C++ Club UK Meeting 123

Gleb Dolgich

2021-02-25

Portability: should we stop using int?

- Reddit

Build2: Complete C++20 Modules Support with GCC

- Boris Kolpackov
  - Reddit

> ***build2*** *now provides conforming and scalable support for all the major C++20 Modules features when used with GCC. This includes named modules, module partitions (both interface and implementation), header unit importation, and include translation.*

Clang support is coming soon.

Meson Build 0.57.0

- Release notes
  - Reddit
- The Absolute Beginner's Guide to Installing and Using Meson

Highlights

- Experimental support for C++ modules in Visual Studio
- **meson test** only rebuilds test dependencies
- Support added for LLVM's thinLTO

Boosting Productivity and Performance with the NVIDIA CUDA 11.2 C++ Compiler

- NVIDIA
  - Reddit

> *All useful stuff for machine learning is written for cuda, so everyone is forced to buy Nvidia. Been waiting for opencl pytorch backend for years, but it just seems like nobody really has a reason to do it.* #

Anonymous types in C++

- Jan Bielak
  - Reddit

```
constexpr auto simplify(struct_(int numerator, denominator;) ratio) ->
    decltype(ratio)
{
    int gcd = std::gcd(ratio.numerator, ratio.denominator);
    return { ratio.numerator / gcd, ratio.denominator / gcd };
}
```

Hot reloading C++ for rapid development with the help of **fungos/cr**

- Alex Dixon
  - fungos/cr
  - cr.h: A Simple C Hot Reload Header-only Library

Library: Conceptual

A C++20 library adapting preexisting type_traits into concepts, as well as improving upon the preexisting standard ones with better subsumption.

- GitHub
  - Reddit

C++ Memory Safety

- Reddit

Library: VirtualMultiArray

Multi graphics card based C++ virtual array implementation that uses OpenCL just for the data transfers on PCIe bridge.

- GitHub
- Wiki
- Reddit

Library: Reference Views

rviews (reference views) is a header-only C++17 library that allows viewing an STL container via another STL container with lvalue semantics. E.g. you could view a list as it would be a vector, or even as it would be a map, or even both.

```
std::list<char> data{'a', 'b', 'c'};
vector_view view{data};
std::cout << view[0] << std::endl; // a
std::cout << view[1] << std::endl; // b
std::cout << view[2] << std::endl; // c
```

- GitHub
  - Reddit
  - See also: Vista
  - See also: Boost flat_map

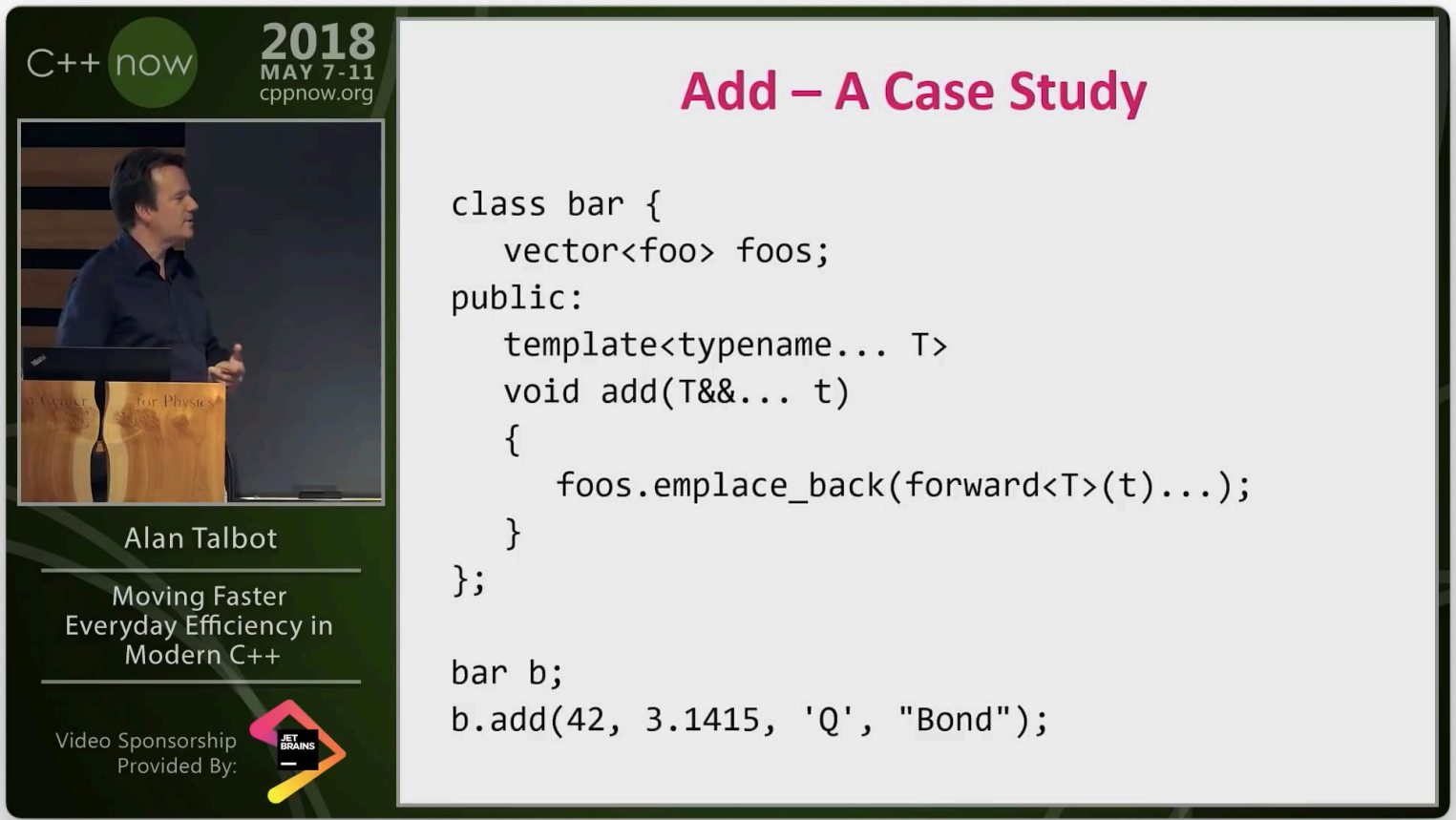
Library: Asio-chan

This library provides golang-inspired channel types to be used with ASIO awaitable coroutines. Channels allow bidirectional message passing and synchronization between coroutines.

- GitHub (C++20, MIT)
  - Reddit

Moving Faster: Everyday Efficiency in Modern C++

- C++Now 2018, YouTube
  - Reddit



Why no standard library support for command line parsing?

- Reddit
  - P0781R0 A Modern C++ Signature for `main`
  - TCLAP - Templatized Command Line Argument Parser: SourceForge, GitHub
  - Gflags, GitHub
  - Cxxopts
  - CLI11
  - Boost.Program_options
  - Quick Arg Parser: GitHub, Reddit
  - Lyra
  - Clara, blog post by Marius Bancila

```
1 std::vector<std::string_view> args(argv, argv+argc);
```

Number Parsing at a Gigabyte per Second

- Daniel Lemire
  - Paper
  - Reddit
  - fast_float (GitHub)
  - The Eisel-Lemire ParseNumberF64 Algorithm
  - Go Systems talk (YouTube)

std::jthread and cooperative cancellation with stop token

- Article on Nextptr
  - Reddit

Time Travel Debugging for C/C++

- Article
  - Reddit

Abbreviated Function Templates and Constrained Auto

- Sy Brand, Microsoft
  - Reddit

Library: C++20 container concepts

This library aims to provide general purpose concepts that are not available in the C++20 concepts library, most notably container concepts.

- GitHub
  - Reddit

Coderrect Scanner

A fast static analysis tool for detecting race conditions in C++ code.

Supports pthreads, `std::thread`, OpenMP, and more.

- Home Page
  - Reddit

Library: Fixed math (header-only, MIT)

- Reddit
  - GitHub (C++17, MIT)

Scientific computing in C++

- Reddit

Libraries

- Eigen
- Blaze
- Boost uBLAS
- PETSc

Documenting C++ code

- Reddit
  - Doxygen, Sphinx + Breathe ⇒ {fmt}
  - Standardese
  - clang-doc
  - hdoc
  - Adobe Hyde

CMake and the Future of C++ Package Management

- Borislav Stanimirov
  - Reddit

Motivating examples of coroutines

- Reddit
- Previously: Reddit

The perils of the accidental C++ conversion constructor

- Raymond Chen
  - Reddit

> *No one hates C++ more than the people who love C++.* #

Making Win32 APIs More Accessible to More Languages

- Microsoft
  - C++/WinRT

C++ and game engines

- Reddit

> *Hey, I started out with C++ 3 months ago and really love it. I already have some experience in Unity, but I'd like to use C++. Is there any engine you would recommend me to try out? I know about Unreal Engine but I can't find any good tutorials for how to use C++ with Unreal Engine. Is there any other option or a tutorial series or anything you could recommend me?*

Game developers, what compiler optimization setting do you use?

- Reddit

EnTT 3.6.0

Gaming meets modern C++ - a fast and reliable entity component system (ECS) and much more.

- Announcement on Reddit
  - GitHub (C++17, MIT)

Better CMake

- Videos by Jefferson Amstutz

Solving differential equations with LLVM

Heyoka is a C++ library for the integration of ordinary differential equations (ODEs) via Taylor's method. Notable features include:

- support for both double-precision and extended-precision floating-point types (80-bit and 28-bit),
- the ability to maintain machine precision accuracy over tens of billions of timesteps, batch mode integration to harness the power of modern SIMD instruction sets,
- a high-performance implementation of Taylor's method based on automatic differentiation techniques and aggressive just-in-time compilation via LLVM.

Links

- GitHub (C++17, MPL-2.0)
  - Docs
  - Reddit

TTauri: modern retained-mode GUI library in C++20

- GitHub
  - Reddit

C++20 Coroutines: sketching a minimal async framework

- Jeremy Ong
  - Reddit

C++ Performance Trap #1: Constant-size std::vector

- Scott Wolchok
  - Reddit
  - Software optimization resources, by Agner

C++ Performance Trap #2: Unnecessary std::function

- Scott Wolchok
  - Reddit

Inlining and Compiler Optimizations

- Scott Wolchok
  - Reddit