C++ Standards Meeting November 2014 Urbana Champaign

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2014-10-30

HEP @ C++ Committee

- Axel = Walter - knowledge
  - experience - recognition
  - creativity

- novice :-(

- representing non-experts

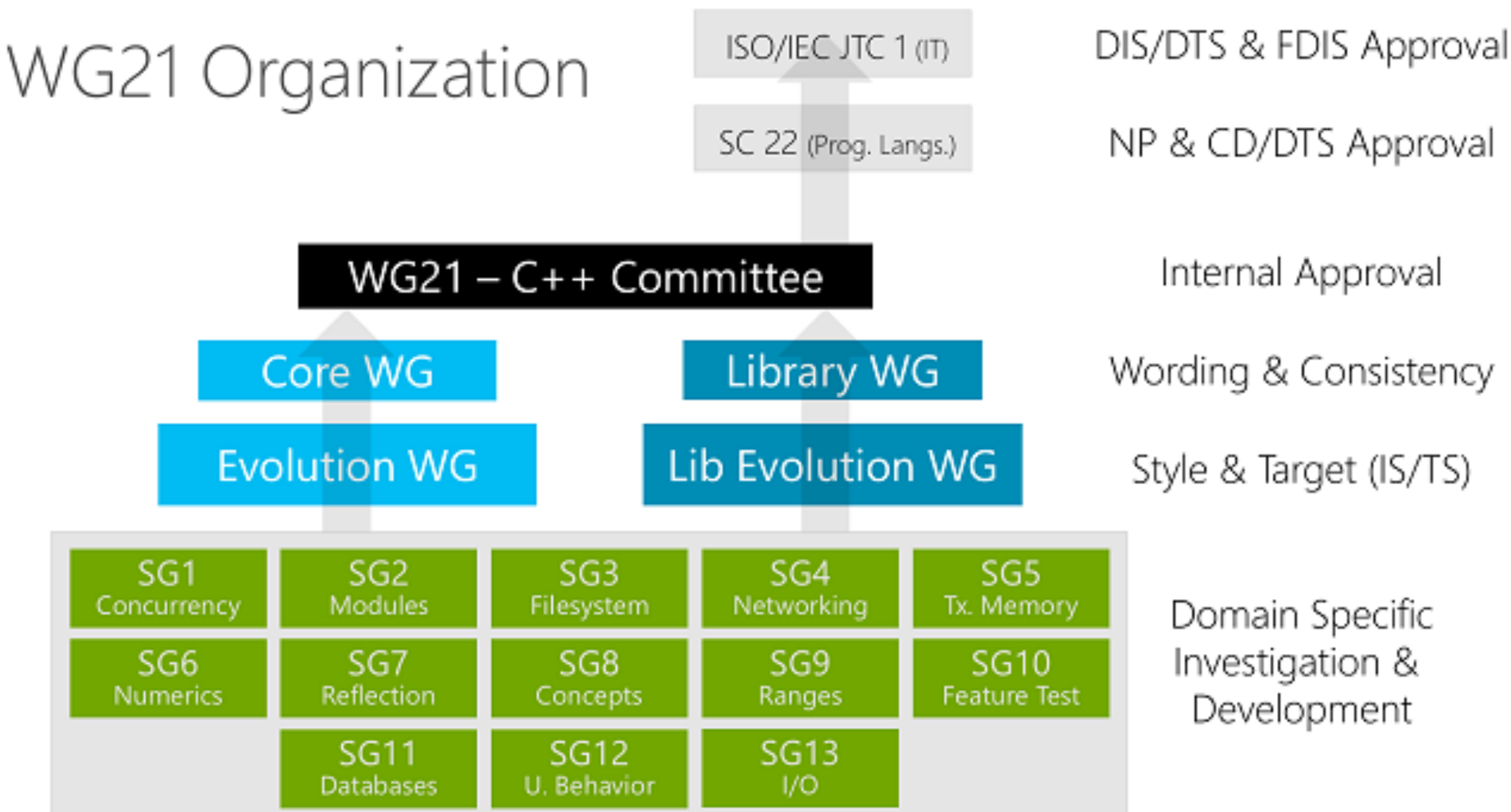
Content

- Intro: C++ standard, working groups, status
- Interesting proposals
  - HEP proposals

C++ Standard

- C++ is an ISO standard
- Meetings: 90..120 people discuss proposals
  - http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/
  - next is Nov 3-8 in Urbana Champaign, IL, US

C++ Committee



From isocpp.org

Standard

- https://isocpp.org/std/status
- C++14 is approved but not yet published
- Several Technical Specifications from Working Groups currently voted on or already accepted
  - file system, std::experimental::optional, parallelism

New Proposals

- Atomic Smart Pointers http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4162.pdf
- Toward More Expressive Iterator Tags http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4124.html decrementable_tag
- Checked dereference conditions http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4127.html if (T x : e) s
- Null Coalescing Conditional Operator http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4120.pdf a ? : b

New (2)

- Refining Expression Evaluation Order http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4228.pdf
- Pointer Ordering http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4229.pdf
- A Proposal to Add 2D Graphics Rendering and Display to C++ http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4073.pdf
- Variant: a typesafe union http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4218.pdf

New (3)

- Data-Invariant Functions http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4145.html runtime independent of control flow
- Inline variables, or encapsulated expressions http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4147.pdf inline auto stdout =…
- assert as operator http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4154.pdf
- Custom Diagnostics and SFINAE http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4186.pdf = delete ("error message")

New (4)

- Proposal for classes with runtime size http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4188.pdf
- Folding expressions http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4191.html
  (args + …)
- Attributes for namespaces and enumerators http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4196.html
- Allow constant evaluation for all non-type template arguments http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4198.html
  template<int*>

New (5)

- Strongly Typed bitset http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4202.html bitset<N, T>
- Generalized lifetime extension http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4221.pdf
- Towards uniform handling of subobjects http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4225.html public base:

Updates

- coordinate, array_view, bounds http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4177.html
- Reflection Type Traits For Classes, Unions and Enumerations http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4113.pdf
- Improved insertion interface for unique-key maps http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4240.html try_emplace insert_or_assign

Updates (2)

- std::rand replacement http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4217.html
- Non-member size() http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4155.htm
- Destructive Move http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4158.pdf
- Uniform Container Erasure http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4161.htm

Updates (3)

- Source-Code Information Capture http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4129.pdf source_context
- Generic Scope Guard and RAII Wrapper http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4189.pdf scope_exit, unique_resource
- Transactional Memory Support for C++ http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4179.html http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4180.pdf
- A Module System for C++ http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4214.pdf

Value + Status

- A Class for Status and Optional Value http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4233.html status_value
- utility class to represent expected monad http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4109.pdf expected

Parameter Packs

- Selecting from Parameter Packs http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4235.htm

- Fixed Size Parameter Packs http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4072.html

- Searching and Manipulation of Parameter Packs http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4144.html

Strings

- A compile-time string library template with UDL operator templates http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4236.html std::basic_string_literal

- Compile-Time String: std::string_literal<n> http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4121.pdf

- Fast ASCII Character Manipulation http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4203.html std::ascii

Default Comparison

- Default comparisons http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4175.pdf
- Defaulted Comparison Ops http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4126.htm
- Defaulted Comparison Using Reflection http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4239.pdf
- Thoughts about Comparisons http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4176.pdf

Call, Member Syntax

- Call syntax: x.f(y) vs. f(x,y) http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4174.pdf
- Unified Call Syntax http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4165.pdf
- Operator Dot http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4173.pdf
- Named arguments http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4172.htm

SIMD Types

- The Vector Type & Operations http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4184.pdf

- The Mask Type & Write-Masking http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4185.pdf

Concurrency

- C++ Latches and Barriers http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4204.html
- Supplements to C++ Latches http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4224.html
- Language Extensions for Vector loop level parallelism http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4237.pdf
- An Abstract Model of Vector Parallelism http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4238.pdf

Concurrency (2)

- Executors and Asynchronous Operations http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4242.html

- std::synchronic<T> http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4195.pdf

Coroutines

- Resumable Functions http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4134.pdf
- Stackful Coroutines and Stackless Resumable Functions http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4232.pdf
- Resumable Lambdas: A language extension for generators and coroutines http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4244.pdf

Networking

- Networking Library Proposal http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4243.html based on boost::asio; might get dependency on coroutines

- Networking Primitives: std::experimental::network::htonl Considered Harmful http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4249.html

Contracts

- Contracts Overview http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4110.pdf
- Language Support for Runtime Contract Validation http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4135.pdf
- Value constraints http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4160.html
- Library Preconditions are a Language Feature http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4248.html

Feedback

- Here!
- axel@cern.ch
  - Comments: anytime before the meeting
  - Welcoming new ideas + future proposals