Software Development with C++

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Programming is in **top 5** most useful skills gained by PhDs

"48% were employed in universities..."

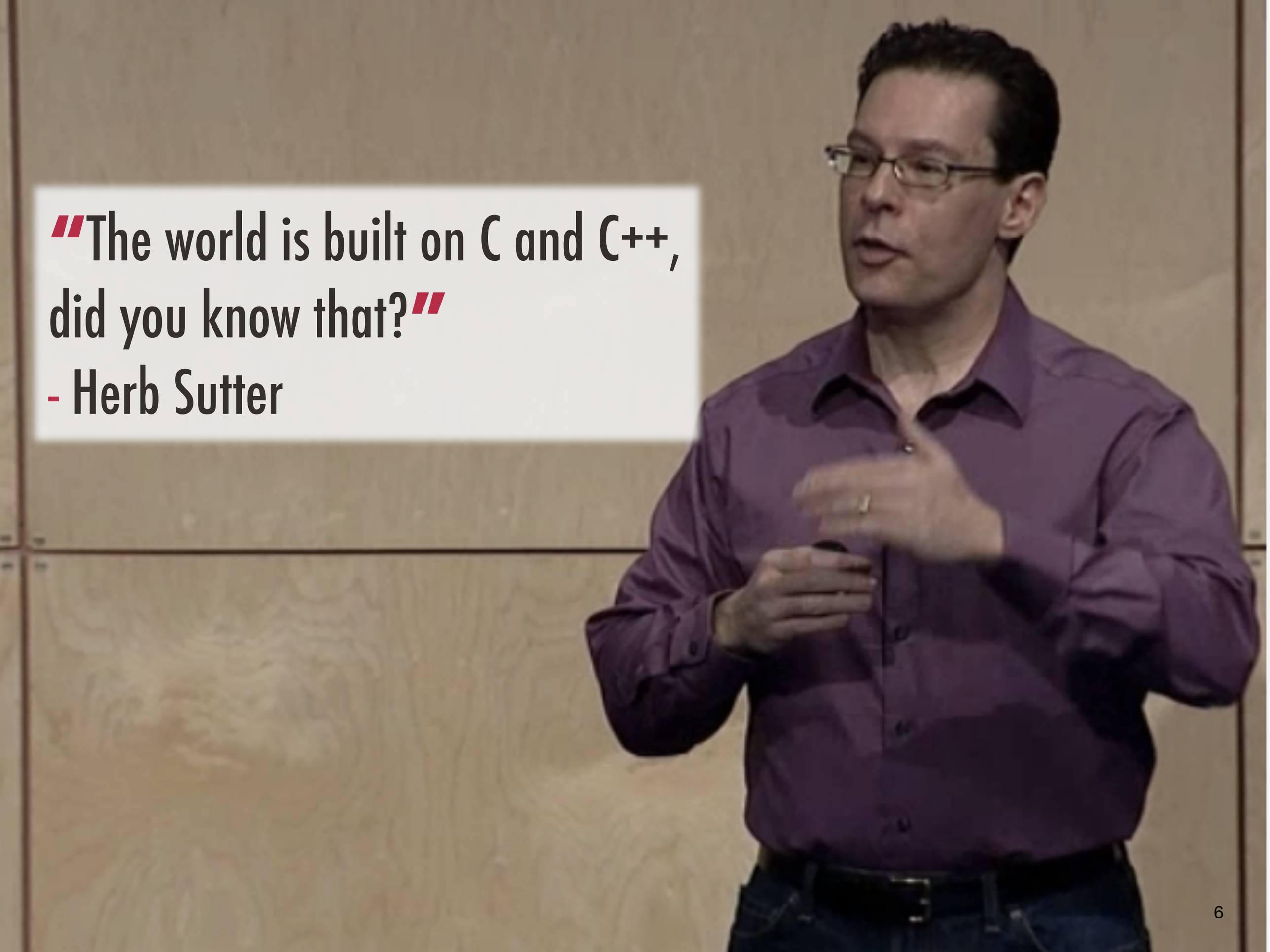
- STFC PhD Careers

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

"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

```
auto myFunc();
```

”Your Children’s C++” - New Code

1. **Procedural** C++

2. Procedural C++ 2

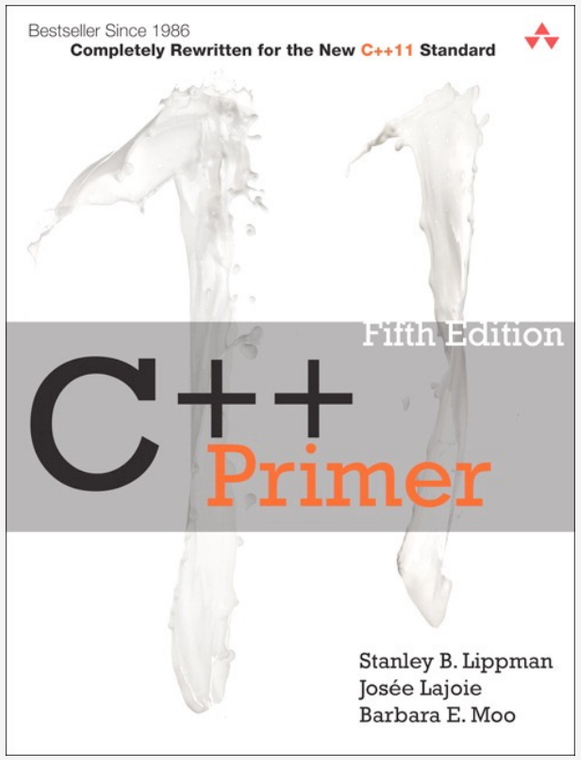
3. **Object Oriented** C++ 1

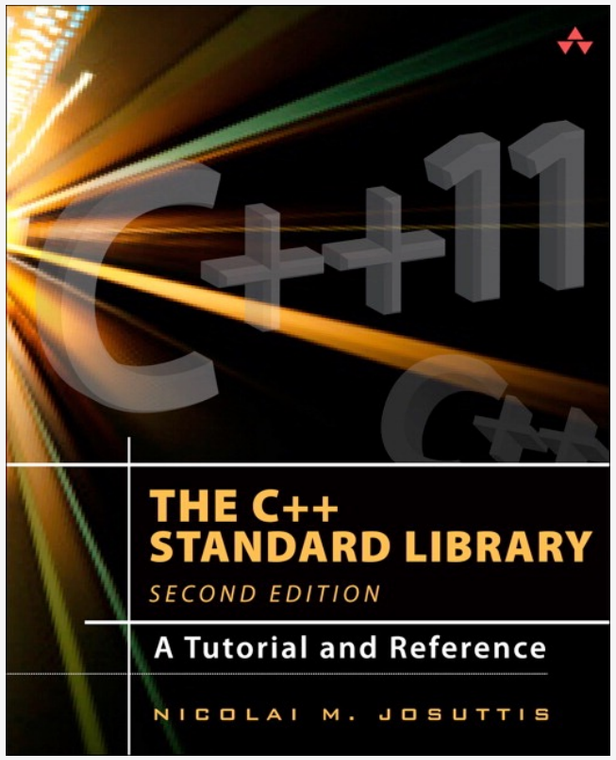
4. **Generic** C++ and the STL

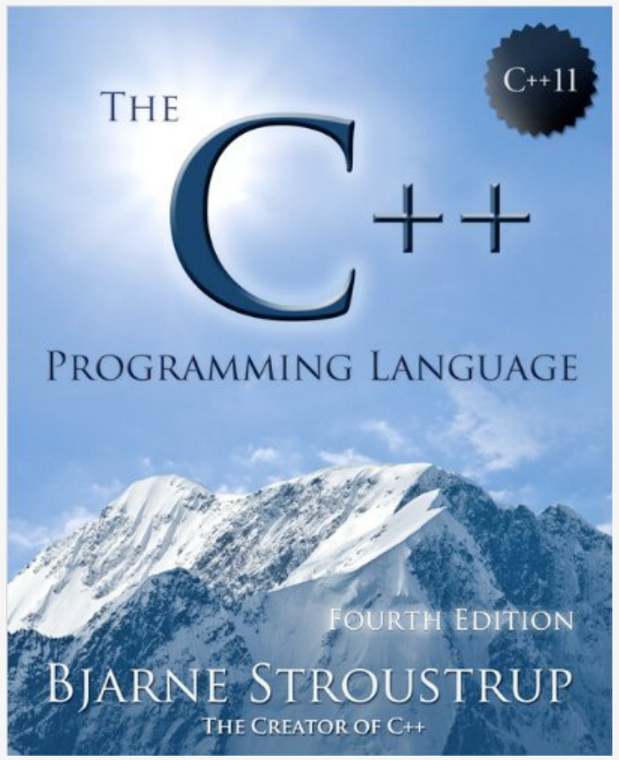
5. Object Oriented C++ 2

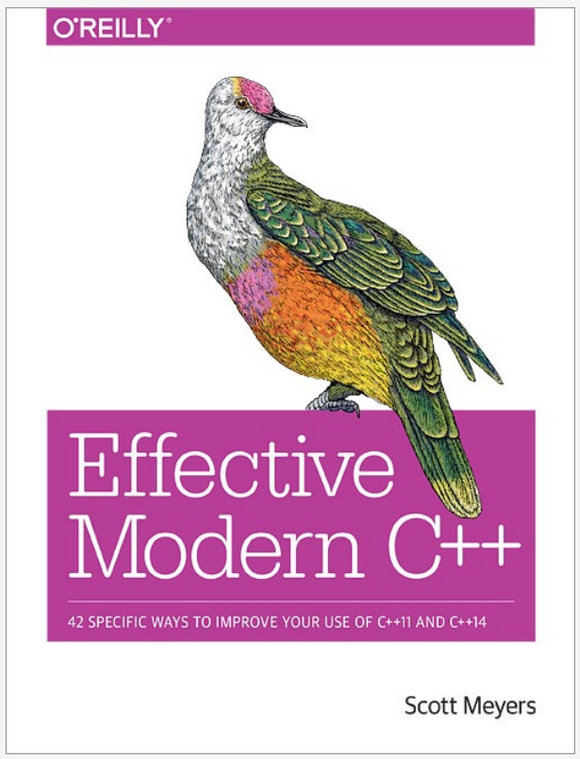
```
int main(int argc, char *argv[])
{
  int result = calculate_foo();
  return 0;
}
```

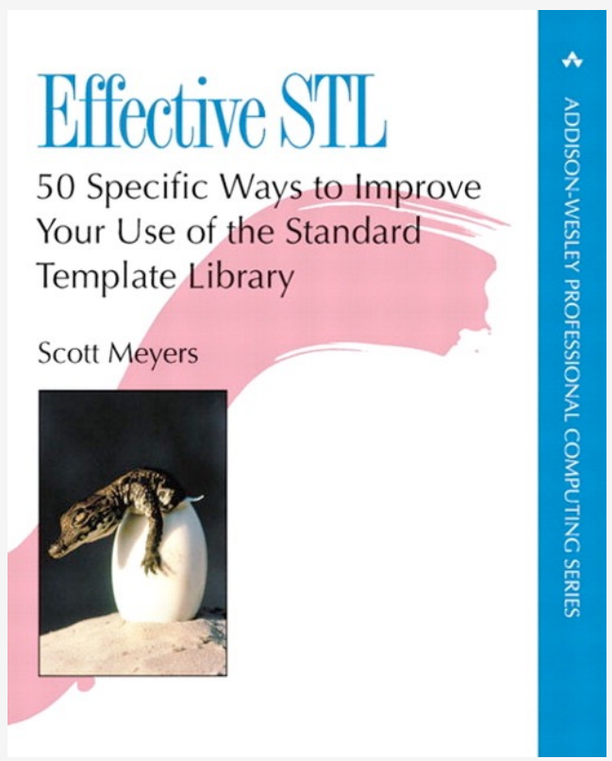
```
int main(int argc, char *argv[])
{
  FooCalculator foo;
  int result = foo.calculate();
  return 0;
}
```

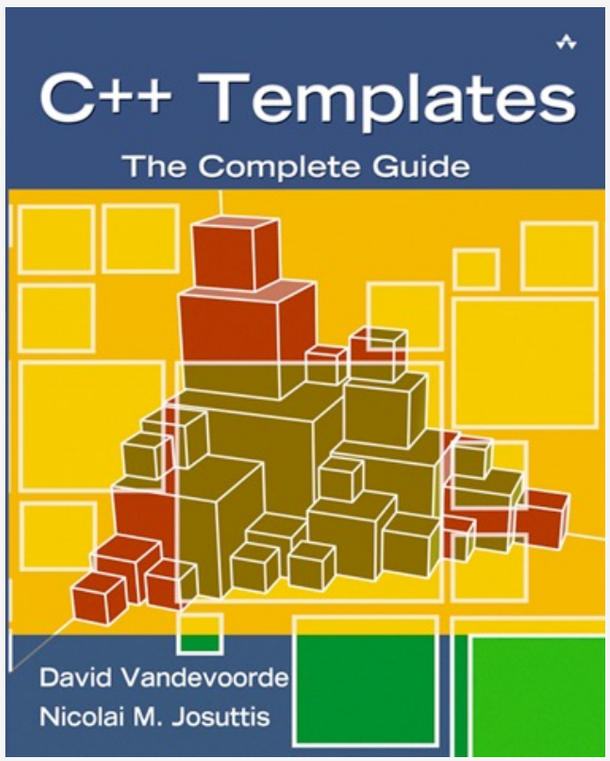

Bestseller Since 1986
Completely Rewritten for the New C++11 Standard
Fifth Edition
C++ Primer
Stanley B. Lippman
Josée Lajoie
Barbara E. Moo


C++11
THE C++ STANDARD LIBRARY
SECOND EDITION
A Tutorial and Reference
NICOLAI M. JOSUTTIS


C++11
THE C++
PROGRAMMING LANGUAGE
FOURTH EDITION
BJARNE STROUSTRUP
THE CREATOR OF C++


O'REILLY
Effective Modern C++
42 SPECIFIC WAYS TO IMPROVE YOUR USE OF C++11 AND C++14
Scott Meyers

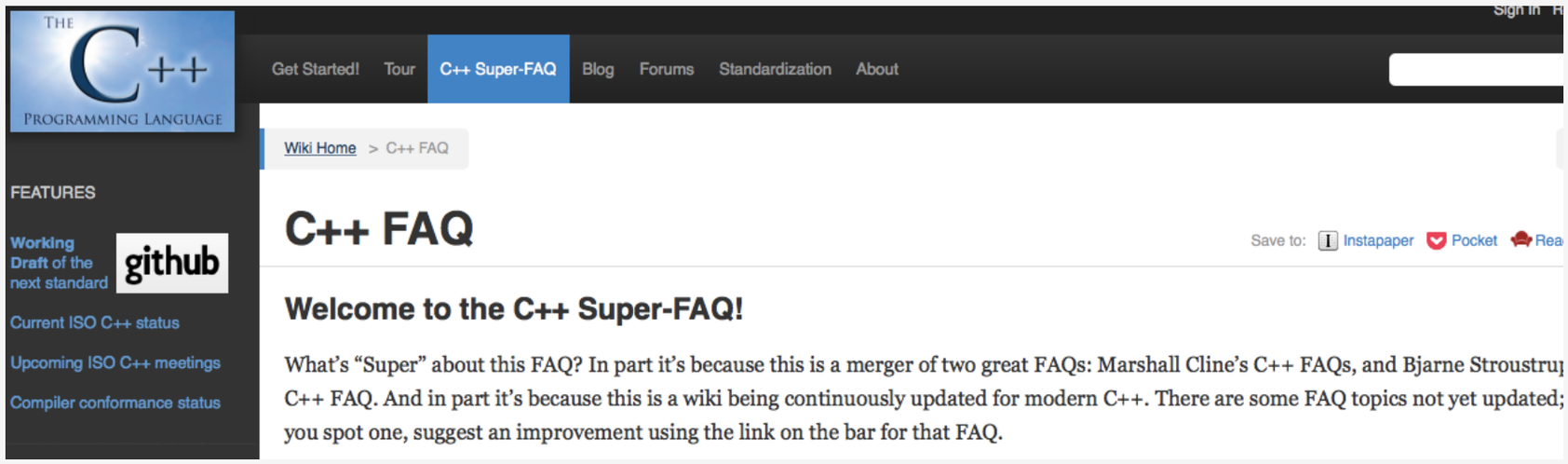

Effective STL
50 Specific Ways to Improve Your Use of the Standard Template Library
Scott Meyers
ADDISON-WESLEY PROFESSIONAL COMPUTING SERIES

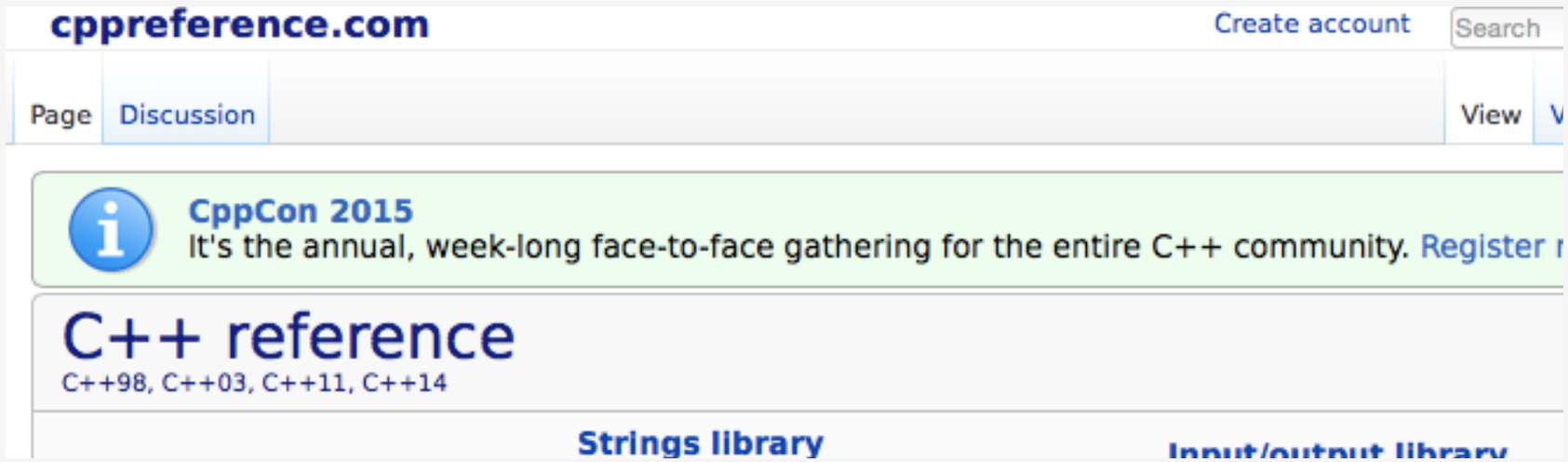

C++ Templates
The Complete Guide
David Vandevoorde
Nicolai M. Josuttis

C++ Bookshelf

stackoverflow

Programmers Q&A





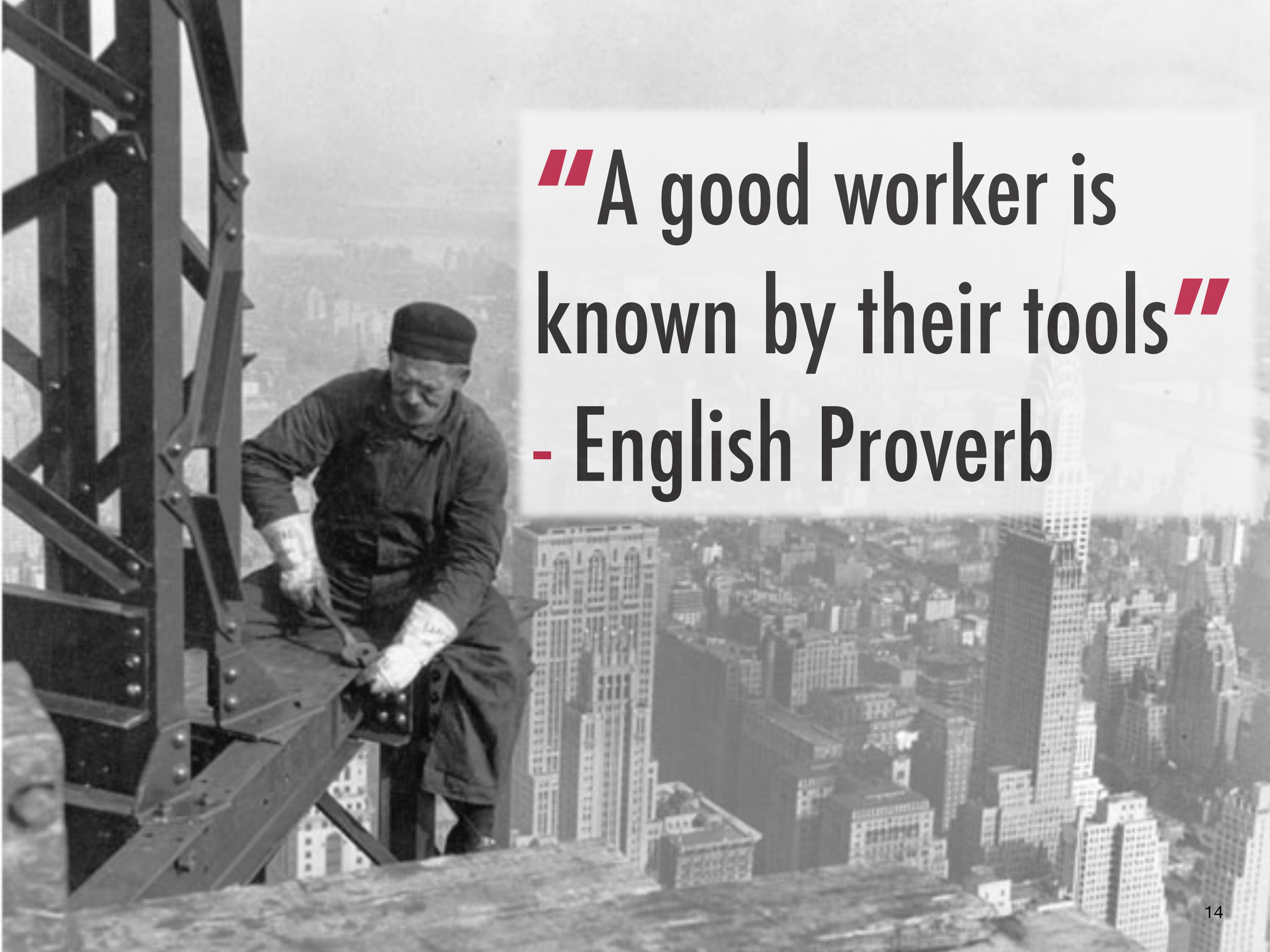
boost
C++ LIBRARIES

Qt The Qt Company

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***)

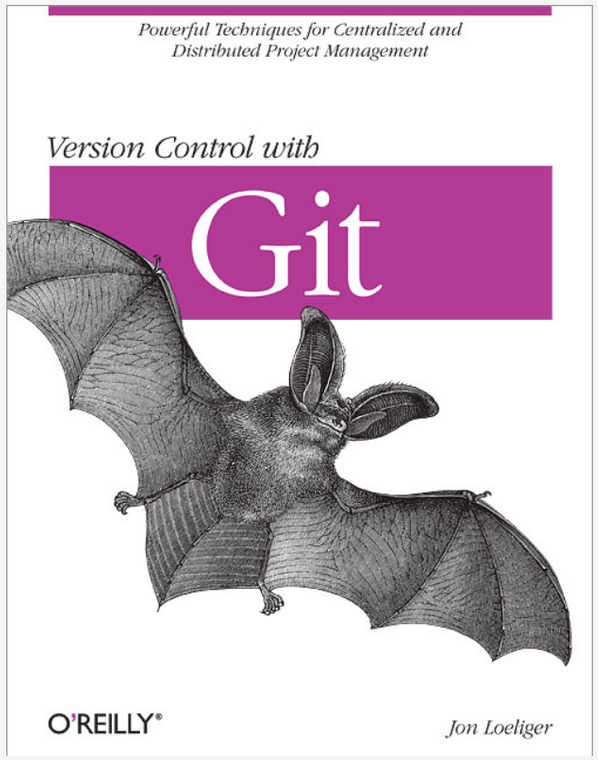
2. Automating builds (***Compiler/CMake***)

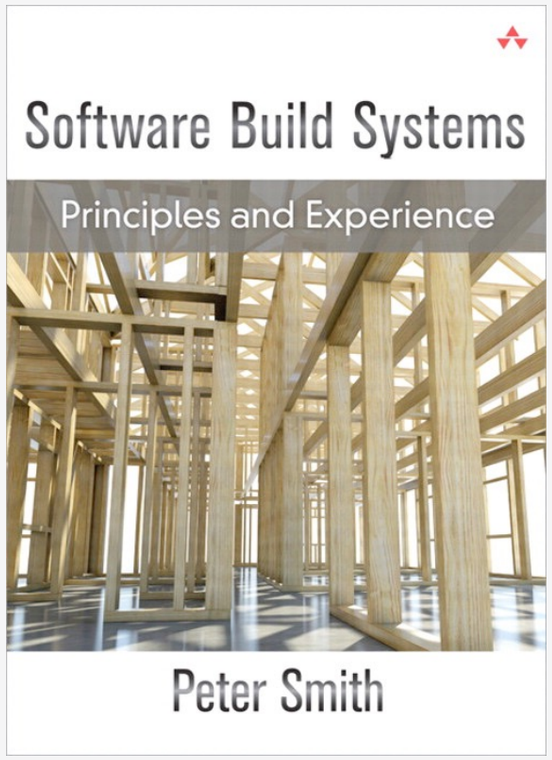
3. Testing (***CMake/General***)

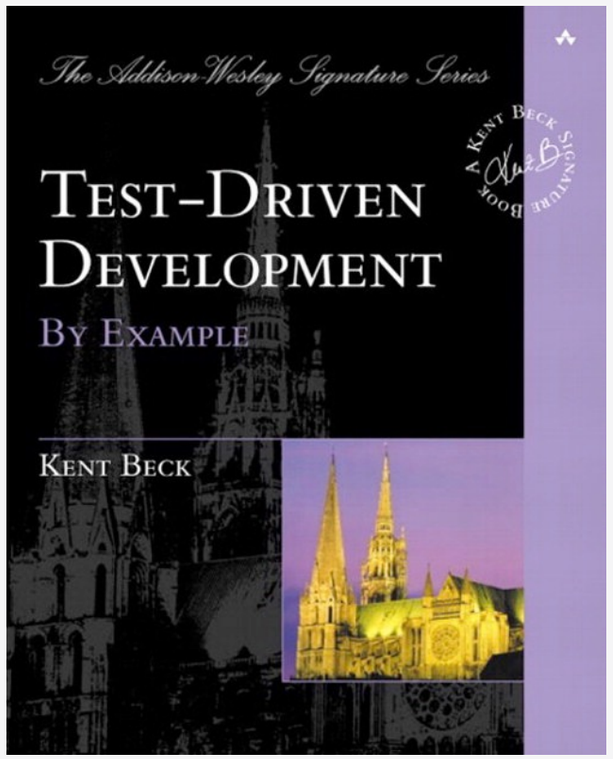
4. Documenting code and programs (***Doxygen***)

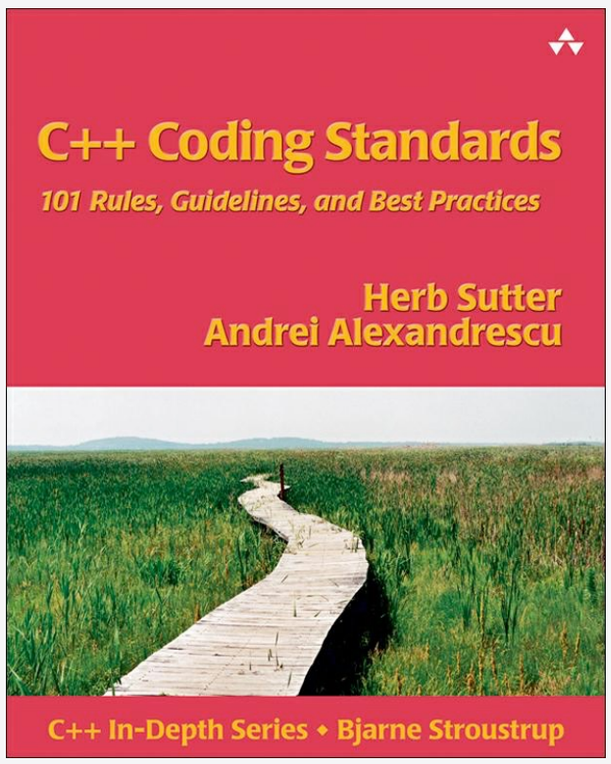
5. Software Design

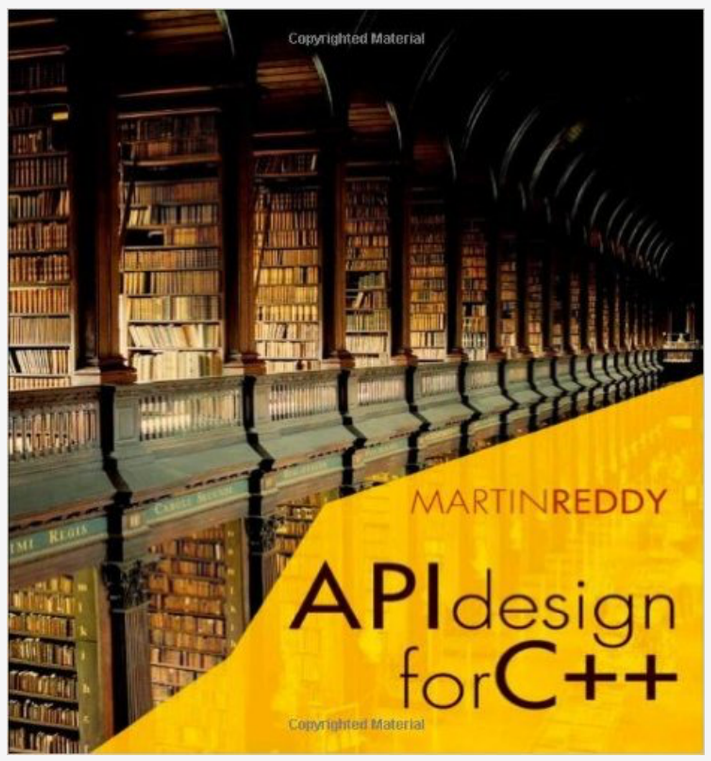
Software Development Stream

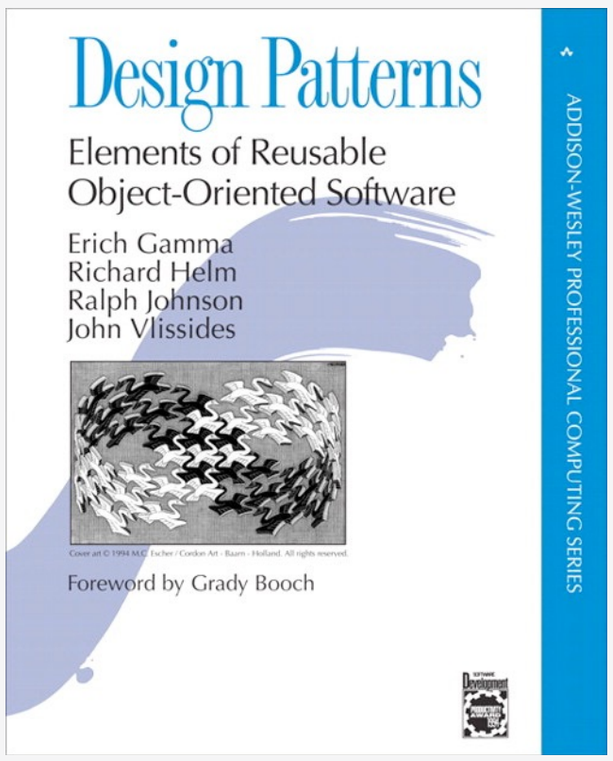




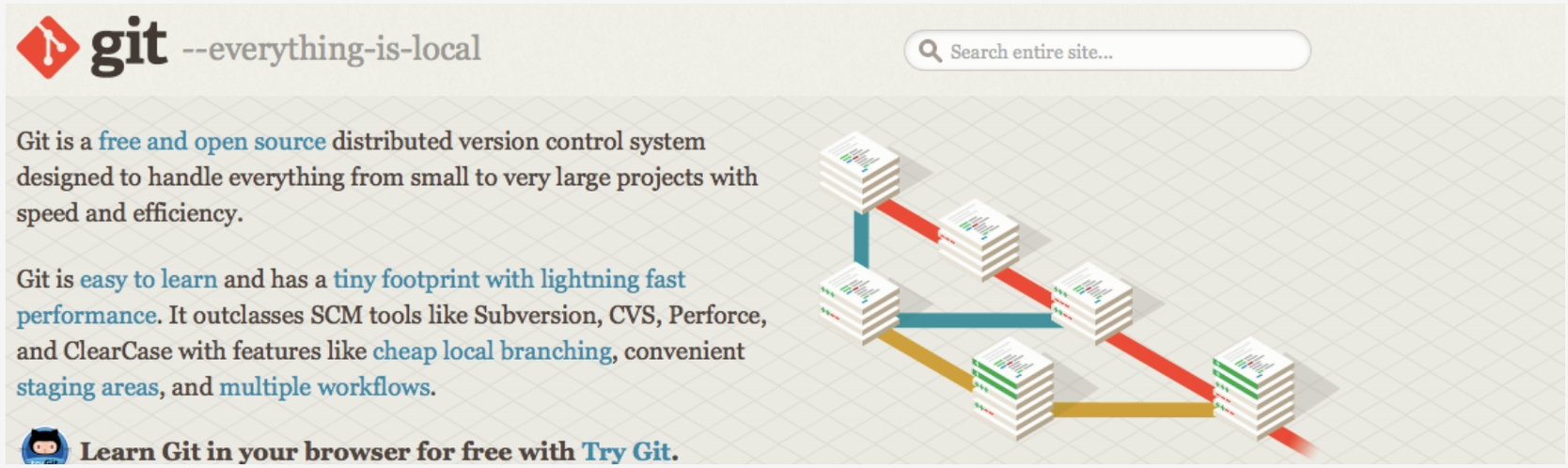








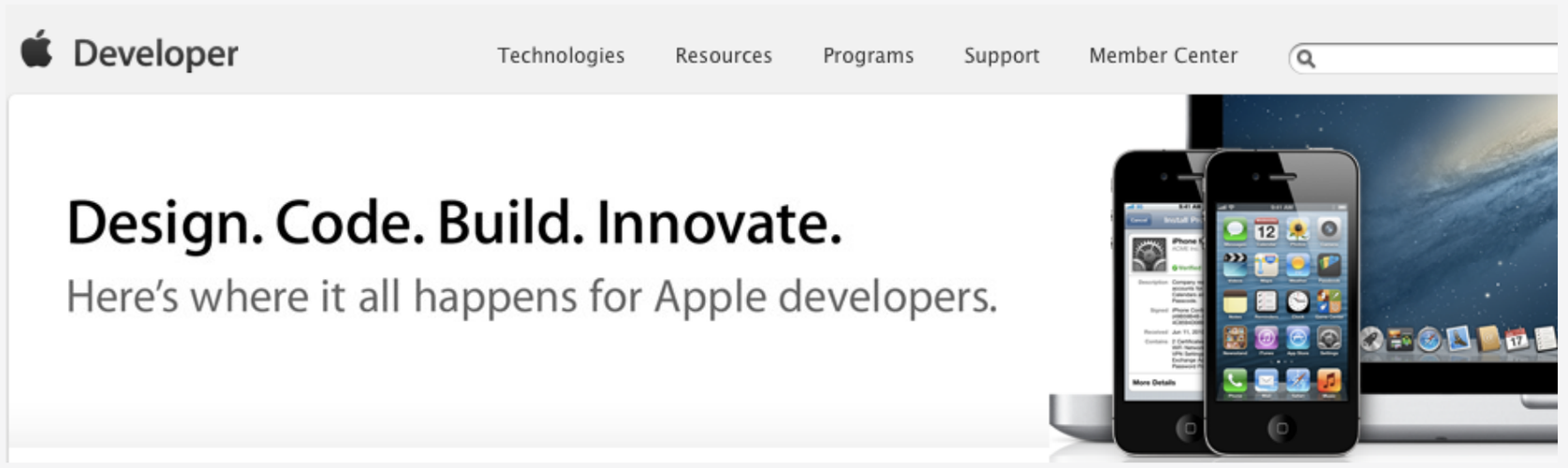
Software Development Bookshelf

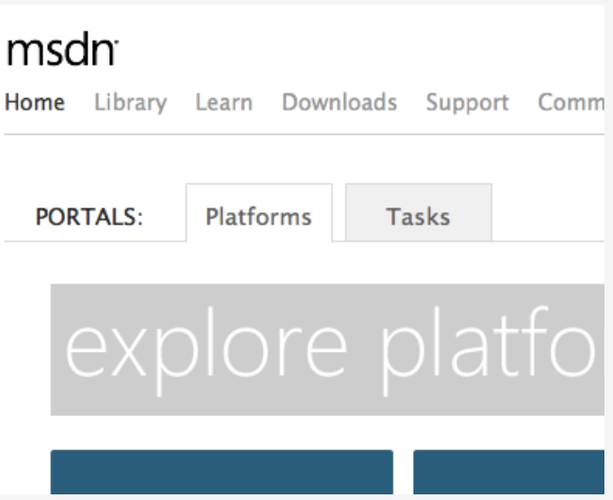


github
SOCIAL CODING

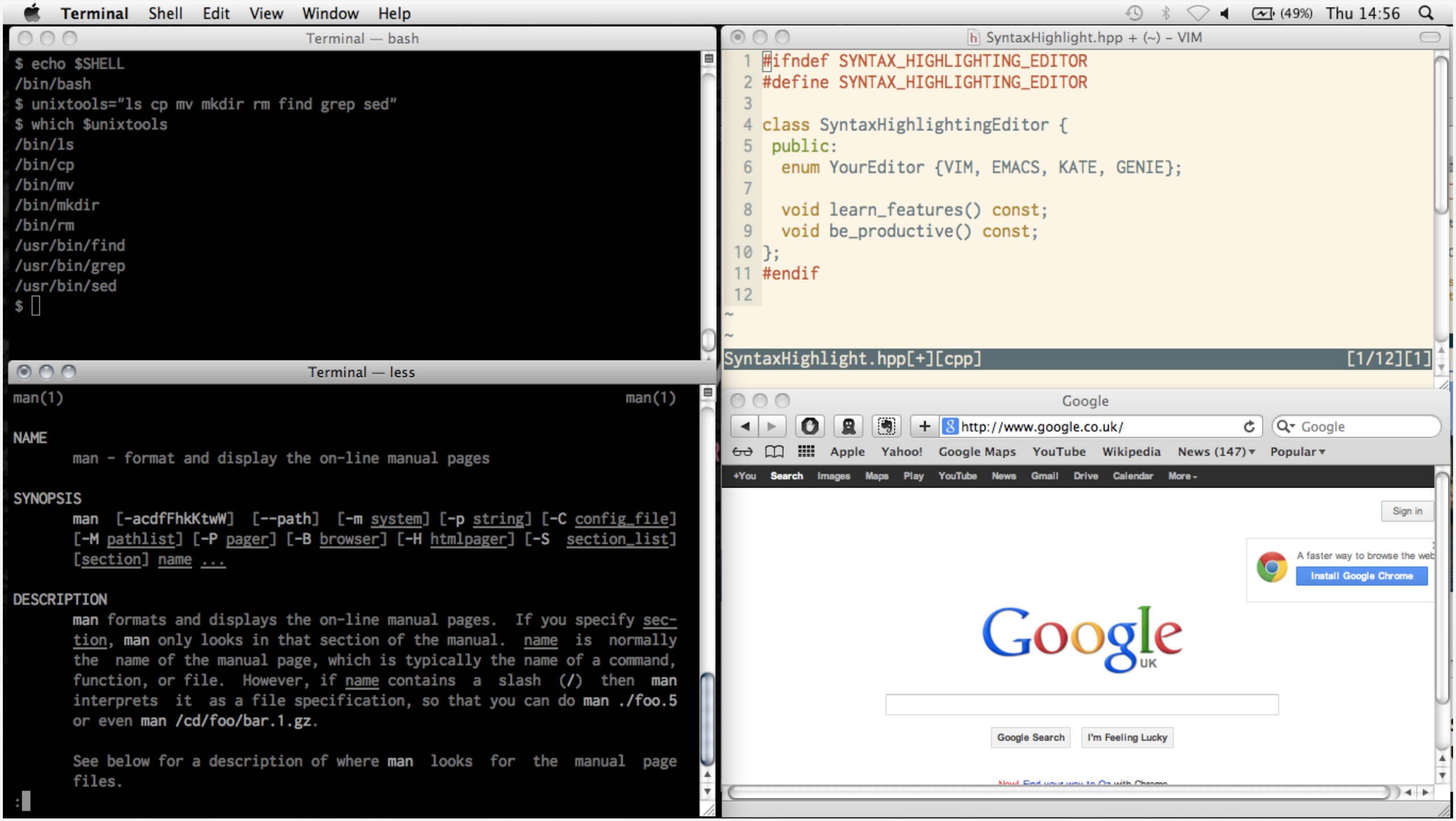
stackoverflow

Developer Q&A





Software Development Online Resources



Getting Started

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