C++ Club Meeting Notes

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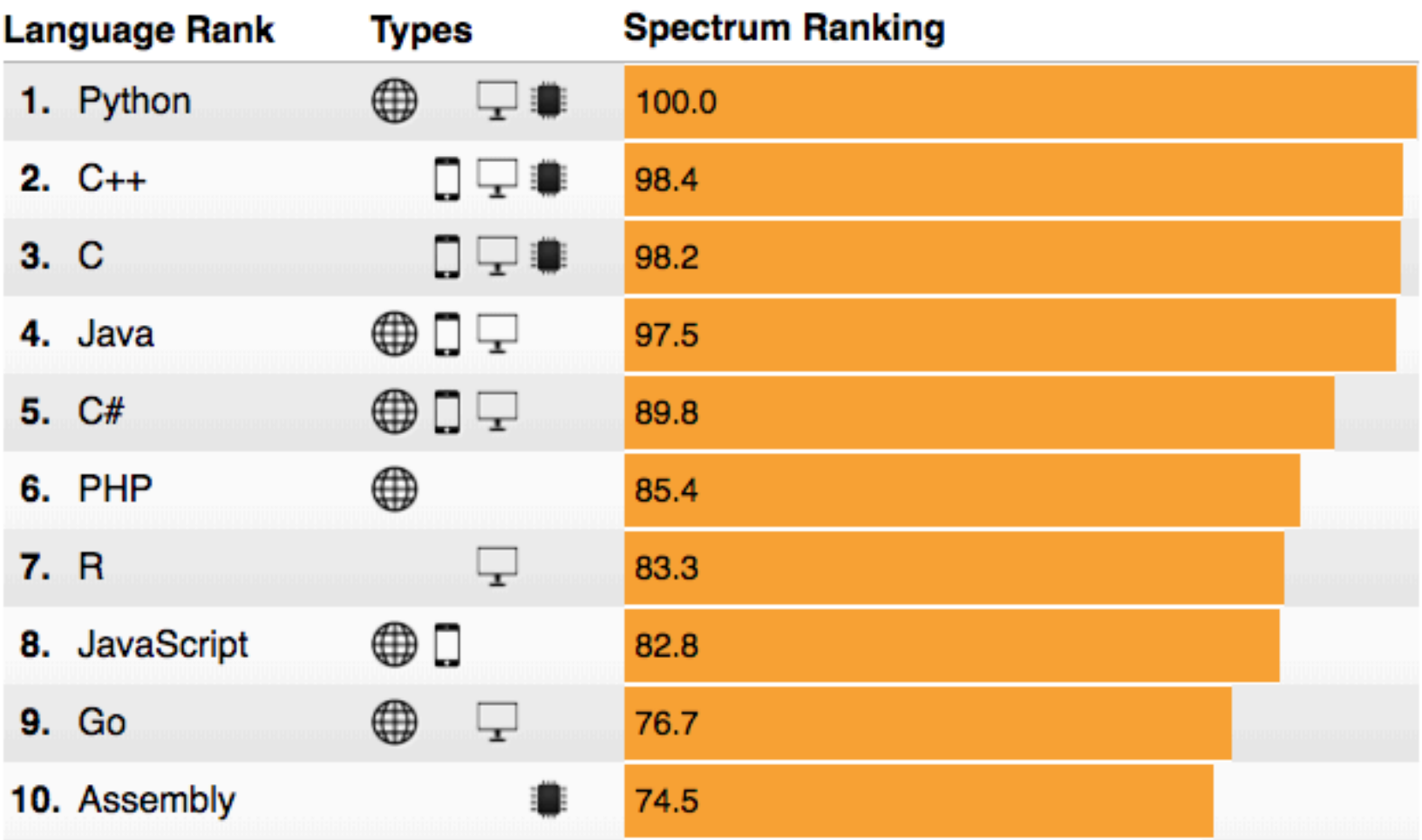
2018-08-09

IEEE Most popular programming languages of 2018

Article, Reddit



Follow-up: Toby Allsopp “An Introduction to the Proposed Coroutine Support for C++”

Video

How to use coroutines today

- Visual Studio 2017 (`/await`)
- Clang 5.0 with libc++ 5.0 (`-fcoroutines-ts -stdlib=libc++`)

Abstraction libraries

- cppcoro
  - task, generator, async_generator, async_mutex, ...
- range-v3
  - generator

Clang Concepts is feature-complete

- Announcement
- Compiler Explorer
- Code
  - Andrew Sutton's reply: "If I had not gone on vacation, I might have beaten you to to the punch in GCC ;) I'm in the process of working through older TS tests."

The optimal way to return from a function, by Jason Turner

Video

Single return (20%):

```
string val(const bool b) {
    string ret;
    if (b) ret = "Hello"; else ret = "World";
    return ret;
}
```

versus multiple return (61%):

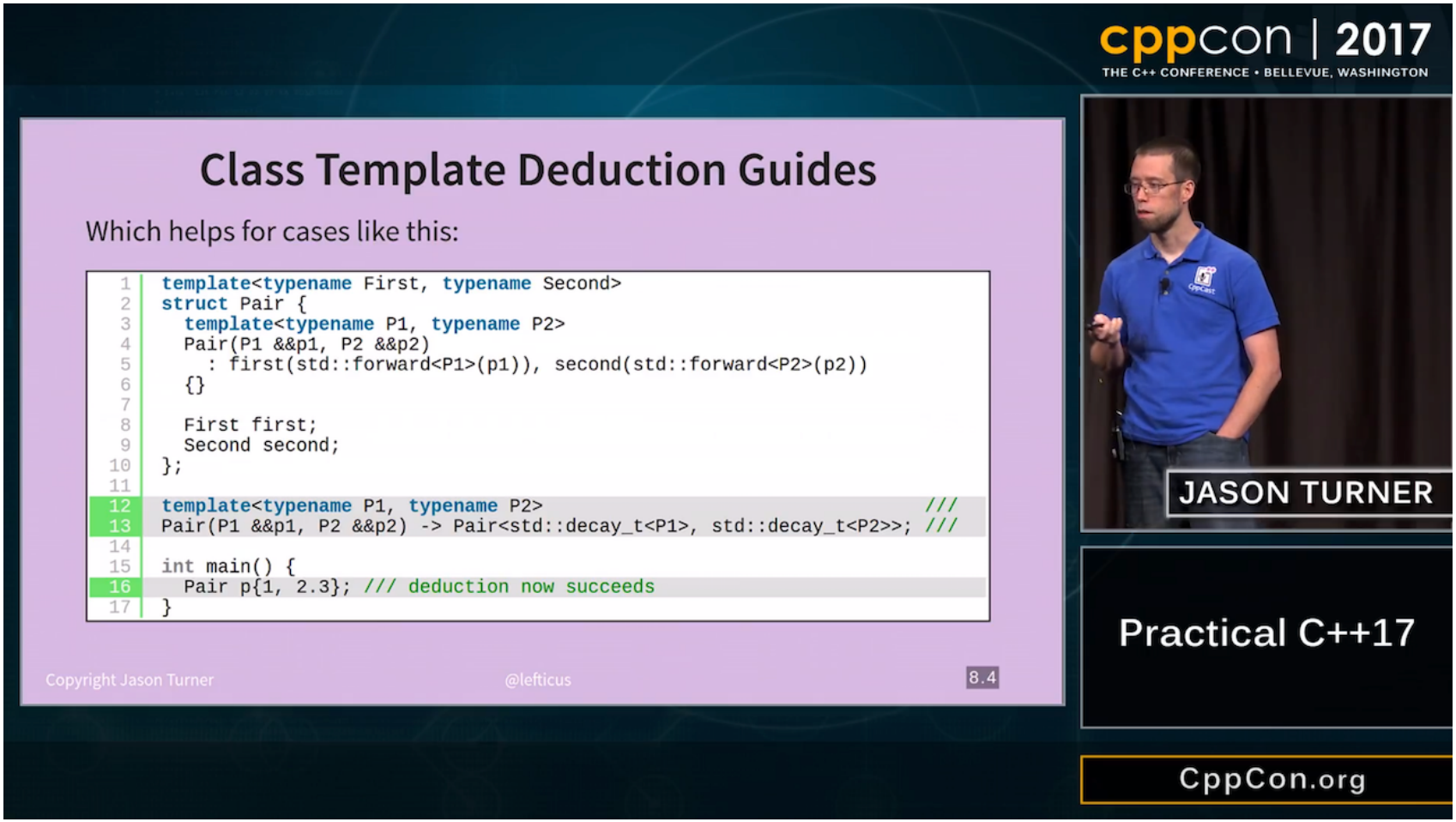
```
string val(const bool b) {
    if (b) return "Hello"; else return "World";
}
```

versus:

```
string val(const bool b) {
    return b ? "Hello" : "World";
}
```

Practical C++17, by Jason Turner

- Video
- Slides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Class Template Deduction Guides
Which helps for cases like this:
template<typename First, typename Second>
struct Pair {
template<typename P1, typename P2>
Pair(P1 &&p1, P2 &&p2)
: first(std::forward<P1>(p1)), second(std::forward<P2>(p2))
{}
First first;
Second second;
};
template<typename P1, typename P2> ///
Pair(P1 &&p1, P2 &&p2) -> Pair<std::decay_t<P1>, std::decay_t<P2>>; ///
int main() {
Pair p{1, 2.3}; /// deduction now succeeds
}
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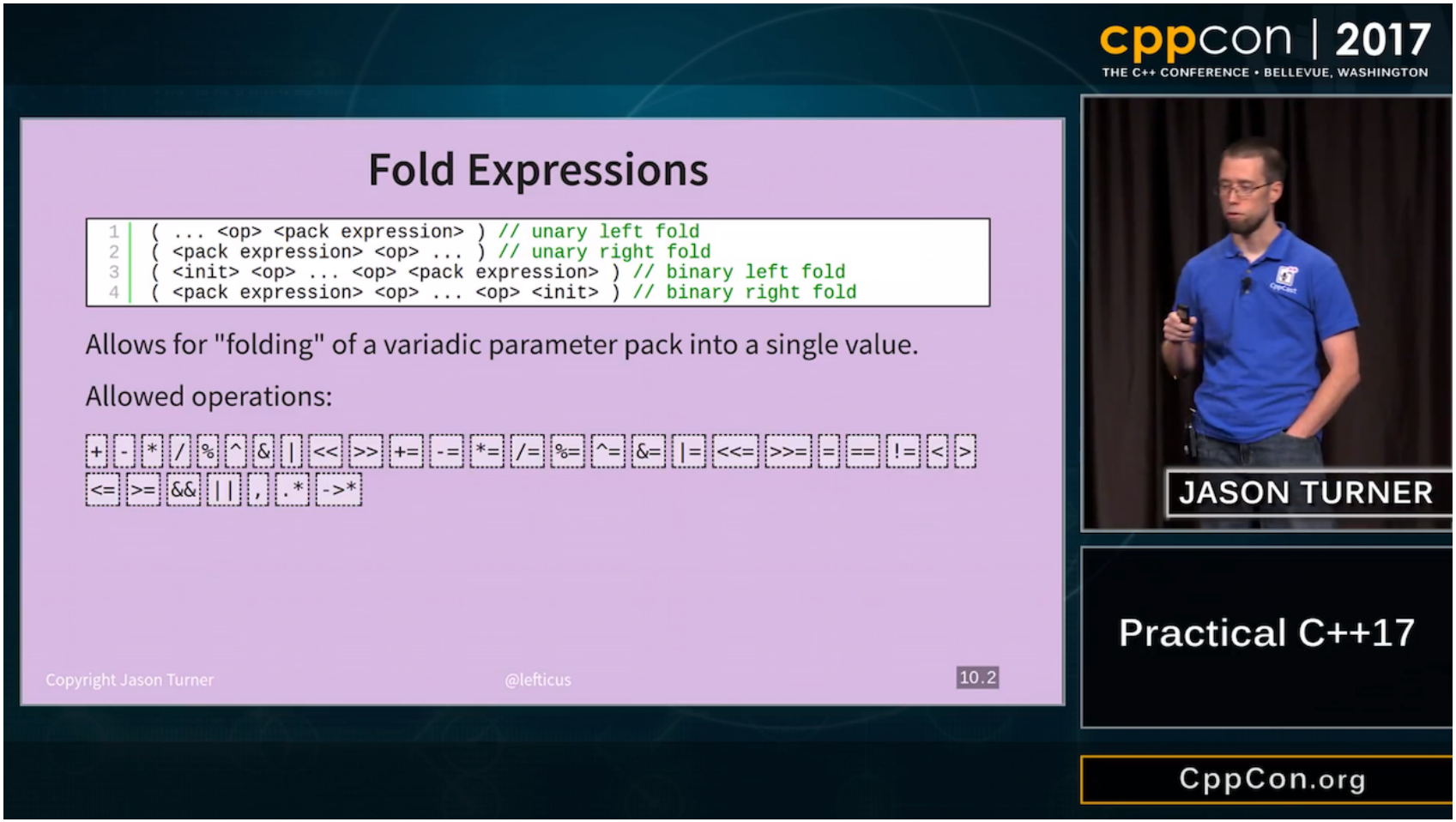
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Fold Expressions
1 (... <op> <pack expression>) // unary left fold
2 (<pack expression> <op> ...) // unary right fold
3 (<init> <op> ... <op> <pack expression>) // binary left fold
4 (<pack expression> <op> ... <op> <init>) // binary right fold
Allows for "folding" of a variadic parameter pack into a single value.
Allowed operations:
+ - * / % ^ & | << >> += -= *= /= %= ^= &= |= <<= >>= = == != < >
<= >= && || , .* ->*
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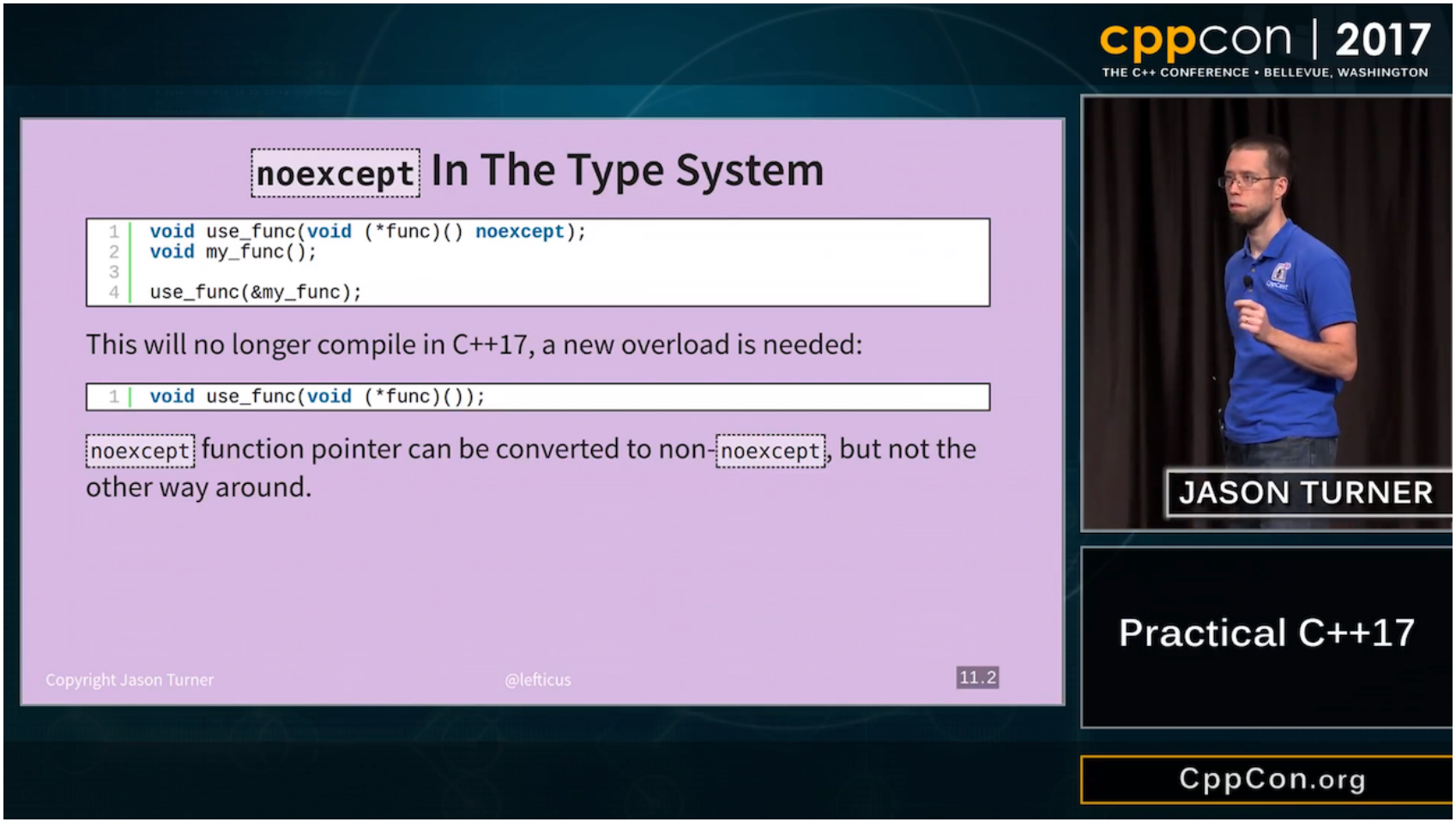
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noexcept In The Type System
1 void use_func(void (*func)() noexcept);
2 void my_func();
3
4 use_func(&my_func);
This will no longer compile in C++17, a new overload is needed:
1 void use_func(void (*func)());
noexcept function pointer can be converted to non-noexcept, but not the other way around.
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C++17: std::apply and std::invoke

- std::apply
- std::invoke

C++17 in libsigc++ : `invoke`, `apply`, and `constexpr if`

- Post
- Code (LGPL)
- Docs

libsigc++ implements a typesafe callback system for standard C++. It allows you to define signals and to connect those signals to any callback function, either global or a member function, regardless of whether it is static or virtual.

Modules TS example

- Post
- Code

Modules TS example

pet.cpp:

```
1 module pets.pet;
2 import std.core;
3
4 export class Pet
5 {
6 public:
7   virtual char const* pet() = 0;
8 };
```

Modules TS example

dog.cpp:

```
1  module pets.dog;
2  import std.core;
3  import pets.pet;
4
5  export class Dog : public Pet
6  {
7  public:
8    char const* pet() override;
9  };
10
11 char const* Dog::pet()
12 {
13   return "Woof!";
14 }
```

Modules TS example

interface.cpp (or maybe pets.cpp?):

```
1 module pets;
2
3 export module pets.pet;
4 export module pets.dog;
```

Modules TS example

main.cpp:

```
1 import pets;
2 import std.core;
3 import std.memory;
4
5 int main()
6 {
7   std::unique_ptr<Pet> pet = std::make_unique<Dog>();
8   std::cout << "Pet says: "<< pet->pet() << std::endl;
9 }
```

More on Modules

- C++ modules and why we need them desperately
- Using modules in Visual C++
- Migrating existing C++ code to use modules
- Compiling boost on QNX: a tale of why modules are needed in C++
  - QNX Demo Floppy (1999)

A C++ Puzzle by Leor Zolman

Video

Question

Write a portable C++ (or C) program that displays:

Hello World

on the standard output when executed, WITHOUT USING ANY SEMICOLONS (;)

- Don't worry what's in standard header files (and in the C version you don't need *any* headers)
- No preprocessor directives are required (aside from `#include` for C++)
- No assembly language required

Solutions

C++:

```cpp
#include <iostream>
int main() {
    if (std::cout << "Hello World") {}
}
```

C:

```c
int main() {
    if (printf("Hello World")) {}
}
```

CppChat: Volatile Is the Embedded Keyword

Episode

- For many embedded or kernel developers using C++ for anything is anathema: “Here is a thing I made in C++ which solves this problem in the kernel/embedded system” – “Why are you even using C++? You should use C!”
- C and C++ compiler defaults differ, so compiling C code with a C++ compiler will make it slower. When you disable certain C++ defaults (RTTI, exceptions) it becomes faster than C.
- Freestanding proposals by Ben Craig:
  - Library
  - Language
- Static exceptions by Herb Sutter

Volatile

- `volatile` is needed:
  - John Regehr's tweet: "I think it's 100% clear the C++ committee should remove `volatile`"
    - JF Bastien's reply: "No! I used `volatile` recently, and advocated for its use too!!! It's great for signals, and TOCTOU, at a minimum. I'm wondering if we should deprecate volatile-qualified functions though. I don't think they're useful anymore."
    - JF Bastien's tweet: "<...> it defines the member function to call if the `this` pointer is `volatile`. That's been standard C++ forever. Same for const member function overloads. Don't forget about *ref* and *rvalue* member functions! <...>"

```
1 class Foo {
2     void bar() volatile;
3 };
```

Spdlog V1.0

A very fast header-only C++ logging library

- Code
- V1.0

Interview


Explain Deadlock, and we'll hire you.
Hire me, and I'll explain it to you.
let's discuss the salary.