

C++ Club Meeting Notes

Gleb Dolgich

2018-12-13

Bjarne Stroustrup on CppChat

► YouTube

- ▶ education
- ▶ The Standards Committee
- ▶ C++20 and beyond



Matt Godbolt on CppChat

► YouTube

- Compiler Explorer, contributors, infrastructure
- Tools —> LLVM MCA (machine code analyser), Clang Tidy, PAHole
- Patched compiler versions to explore new features
- Code execution is coming
- Undefined behaviour



C++Now 2018: Matt Godbolt - What else has compiler done for me lately? (1/7)

YouTube

The image shows a screenshot of a YouTube video player. In the top right corner, there is a green circular logo with the text "C++ now" and "2018 MAY 7 - 11 cppnow.org". The main video frame shows a man with short brown hair, wearing a grey and black zip-up hoodie, standing and gesturing with his hands while speaking. Below the video frame, the name "Matt Godbolt" is displayed. Underneath his name is the title of the video: "What Else Has My Compiler Done For Me Lately? Unbolting the Compiler's Lid...Again". At the bottom of the video frame, there is a small circular icon with arrows pointing in different directions. In the bottom right corner of the player, there is a logo for "Video Sponsorship Provided By" with a yellow and red arrow-like graphic.

REGISTERS

- rax, rbx, rcx, rdx, rsp, rbp, rsi, rdi, r8-r15
- xmm0-xmm15
- rdi, rsi, rdx... arguments
- rax is return value

C++Now 2018: Matt Godbolt - What else has compiler done for me lately? (2/7)

The slide displays the bit layout of the x86 registers RAX, EAX, AX, AH, and AL. The registers are shown as horizontal bars with their bit ranges labeled above them:

- RAX: 63...56, 55...48, 47...40, 39...32, 31...24, 23...16, 15...8, 7...0. The first two segments (63..56 and 55..48) are labeled "(zeroed on write)".
- EAX: 31...24, 23...16, 15...8, 7...0.
- AX: 15...8, 7...0.
- AH: 7...0.
- AL: 7...0.

The slide also features the C++ now logo, the event date "2018 MAY 7 - 11", and the website "cppnow.org". On the right side, there is a video frame showing Matt Godbolt speaking, his name, and the title of his talk: "What Else Has My Compiler Done For Me Lately? Unbolting the Compiler's Lid...Again". Below the video frame, it says "Video Sponsorship Provided By" and shows the Art Blocks logo.

C++Now 2018: Matt Godbolt - What else has compiler done for me lately? (3/7)

INSTRUCTIONS

```
op  
op dest  
op dest, src  
op dest, src1, src2
```

- op is e.g. call, ret, add, sub, cmp...
- dest, src is register or memory reference:
[base + reg_{1opt} + reg_{2opt}(1, 2, 4 or 8)_{opt}]

(Intel asm syntax)



Matt Godbolt

What Else Has My Compiler Done For Me Lately? Unbolting the Compiler's Lid...Again

Video Sponsorship Provided By:



C++Now 2018: Matt Godbolt - What else has compiler done for me lately? (4/7)

INSTRUCTIONS

```
mov eax, DWORD PTR [r14]
add rax, rdi
add eax, DWORD PTR [r14+4]
sub eax, DWORD PTR [r14+4*rbx]
lea rax, [r14+4*rbx]
xor edx, edx
```

```
int eax = *r14;    // int *r14;
rax += rdi;
eax += r14[1];
eax -= r14[rbx];
int *rax = &r14[rbx];
edx = 0;
```



Matt Godbolt

What Else Has My Compiler Done For Me Lately? Unbolting the Complier's Lid...Again

Video Sponsorship Provided By:



C++Now 2018: Matt Godbolt - What else has compiler done for me lately? (5/7)

COMPILER EXPLORER V0.1

```
$ g++ /tmp/test.cc -O2 -c -S -o - -masm=intel \
| c++filt \
| grep -vE '\s+\.'
```

```
sum(std::vector<int, std::allocator<int> > const&):
.LFB786:
    mov rcx, QWORD PTR [rdi]
    mov rax, QWORD PTR 8[rdi]
    sub rax, rcx
    shr rax, 2
    mov rsi, rax
    ...
```



Matt Godbolt

What Else Has My Compiler Done For Me Lately? Unbolting the Complier's Lid Again

Video Sponsorship Provided By: 

C++Now 2018: Matt Godbolt - What else has compiler done for me lately? (6/7)

The image shows a composite view. On the left, a screenshot of a C++ IDE (Code::Blocks) displays a source file with the following code:

```
1 // setup...
2 int func() {
3     auto a = make_unique<int>(42);
4     auto b = make_unique<int>(24);
5     return *a + *b;
6 }
```

On the right, a video player window shows Matt Godbolt speaking at a conference. The video title is "What Else Has My Compiler Done For Me Lately? Unbolting the Compiler's Lid...Again". The C++Now 2018 logo is visible in the top right corner of the video frame.

Matt Godbolt
What Else Has My Compiler
Done For Me Lately? Unbolting
the Compiler's Lid...Again

Video Sponsorship
Provided By:

C++Now 2018: Matt Godbolt - What else has compiler done for me lately? (7/7)

The video player interface shows the following details:

- Event Logo:** C++ now 2018, MAY 7 - 11, cppnow.org
- Speaker:** Matt Godbolt
- Title:** What Else Has My Compiler Done For Me Lately? Unbolting the Compiler's Lid...Again
- Code Editor:** Shows the command '\$ make'.
- Links:** A list of GitHub links:
 - github.com/mattgodbolt/compiler-explorer
 - github.com/mattgodbolt/compiler-explorer-image
 - Running locally is easy!
- Sponsorship:** Video Sponsorship Provided By:

- ▶ [GitHub](#)
- ▶ [Image](#)

IntelliCode in Visual C++

- ▶ [VCBlog](#)
- ▶ [YouTube](#)
- ▶ Uses SFML: Simple and Fast Multimedia Library

IntelliCode uses machine learning to train over thousands of real-world projects including open-source projects on GitHub. As such, IntelliCode will be most helpful when using common libraries such as STL. Based on this training, IntelliCode saves your time by putting what you're most likely to use at the top of your IntelliSense completion list.

VS2019 Preview

- ▶ Release notes
- ▶ Live Share
 - ▶ Blog post
 - ▶ Reddit

CLion 2019 Roadmap

- [Blog post](#)

IKOS static analyzer from NASA

- ▶ GitHub
 - ▶ Reddit announcement

IKOS is a **sound** static analyzer for C and C++ based on LLVM, developed at NASA.

Here, **sound** means that it is mathematically correct and cannot miss a bug, thanks to the theory of Abstract Interpretation. The counterpart is that it might produce false positives.

IKOS checks for a lot of undefined behaviors, such as buffer overflows, divisions by zero and so on. The full list is available [here](#). The list is somewhat similar to UBSan checks.

Concepts



Ólafur Waage

@olafurw

Andrew Sutton said something like this at CppCon:

"You can make your own concepts, but be careful, it's harder than you think!"

I went, "What do you mean? It's just compile time template argument validation. How hard can it be?"

Then I saw std::Boolean

en.cppreference.com/w/cpp/concepts...

23 Likes

2 Retweets

5 Dec 2018 at 12:00

via TweetDeck

std::Boolean concept

Standard Ranges, by Eric Niebler

- ▶ [Blog post](#)

Ranges got merged and will be part of C++20. This is huge news and represents probably the biggest shift the Standard Library has seen since it was first standardized way back in 1998.

Library: SQLite ORM

SQLite ORM light header only library for modern C++

- ▶ [Code](#) (BSD-2-Clause)
 - ▶ C++14
 - ▶ No raw string queries
 - ▶ CRUD support; pure select query support
 - ▶ Custom types binding support
 - ▶ Supports: BLOB - maps to std::vector<char> or a custom type;
FOREIGN KEY; composite keys; JOIN; transactions; ORDER BY and LIMIT,
OFFSET, GROUP BY / DISTINCT, INDEX, COLLATE
 - ▶ Migration functionality
 - ▶ The only dependency - [libsqLite3](#)
 - ▶ No undefined behaviour - if something goes wrong lib throws an exception
 - ▶ In-memory database support - provide :memory: or empty filename

Library: Inja - a template engine for modern C++

► Code

- ▶ Licence: MIT
- ▶ Header-only
- ▶ Uses NLoehmann's [JSON library](#)
- ▶ [Conan wrapper](#)

```
1 json data;
2 data["name"] = "world";
3 inja::render("Hello {{ name }}!", data); // Returns "Hello world!"
```

Library: C++ REST SDK (formerly Casablanca) by Microsoft

► **Code**

- ▶ Licence: MIT
- ▶ C++11
- ▶ Supports Windows, Linux, macOS, iOS, Android

The C++ REST SDK is a Microsoft project for cloud-based client-server communication in native code using a modern asynchronous C++ API design. This project aims to help C++ developers connect to and interact with services.

Library: Caffe2 - A New Lightweight, Modular, and Scalable Deep Learning Framework

- ▶ [Website](#)
- ▶ [Code](#)
- ▶ Licence: Apache-2.0

Tool: Superluminal profiler for Windows

Website

- ▶ Combines sampling and instrumentation
- ▶ Visualizes thread communication flow
- ▶ Kernel-level callstacks
- ▶ Dynamic filtering of areas of interest
- ▶ High frequency sampling (8 KHz)
- ▶ Timeline view, call graph, source view
- ▶ 7-day free trial, then EUR 99/149/289

Twitter



Eric Niebler
@ericniebler

My other car is a Vasa.

13 Likes	0 Retweets
6 Dec 2018 at 22:42	via Twitter Web Client

Reddit

r/ProgrammerHumor • i.redd.it

I find this cup to represent Java perfectly

u/SLYGUY1205

