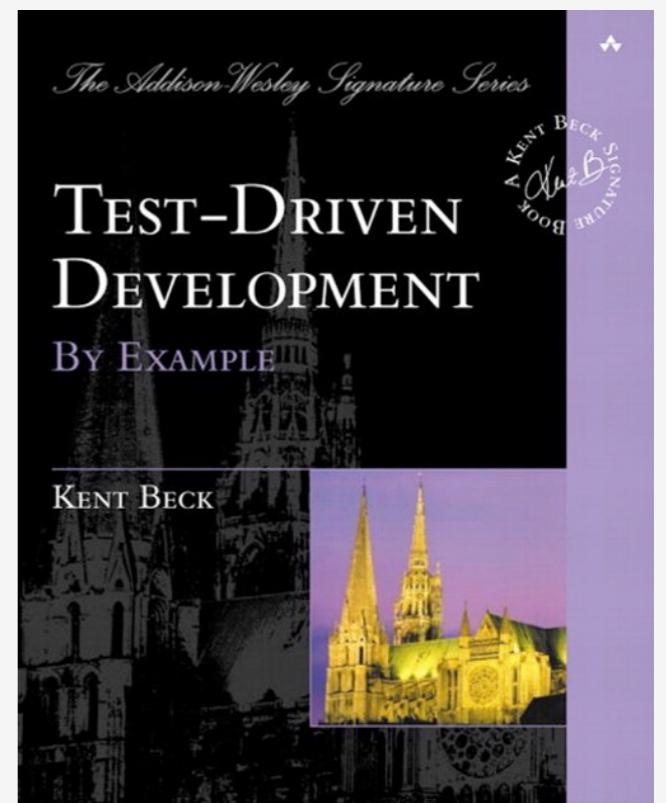
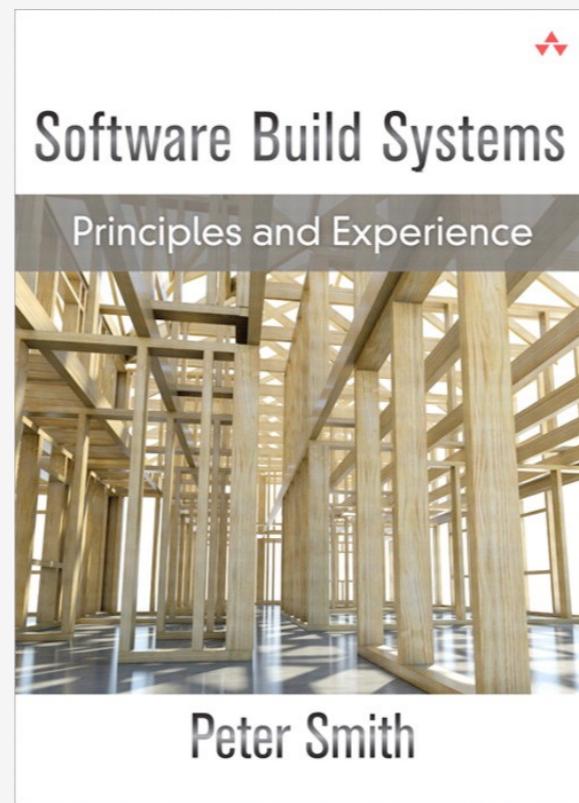
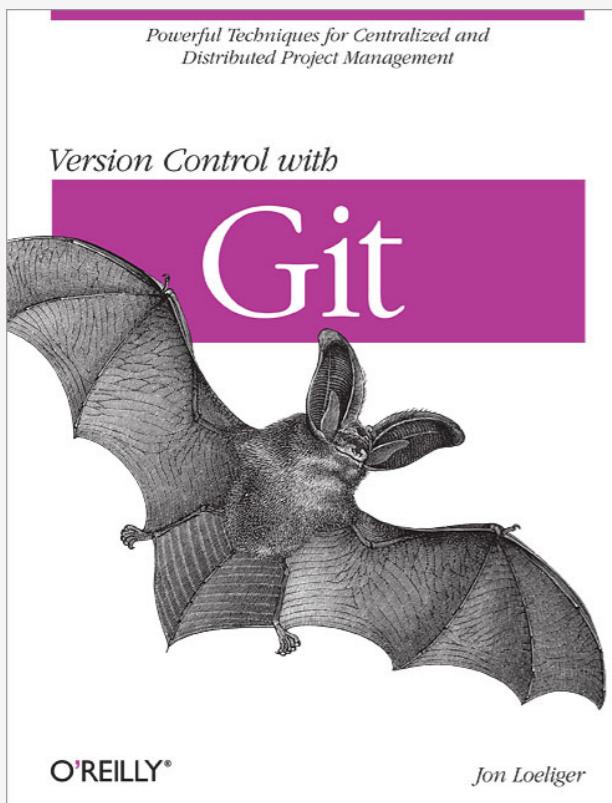
3. Testing (**CMake/General**)

4. Documenting code and
programs (**Doxxygen**)



5. *Software Design*







Search entire site...

Git is a [free and open source](#) distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Git is [easy to learn](#) and has a [tiny footprint with lightning fast performance](#). It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like [cheap local branching](#), convenient [staging areas](#), and [multiple workflows](#).



[Learn Git in your browser for free with Try Git.](#)

[CMake » 3.3.1 Documentation »](#)

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Command-Line Tools

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Interactive Dialogs

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Software Development Online Resources

The image shows a Mac OS X desktop with four windows open:

- Terminal — bash**: Displays a shell session with commands to echo \$SHELL, list unix tools, and which \$unixtools.
- SyntaxHighlight.hpp + (~) - VIM**: A code editor window showing a C++ class definition for SyntaxHighlightingEditor.
- Terminal — less**: Displays the man(1) page for the man command, showing synopsis, description, and usage information.
- Google**: A web browser window showing the Google homepage.

Getting Started

```
$ mpags-cipher --help  
➤ questions?  
➤ comments?
```