

WG21 2019-02 Kona Minutes of Meeting

ISO/IEC JTC1 SC22 WG21 N4805 — 2019-03-10

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18-23 February 2019, Kona, HI, USA

Chair: John Spicer

1. Opening activities

John Spicer opened the meeting at 8:34 UTC-10.

1.1 Opening comments, welcome from host

Thomas Plum welcomes the group.
Herb Sutter thanks the sponsors.
Jens presents the meeting amenities.

John Spicer presents the meeting wiki.

1.2 Meeting Guidelines

Every participant is responsible for understanding and abiding by the following:

- [The INCITS Antitrust Guidelines](#) (PL22.16)
- [The INCITS Patent Policy](#) (PL22.16)
- [The ISO Code of Conduct](#)
- [The WG21 Practices and Procedures, and Code of Conduct](#)

John Spicer presents the meeting guidelines. Please take the time to review these documents.

If you have any questions, or want to report a code of conduct issue, please talk to one of the officials.

1.3 Membership, voting rights, and procedures for the meeting

John Spicer reminds the room of the meeting procedures.

Hal Finkel reminds the room to sign the attendance list and wear name tags. There is a new paper numbering system, please use it.

John Spicer presents the voting rights.

1.4 Introductions

Officers and WG chairs introduce themselves
First time attendees introduce themselves.
John Spicer welcomes first time attendees.

1.5 Agenda review and approval

John Spicer presents the agenda for the meeting and reminds everyone that we start half an hour earlier than usual. The meeting will finish no later than 1:30pm on Saturday, but WGsmay continue working.

The primary goals of this meeting will be:

- Work on C++20 features

Additional, lower-priority goals include:

- Merge modules into Working Draft [P1103R2](#)
- Merge the Coroutines TS into the C++20 working draft, continuing to refine it in the IS draft and adopting its issues list into the main issues lists

PL22/16 motion to approve the meeting agenda.

Marshall Clow moves. Barry Hedquist seconds. The motion is unanimously approved by PL22/16.

WG21 motion to approve the meeting agenda.

The motion is unanimously approved by WG21.

1.6 Editor's reports, approval of working drafts

Document	Editor's report	Prospective WD
C++20 Standard	N4799	N4800
Coroutines TS	None	None
Networking TS	None	None
Library Fundamentals TS	N4787	N4786

Motion to approve editor's reports and working drafts.
The motion is unanimously approved by WG21.

1.7 Approval of the minutes of the previous meetings

PL22/16 motion to approve the PL22.16 minutes of the previous meeting.
Marshall Clow moves, Aaron Ballman seconds.
The motion is unanimously approved by PL22/16.

Meeting	Minutes
WG21 San Diego	N4790 N4802
WG21 pre-Kona administrative telecon	N4801

John Spicer calls for WG21 motion to approve the minutes of the previous meetings with the correction to the San Diego minutes number.
The motion is unanimously approved by WG21.

2. Liaison reports, and WG21 study group reports (see pre-meeting WG21 telecon minutes)

Additional report from the Direction Group.

Howard Hinnant presents.

3. WG progress reports and work plans for the week (Core, Evolution, Library, Library Evolution; see pre-meeting WG21 telecon minutes)

No discussion.

4. New business requiring action by the committee

No discussion.

5. Organize working groups and study groups, establish working procedures

John Spicer presents. WG and SG chairs must have proposals on the straw poll page no later than 8pm on Friday.

6. WG and SG sessions

Jens Maurer presents meeting room schedule, room assignments and evening session.

Evening sessions scheduled for the week :

- Monday:
 - SG15 Modules Tooling Interactions (Titus Winters and Bryce Adelstein Lelbach)
- Tuesday:
 - LEWGI Linear Algebra Requirements (Bryce Adelstein Lelbach)
 - SG14 Freestanding Implementations (Michael Wong; backup: Ville Voutilainen) [moved by pre-meeting teleconference]
- Wednesday:
 - Coroutines informational session (Ville Voutilainen): For a larger group, summarizing the results of EWG discussion and specifically the "late-sized type" design question and implementation alternatives
 - LWG Issues processing in Conf. Room 3 (Marshall Clow)
- Thursday:
 - SG13 Audio Basics [informational session] (Roger Orr) [see Fri pm for actual paper review by SG13]

- Overview: Timur Doumler and Guy Somberg's aim is to first describe the basics of audio in C++, that is, explain how an audio signal is represented digitally (linear PCM, samples, channels, frames, and buffers), explain the basic working of an audio device (inputs, outputs, buffer size, sample rate, callback-based vs. polling-based processing), and talk about our motivation why audio should be standardized for C++ in the first place.
- Editorial meeting in Conf. Room 6 (Richard Smith)
- Friday: no evening sessions

Meeting adjourned at 9:44 UTC-10

7. Review of the meeting (Saturday 8:00 AM)

John Spicer opened the meeting at 8:03 am UTC-10.

WG and SG status and progress reports.

- **SG5: Transactional memory (Boehm)**

Hans Boehm presents.

- **SG6: Numerics (Crowl)**

Lawrence Crowl presents.

- **SG7: Compile-time programming (Carruth)**

Chandler Carruth presents.

- **SG13: HMI & I/O (Human/Machine Interface) (Orr)**

Roger Orr presents.

- **SG12: Undefined and unspecified behavior (Dos Reis)**

Gabriel Dos Reis presents.

- **SG14: Games & low latency (Wong)**

Michael Wong presents.

- **SG15: Tooling (Adelstein Leibach)**

Bryce Adelstein Leibach presents.

- **SG16: Unicode (Honermann)**

Tom Honermann presents.

- **SG1: Concurrency (Giroux)**

Hans Boehm presents.

- **SG17: EWG Incubator (Bastien)**

JF Bastien presents.

- **SG18: LEWG Incubator (Adelstein Leibach)**

Bryce Adelstein Leibach presents.

- **SG19: Machine Learning (Wong)**

Michael Wong presents.

- **SG20: Education (van Winkel)**

JC van Winkel presents.

- **Evolution (Voutilainen)**

Ville Voutilainen presents.

- **Library Evolution (Winters)**

Titus Winters presents.

- **Core (Miller)**

Mike Miller presents.

John Spicer reminds the group on voting rules.

CWG Motions

Motion 1

Move to accept as Defect Reports all issues in [P1358R0](#) (Core Language Working Group "ready" Issues for the February, 2019 (Kona) meeting) and apply the proposed resolutions to the C++ working paper.

No objection to unanimous consent.

Motion passes

Motion 2

Move to accept as Defect Reports all issues in [P1359R0](#) (Core Language Working Group "tentatively ready" Issues for the February, 2019 (Kona) meeting) and apply the proposed resolutions to the C++ working paper.

No objection to unanimous consent.

Motion passes.

Motion 3

Move to accept as a Defect Report and apply the changes in [P1286R2](#) (Contra CWG DR1778) to the C++ working paper.

No objection to unanimous consent.

Motion passes.

Motion 4

Move to apply the changes in [P1091R3](#) (Extending structured bindings to be more like variable declarations) to the C++ working paper. *[Note that this paper is modified by the next motion.]*

No objection to unanimous consent.

Motion passes.

Motion 5

Move to apply the changes in [P1381R1](#) (Reference capture of structured bindings) to the C++ working paper. *[Note that this paper assumes that the preceding motion passes.]*

No objection to unanimous consent.

Motion passes.

Motion 6

Move to apply the changes in [P1041R4](#) (Make char16_t/char32_t string literals be UTF-16/32) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 7

Move to apply the changes in [P1139R2](#) (Address wording issues related to ISO 10646) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 8

Move to apply the changes in [P1323R2](#) (Contract postconditions and return type deduction) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 9

Move to apply the changes in [P0960R3](#) (Allow initializing aggregates from a parenthesized list of values) to the C++ working paper.

Objections to unanimous consent.

In favor : 40
Opposed : 9
Abstain : 13

Motion passes.

Motion 10

Move to accept as a Defect Report and apply the changes in [P1009R2](#) (Array size deduction in new-expressions) to the C++ working paper. *[Note that this paper assumes that the preceding motion passes.]*

No objection to unanimous consent.
Motion passes.

Motion 11

Move to apply the changes in [P1103R3](#) (Merging Modules) to the C++ working paper.

Objections in the room.
In favor : 43

Opposed : 6
Abstain : 16

Motion passes.

Motion 12

Move to apply the changes in [P1185R2](#) (<=> != ==) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Reflection TS

Motion 13

Move to apply the changes in [P1390R1](#) (Reflection TS NB comment resolutions: summary and rationale) to the Reflection TS working paper.

No objection to unanimous consent.
Motion passes.

Motion 14

Move to appoint a review committee composed of Axel Naumann, Roger Orr, Hubert Tong, and Guy Davidson to approve the correctness of the Technical Specification for C++ Extensions for Reflection working paper as modified by the motions approved at this meeting, and to direct the Convener to transmit the approved updated working paper for publication.

Call for volunteers for review committee.
Roger Orr, Hubert Tong, Guy Davidson volunteer.
Jens Maurer updates the motion with the names of the reviewers.

No objection to unanimous consent.
Motion passes.

Coroutines

Motion 15

Move to apply the changes in [P0912R5](#) (Merge Coroutines TS into C++20 working draft) to the C++ working paper and incorporate all open issues against the TS into the core language issues list.

Objections in the room:
In favor : 48
Opposed : 4
Abstained : 15
Motion passes.

- **Library (Clow)**

Marshall Clow presents.

LWG Motions

Library Fundamentals

Motion 1

Move to apply the changes in [P0052R10](#) (Generic Scope Guard and RAII Wrapper for the Standard Library) to the Library Fundamentals 3 working paper.

No objection to unanimous consent.

Motion passes.

Thomas Köppe : This may not be ready to be included in the post-meeting mailing.

Draft Standard

Motion 2

Move to apply to the C++ working paper the proposed resolutions of all of the issues in [P1457R0](#) (C++ Standard Library Issues to be moved in Kona).

No objection to unanimous consent.

Motion passes.

Motion 3

Move to apply the changes in [P0339R6](#) (`polymorphic_allocator<>` as a vocabulary type) to the C++ working paper.

Objections in the room:

In favor : 40

Opposed : 0

Abstained : 24

Motion passes.

Motion 4

Move to apply the changes in [P0340R3](#) (Making `std::underlying_type` SFINAE-friendly) to the C++ working paper.

No objection to unanimous consent.

Motion passes.

~~*Motion 5*~~

~~Move to apply the changes in [P1272R1](#) (Byteswapping for fun&&nuf) to the C++ working paper.~~

Motion 6

Move to apply the changes in [P0738R2](#) (I Stream, You Stream, We All Stream for `istream_iterator`) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 7

Move to apply the changes in [P1458R1](#) (Mandating the Standard Library: Clause 16 - Language support library) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 8

Move to apply the changes in [P1459R1](#) (Mandating the Standard Library: Clause 18 - Diagnostics library) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 9

Move to apply the changes in [P1462R1](#) (Mandating the Standard Library: Clause 20 - Strings library) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 10

Move to apply the changes in [P1463R1](#) (Mandating the Standard Library: Clause 21 - Containers library) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 11

Move to apply the changes in [P1464R1](#) (Mandating the Standard Library: Clause 22 - Iterators library) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 12

Move to accept as a Defect Report and apply the changes in [P1164R1](#) (Make create_directory() Intuitive) to the C++ working paper.

Objections in the room.

In favor : 48

Opposed : 1

Abstained : 13

Motion passes.

Motion 13

Move to apply the changes in [P0811R3](#) (Well-behaved interpolation for numbers and pointers) to the C++ working paper.

No objection to unanimous consent.

Motion passes.

Motion 14

Move to apply the changes in [P1001R2](#) (Target Vectorization Policies from Parallelism V2 TS to C++20) to the C++ working paper.

No objection to unanimous consent.

Motion passes.

Motion 15

Move to apply the changes in [P1227R2](#) (Signed ssize() functions, unsigned size() functions) to the C++ working paper.

Objections in the room.

In favor : 42

Opposed : 5

Abstained : 19

Motion passes.

Motion 16

Move to apply the changes in [P1252R2](#) (Ranges Design Cleanup) to the C++ working paper.

No objection to unanimous consent.

Motion passes.

Motion 17

Move to apply the changes in [P1024R3](#) (Usability Enhancements for `std::span`) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 18

Move to apply the changes in [P0920R2](#) (Precalculated hash values in lookup) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 19

Move to apply the changes in [P1357R1](#) (Traits for [Un]bounded Arrays) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

- Direction Group (Hinnant)

Howard Hinnant presents.

8. Closing activities

8.1 Issues delayed until today

No discussion.

8.2. PL22.16 motions, if any

- 1) **PL22.16, the US TAG to ISO/IEC JTC1 / SC22 / WG21, approves to WITHDRAW ISO/IEC TS 19571:2015 in the Systematic Review for that document.**

Barry Hedquist moves.
Adam Martin seconds.

In favor : 36
Opposed : 0
Abstained : 2

Motion Passes

9. Plans for the future (PL22.16)

9.1 Next and following meetings

2019-07-15/20: Cologne, Germany ([N4783](#))
2019-11-04/09: Belfast, Northern Ireland ([N4782](#))
2020-02-10/15: Prague, Czech Republic
2020-06-01/06: Bulgaria

2020-11: New York, tentative
2021-02: Kona, HI, USA

9.2. Mailings

2018-03-11: Post-Kona
2019-06-17: Pre-Cologne

10. Adjournment

Thank you the host and the sponsors.

PL22.16 motion to adjourn.
Marshall Clow moves. Adam Martin seconds.
Approved by unanimous consent.

John Spicer adjourns the meeting at 11:26 am UTC-10.

11. Attendance

Name	Representing	NB
Aaron Ballman	GammaTech Inc	
ADAM David Alan Martin	MongoDB Inc	

Name	Representing	NB
Alan Talbot	LTK Engineering Services	
Alex Wells	Intel Corporation	
Alisdair Meredith	Bloomberg	
Andreas Weis	BMW	
Andrew Lumsdaine	Pacific Northwest National Laboratory	
Andrzej Krzemienski		PL
Anton Polukhin	Yandex.Taxi	RU
Attila Feher	Bloomberg	
Authur O'Dwyer		
Axel Naumann	CERN	CH
Barry Hedquist	Perennial	
Barry Revzin	Jump Trading	
Ben Boeckel	Kitware, Inc.	
Benjamin Craig	National Instruments	
Benjamin Saks	Saks & Associates	
Billy Baker	FlightSafety International	
Bjarne Stroustrup	Morgan Stanley	
Botond Ballo	Mozilla	CA
Brian Van Straalen	Lawrence Berkeley National Laboratory	
Bruno Lopes	Apple	
Bryce Adelstein Lelbach	NVidia Corporation	
Casey Carter	Microsoft Corporation	
Chandler Carruth	Google	
Chanyoung Park		CA
Charles-Henri Gros	Synopsys Inc	

Name	Representing	NB
Chris Kennelly	Google	
Chris Kohlhoff		GB
Christian Trott	Sandia National Laboratories	
Christof Meerwald	Programming Research Ltd	
Christopher Di Bella	Codeplay	
Christopher Earl	Lawrence Livermore National Laboratory	
CJ Johnson	Google	
Corentin Jabot		FR
Damien Lebrun-Grandie	Oak Ridge National Laboratory	
Daniel Sunderland	Sandia National Laboratories	
Danila Kutenin	Yandex	
Daveed Vandevoorde	Edison Design Group	
David Goldblatt	Facebook	
David Hollman	Sandia National Laboratories	
David Olsen	NVidia Corporation	
David Sankel	Bloomberg	
David Stone	Google	
Davis Herring	Los Alamos National Laboratory	
Dawn Perchik		
Detlef Vollmann	Vollmann Engineering	CH
Dietmar Kühl	Bloomberg	
Ellen Hedrick	Edison Design Group	
Eric Fiselier	Google	
Eric Niebler	Facebook	
Erich Keane	Intel Corporation	

Name	Representing	NB
Fabio Fracassi		DE
Faisal Vali		
Frank Birbacher	Bloomberg	
Gabriel Dos Reis	Microsoft Corporation	
Geoffrey Romer	Google	
Georgi Dimitrov	VMware Inc	BG
Gor Nishanov	Microsoft Corporation	
Graham Lopez	Oak Ridge National Laboratory	
Guy Davidson	Creative Assembly	GB
Guy Somberg	Echtra Games	
Hal Finkel	Argonne National Laboratory	
Hana Dusíková	AVAST	CZ
Hans Boehm	Google	
Herb Sutter	Microsoft Corporation	
Howard Hinnant	Ripple Labs	
Hubert Tong	IBM Corporation	CA
Iain Sandoe		
Isabella Muerte		
J. Daniel García	University Carlos III of Madrid	ES
J.C. van Winkel		NL
Jade Alglave	ARM Ltd	
James Dennett	Google	
James Touton	Blizzard	
Jared Hoberock	NVIDIA Corporation	
Jason Carey	MongoDB Inc	

Name	Representing	NB
Jason Merrill	Red Hat Inc	
Jean-Francois Bastien	Apple	CA
JeanHeyd Meneide		
Jeff Garland	Crystal Clear Software	
Jeff Snyder	PDT Partners	GB
Jeffrey Mendelsohn	Bloomberg	
Jeffrey Yasskin	Google	
Jens Maurer	Edison Design Group	
John Lakos	Bloomberg	
John Spicer	Edison Design Group	
Jonathan Brian Coe		GB
Jonathan Caves	Microsoft Corporation	
Jonathan Wakely	Red Hat Inc	GB
Jorg Brown	Google	
Joshua Berne	Bloomberg	
Juan Alday	GreenWireSoft	
Kelly Walker	Stellar Science	
Kirk Shoop	Facebook	
Lars Gullik Bjønnes	Cisco Systems Inc	
Lawrence Crowl	Perennial	
Lee Howes	Facebook	
Lewis Baker	Facebook	
Li-Ta Lo	Los Alamos National Laboratory	
Lisa Lippincott	Tanium	
Louis Dionne	Apple	CA

Name	Representing	NB
Maged Michael	Facebook	
Marcin Grzebieluch	Sii Poland	PL
Mark Hoemmen	Sandia National Laboratories	
Marshall Clow	C Plus Plus Alliance Inc	
Mateusz Pusz	EPAM Systems Inc	PL
Mathias Stearn	MongoDB Inc	
Matt Calabrese	Google	
Maurice Barnhy		
Michael Garland	NVidia Corporation	
Michael Spencer	Apple	
Michael Spertus	Symantec	
Michael Wong	Codeplay	CA
Michał Dominiak	NVidia Corporation	PL
Mihail Mihaylov		BG
Mike Herrick	Edison Design Group	
Nathan Burgers	Bloomberg	
Nathan Myers	Maystreet	
Nathan Sidwell	Facebook	
Nathaniel Goodspeed	Linden Research, Inc	
Neal Meyer	Amazon Corporate LLC	
Nevin Liber	Argonne National Laboratory	
Nicolai Josuttis		DE
Nicolas Lesser	Albert-Ludwigs-Universität Freiburg	
Nina Dinka Ranns	Edison Design Group	GB
Olga Arkhipova	Microsoft Corporation	

Name	Representing	NB
P.J. Plauger	Dinkumware Ltd	
Pablo Halpern	Intel Corporation	
Patrice Roy	Université de Sherbrooke	CA
Paul McKenney	IBM Corporation	
Paul Preney	University of Windsor	CA
Peter Sommerlad	HSR	CH
Rene Rivera	C Plus Plus Alliance Inc	
Richard Smith	Google	
Robert Schumacher	Microsoft Corporation	
Robert Simpson	Qualcomm Inc	
Robert Steagall	KEWB Computing	
Roger Orr		GB
Ronan Keryell	Xilinx	
Rostislav Khlebnikov	Bloomberg	
Ryan McDougall	Zoox Inc	CA
Sebastian Messmer	Facebook	
Shuo Feng Liu	IBM Corporation	CA
Stephan Boekelmann	Ruhr-Universität Bochum	
Stephen Michels	WGZM	
Stephen Schurr	Ripple Labs	
Steve Downey	Bloomberg	
Sylvio Dos Reis		
Tabea Röthemeyer	Ruhr-Universität Bochum	
Tana Plauger	Dinkumware Ltd	
Thomas Koeppe		

Name	Representing	NB
Thomas Plum	Plum Hall Inc	
Thomas Rodgers	Red Hat Inc	
Thomas Scogland	Lawrence Livermore National Laboratory	
Tim Northover	Apple	
Timur Doumler	Jetbrains	GB
Titus Winters	Google	
Tom Honermann	Synopsys Inc	
Tyler Sutton	Lock3Software	
Victor Zverovich	Facebook	
Ville Voutilainen	Plum Hall Inc	FI
Vincent Reverdy	Paris Observatory	FR
Vito Giovanni Castellana	Pacific Northwest National Laboratory	
Walter Brown	Brown	
William Miller	Edison Design Group	
William Seymour	Seymour	
Wyatt Childers	Lock3Software	
Xinmin Tian	Intel Corporation	
Zach Laine	Cadence	