

# C++ Standards Meeting

## November 2014

### Urbana Champaign

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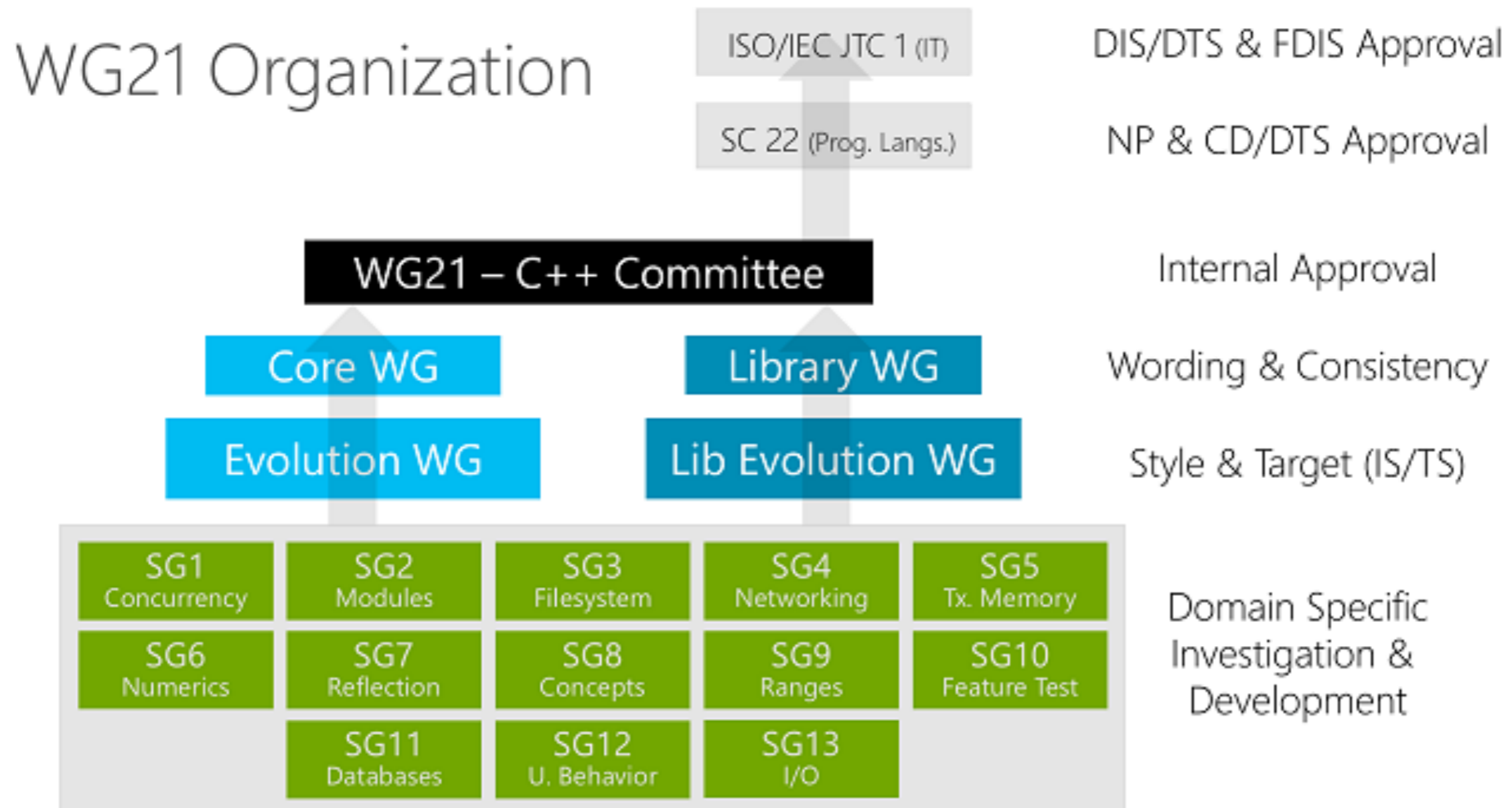
# Content

- Intro: C++ standard, working groups, status
- Interesting proposals
  - CERN 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](http://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 (args + ...) <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4191.html>
- 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)

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

# Updates (3)

- `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>

# 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`



# Networking

- Networking Library Proposal <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4243.html>
- Networking Primitives:  
std::experimental::network::htonl Considered Harmful <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2014/n4249.html>

# 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>

# 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](mailto:axel@cern.ch)
- Comments: anytime before the meeting
- Welcoming new ideas + future proposals