WG21 2019-07 Cologne Minutes of Meeting

ISO/IEC JTC1 SC22 WG21 N4826 — 2019-08-03

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15-20 July 2019, Cologne, Germany

Chair: John Spicer

1.   Opening activities

John Spicer opened the meeting at 9:03 UTC+2.

1.1 Opening comments, welcome from host

Nico Josuttis welcomes the group and thanks the sponsors.
Nico Josuttis presents the local amenities.

John Spicer presents the meeting agenda.

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 IEC 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 CoC issues, please approach a committee officer or a NB representative and bring it to their attention.
If you have any technical issues or concerns, please bring them up as soon as possible.

1.3 Membership, voting rights, and procedures for the meeting

John Spicer presents voting rights.

Hal Finkel reminds the room to sign attendance sheet and to wear name tags.

If you need a paper number, please use the isocpp.org website. If you do not have access to the paper number system, please send Hal Finkel or Herb Sutter an e-mail.

1.4 Introductions

Officers, WG chairs and SG 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. The meeting will finish no later than 2pm on Saturday, but WGs may continue working.

John Spicer presents the meeting goals. Primary goal is to work on C++20 features and to start the CD ballot.

Herb Sutter presents. We are the stage where we do not take in new features, but there may be exceptions. If LEWG or EWG agrees a paper is a bug fix or that it is an exception, and if the group accepts it, then it goes to the end of the queue for CWG and LWG.
A paper that misses C++20 will go to the next ship vehicle.

PL22/16 motion to approve the meeting agenda.
Marshall Clow moves. Adam Martin 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	N4821	N4820
Library Fundamentals TS	N4807	N4806
Reflection TS	N4819	N4818

John Spicer presents. There was an update to the Reflection TS to prepare it for the rebasing.

PL22/16 motion to approve editor's reports and working drafts.
Marshall Clow moves. Barry Hedquist seconds. The motion is unanimously approved by PL22/16.

WG21 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

Meeting	Minutes
WG21 Kona	N4805
PL22.16 Kona	pl22.16-2019-00003
WG21 pre-Cologne administrative telecon	N4822

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

WG21 motion to approve minutes of the previous meeting.
The motion is unanimously approved by WG21.

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

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

4. New business requiring action by the committee

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. If you have any questions or concerns, please bring them up with papers authors and/or SG/WG chairs to avoid surprises on Saturday that could have been dealt with earlier.

6. WG and SG sessions

Jens Maurer presents meeting room assignments.
Jens Maurer presents the evening sessions.
Jens Maurer presents the meeting schedule.

Please make sure your new feature has a feature test macro. If you have questions, please ask John Spicer.

John Spicer presents. We use a shared wiki login. Do not edit the wiki, unless you have been asked to do so. Attaching papers is fine.

Direction Group report, Michael Wong presents. DG re-confirms support for the C++ schedule as published in P1000R1.

Meeting adjourned at 9:34 UTC+2.

7. Review of the meeting (Saturday 8:30 AM)

John Spicer opened the meeting at 8:30 am UTC+2.

Herb Sutter presents.
We have a new study group - SG21 Contracts. John Spicer will be the chair.

From the pre-Belfast mailing onward we will accept html and pdf format only. c If it is a revision of a previous paper, we will allow the same format as the previous revision in the next post-meeting mailing.

As pointed out in P1000, we will not accept new papers unless a poll to make an exception succeeds.

WG and SG status and progress reports.

- ◦ **SG2: Modules (Stone)**

No report.

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

No report.

- ◦ **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.

- ○ **SG19: Machine Learning (Wong)**

Michael Wong presents.

- ○ **SG15: Tooling (Adelstein Lelbach)**

Bryce Adelstein Lelbach presents.

- ○ **SG16: Unicode (Honermann)**

Tom Honermann presents.
- ○ **SG20: Education (van Winkel)**

Christopher Di Bella presents.

- ○ **SG1: Concurrency (Giroux)**

Olivier Giroux presents.

- ○ **SG17: EWG Incubator (Bastien)**

JF Bastien presents.

- ○ **Evolution (Voutilainen)**

Ville Voutilainen presents.

- ○ **SG18 LEWG Incubator (Adelstein Lelbach)**

Bryce Adelstein Lelbach presents.

- ○ **Library Evolution (Winters)**

Titus Winters presents.

- ○ **Core (Miller)**

Mike Miller presents.

CWG Motions

Motion 1
Move to accept as Defect Reports all issues in P1510R0 (Core Language Working Group "tentatively ready" Issues for the July, 2019 (Cologne) meeting) and apply the proposed resolutions to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 2
Move to apply the changes in P1161R3 (Deprecate uses of the comma operator in subscripting expressions) to the C++ working paper.

Objection to unanimous consent.
Herb Sutter reminds the group of the voting rules.

In favor: 61
Opposed 1
Abstain : 8
Motion passes.

Motion 3
Move to apply the changes in P1331R2 (Permitting trivial default initialization in constexpr contexts) to the C++ working paper.

Objection to unanimous consent.
In favor : 61
Opposed : 0
Abstain : 11

Motion passes.

Motion 4
Move to apply the changes in P0735R1 (Interaction of `memory_order_consume` with release sequences) to the C++ working paper.

No objection to unanimous consent.

Motion passes.

Motion 5
Move to apply the changes in P0848R3 (Conditionally Trivial Special Member Functions) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 6
Move to apply the changes in P1186R3 (When do you actually use <=>?) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 7
Move to apply the changes in P1301R4 (`[[nodiscard("should have a reason")]]`) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 8
Move to apply the changes in P1099R5 (Using Enum) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 9
Move to apply the changes in P1630R1 (Spaceship needs a tune-up) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 10
Move to apply the changes in P1616R1 (Using unconstrained template template parameters with constrained templates) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 11
Move to apply the changes in P1816R0 (Wording for class template argument deduction for aggregates) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 12
Move to apply the changes in P1668R1 (Enabling `constexpr` Intrinsics By Permitting Unevaluated inline-assembly in `constexpr` Functions) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 13
Move to apply the changes in P1766R1 (Mitigating minor modules maladies) to the C++ working paper and accept the changes therein for default arguments and classes having typedef names for linkage purposes as Defect Reports.

No objection to unanimous consent.
Motion passes.

Motion 14
Move to apply the changes in P1811R0 (Relaxing redefinition restrictions for re-exportation robustness) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 15
Move to apply the changes in P0388R4 (Permit conversions to arrays of un-known bound) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 16
Move to apply the changes in P1823R0 (Remove Contracts from C++20) to the C++ working paper.

There are objections in the room.
In favour : 68
Opposed : 0
Abstain : 4
Motion passes.

Motion 17
Move to apply the changes in P1143R2 (Adding the `constinit` keyword) to the C++ working paper.

No objection to unanimous consent.

Motion passes.

Motion 18
Move to apply the changes in P1452R2 (On the non-uniform semantics of *return-type-requirement*s) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 19
Move to apply the changes in P1152R4 (Deprecating `volatile`) to the C++ working paper.

There are objections in the room.
In favour : 63
Opposed : 1
Abstain : 7
Motion passes.

Motion 20
Move to accept the changes in P1771R1 (`[[nodiscard]]` for constructors) as a Defect Report and apply them to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 21
Move to apply the changes in P1814R0 (Wording for Class Template Argument Deduction for Alias Templates) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 22
Move to apply the changes in P1714R1 (NTTP are incomplete without float, double, and long double!) to the C++ working paper.

This is potentially a new feature.
Are we considering this motion for C++20 ?
In favour : 39
Opposed : 14
Abstain : 21
NB objection to this poll : 2

Motion 22 has been withdrawn

Motion 23

Move to accept the changes in P1825R0 (Merged wording for P0527R1 and P1155R3) as a Defect Report and apply them to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 24
Move to accept the changes in P1703R1 (Recognizing Header Unit Imports Requires Full Preprocessing) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 25
Move to accept the changes in P0784R7 (More constexpr containers) to the C++ working paper.

There are objections in the room.
In favour : 61
Opposed : 0
Abstain : 9
Motion passes.

◦ **Library (Clow)**

Marshall Clow presents.

LWG Motions

Motion 1
Move to apply the changes in P1724R0 (C++ Standard Library Issues to be moved in Cologne) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 2
Move to apply the changes in P1355R2 (Exposing a narrow contract for `ceil2`) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 3

Move to apply the changes in P0553R4 (Bit operations) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 4
Move to apply the changes in P1424R1 ('constexpr' feature macro concerns) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 5
Move to apply the changes in P0645R10 (Text Formatting) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 6
If motion 5 passes, move to apply the changes in P1361R2 (Integration of chrono with text formatting) to the working paper.

No objection to unanimous consent.
Motion passes.

Motion 7
If motion 5 passes, move to apply the changes in P1652R1 (Printf corner cases in `std::format`) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 8
Move to apply the changes in P0631R8 (Math Constants) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 9
Move to apply the changes in P1135R6 (The C++20 Synchronization Library), P1643R1 (Add wait/notify to atomic_ref), and P1644R0 (Add wait/notify to atomic<shared_ptr>) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 10

Move to apply the changes in P1466R3 (Miscellaneous minor fixes for chrono) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 11

Move to apply the changes in P1754R1 (Rename concepts to standard_case for C++20, while we still can) to the C++ working paper.

There are objections in the room.
In favor : 45
Opposed : 3
Abstain : 21
Motion passes.

Motion 12

Move to apply the changes in P1614R2 (The Mothership has Landed) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 13

Move to apply the changes in P0325R4 (`to_array` from LFTS with updates) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 14

Move to apply the changes in P0408R7 (Efficient Access to `basic_string-buf` 's Buffer) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 15

Move to apply the changes in P1423R3 (`char8_t` backward compatibility remediation) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 16

If Core motion 14 passes, move to apply the changes in P1502R1 (Standard library header units for C++20) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 17
Move to apply the changes in P1612R1 (Relocate Endian's Specification) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 18
Move to apply the changes in P1661R1 (Remove dedicated precalculated hash lookup interface) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 19
Move to apply the changes in P1650R0 (Output `std::chrono::days` with 'd' suffix) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 20
Move to apply the changes in P1651R0 (`bind_front` should not unwrap `reference_wrapper`) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 21
Move to apply the changes in P1065R2 (Constexpr INVOKE) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 22
Move to apply the changes in P1207R4 (Movability of Single-pass Iterators) to the C++ working paper.

There are objections in the room.
In favour : 39
Opposed : 0

Abstain : 31
Motion passes.

Motion 23
Move to apply the changes in P1035R7 (Input Range Adaptors) to the C++
working paper.

No objection to unanimous consent.
Motion passes.

Motion 24
If motion 22 and 23 pass, move to apply the changes in P1638R1 (`ba-sic_istream_view::iterator` should not be copyable) to the C++ working
paper.

No objection to unanimous consent.
Motion passes.

Motion 25
Move to apply the changes in P1522R1 (Iterator Difference Type and Integer
Overflow) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 26
Move to apply the changes in P1004R2 (Making `std::vector` constexpr) to
the C++ working paper.

There are objections in the room
In favour : 56
Opposed : 0
Abstain : 15
Motion passes.

Motion 27
Move to apply the changes in P0980R1 (Making `std::string` constexpr) to
the C++ working paper.

There are objections in the room
In favour : 55
Opposed : 0
Abstain: 15
Motion passes.

Motion 28

Move to apply the changes in P0660R10 (Stop Token and Joining Thread, Rev 10) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 29
Move to apply the changes in P1474R1 (Helpful pointers for `ContiguousIterator`) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 30
Move to apply the changes in P1523R1 (Views and Size Types) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 31
Move to apply the changes in P0466R5 (Layout-compatibility and Pointer-inter-convertibility Traits) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

Motion 32
Move to apply the changes in P1208R6 (Adopt source_location for C++20) to the C++ working paper.

No objection to unanimous consent.
Motion passes.

WG21 Motion

Motion 1
Move to appoint an editing committee composed of Daniel Kruegler, Davis Herring, Nina Ranns, and Ville Voutilainen to approve the correctness of the C++ working paper as modified by the motions approved at this meeting, and to direct the Convener to transmit the approved updated working paper for CD ballot.

No objection to unanimous consent.
Motion passes.

- ◦ **Direction Group (Hinnant)**

No report.

8. Closing activities

8.1 Issues delayed until today

8.2. PL22.16 motions, if any

9. Plans for the future (PL22.16)

9.1 Next and following meetings

- 2019-11-04/09: Belfast, Northern Ireland ([N4782](#))
- 2020-02-10/15: Prague, Czech Republic ([N4817](#))
- 2020-06-01/06: Varna, Bulgaria
- 2020-11 New York (tentative)
- 2021-02 Kona, Hi, USA

9.2. Mailings

- 2019-08-05: Post-Cologne
- 2019-10-07: Pre-Belfast

10. Adjournment

Thank you the host and the sponsors.

PL22.16 motion to adjourn.
Marshall Clow moves. Barry Hedquist seconds.
Approved by unanimous consent.

John Spicer adjourns the meeting at 12:08 pm UTC+2.

11. Attendance

Name	Representing	NB
Aaron Ballman	GrammaTech Inc	
ADAM David Alan Martin	MongoDB Inc	
Adrian Cowan		
Adrien Hamelin		
Agustin Berge	Louisiana State University	
Aleksandr Fokin	Yandex	RU
Alex Wells	Intel Corporation	
Alexandru Croitor	The Qt Company	
Alexandru Voicu	AMD	
Alisdair Meredith	Bloomberg	
Andreas Bemitzke		
Andreas Fertig		
Andreas Reischuck	HicknHack Software GmbH	
Andreas Weis	BMW AG	DE
Andrew Lumsdaine	Pacific Northwest National Laboratory	
Andrew Soffer	Google	
Andrew Sutton	Lock3 Software	
Andrey Erokhin		
Andrzej Krzemienski	Sabre	PL
Anton Polukhin	Yandex.Taxi	RU
Attila Feher	Bloomberg	

Name	Representing	NB
Axel Naumann	CERN	CH
Barry Hedquist	Perennial	
Barry Revzin	Jump Trading	
Ben Boeckel	Kitware, Inc.	
Benjamin Saks	Saks & Associates	
Bernhard Manfred Gruber	CERN	
Billy Baker	FlightSafety International	
Billy O'Neal	Microsoft Corporation	
Bjarne Stroustrup	Morgan Stanley	
Boris Kolpackov		
Botond Ballo	Mozilla	CA
Bruno Lopes	Apple	
Bryan St. Amour		CA
Bryce Adelstein Lelbach	NVidia Corporation	
Bryce Kille		
Caleb Sunstrum	Edison Design Group	
Casey Carter	Microsoft Corporation	
Chandler Carruth	Google	
Chanyoung Park	Facebook	CA
Chris Kennelly	Google	
Chris Kohlhoff	**clearpool.io**	GB
Christian Trott	Sandia National Laboratories	
Christof Meerwald	Programming Research Ltd	
Christopher Di Bella	Codeplay	GB
Christopher Earl	Lawrence Livermore National Laboratory	

Name	Representing	NB
CJ Johnson	Google	
Clive Pygott		
Conor Hoekstra	Amazon Corporate LLC	
Corentin Brauge	Microsoft Corporation	
Corentin Jabot		FR
Cristian Adam	The Qt Company	
Damien Lebrun-Grandie	Oak Ridge National Laboratory	
Daniel Krügler		
Daniel Sunderland	Sandia National Laboratories	
Daniela Engert	GMH Prüftechnik GmbH	
Daveed Vandevoorde	Edison Design Group	
David Goldblatt	Facebook	
David Hollman	Sandia National Laboratories	
David Olsen	NVidia Corporation	
David Sankel	Bloomberg	
David Stone	Uber	
Davis Herring	Los Alamos National Laboratory	
Dawid Pilarski		PL
Detlef Vollmann	Vollmann Engineering	CH
Dietmar Kühl	Bloomberg	
Duncan Exon Smith	Apple	
Elias Kosunen		
Eric Niebler	Facebook	
Erich Keane	Intel Corporation	
Espen Harlinn		NO

Name	Representing	NB
Eugenio Bargiacchi	Vrije Universiteit Brussel	
Fabio Fracassi		DE
Federico Kircheis		
Florian Sattler		
Floris Bob van Elzelingen		
Frank Birbacher	Bloomberg	
Gabriel Dos Reis	Microsoft Corporation	
Geoffrey Romer	Google	
Gor Nishanov	Microsoft Corporation	
Graham Lopez	Oak Ridge National Laboratory	
Guy Davidson	Creative Assembly	GB
Hal Finkel	Argonne National Laboratory	
Hana Dusíková	AVAST	CZ
Hannes Hauswedell	Freie Universität Berlin	
Hans Boehm	Google	
Hartmut Kaiser	Louisiana State University	
Herb Sutter	Microsoft Corporation	
Hubert Tong	IBM Corporation	CA
Iain Sandoe		
Ievgen Polyvanyi		
Ilya Burylov	Intel Corporation	
J. Daniel García	University Carlos III of Madrid	ES
Jade Alglave	ARM Ltd	
James Dennett	Google	
James Touton	Blizzard	

Name	Representing	NB
Jamie Allsop	**clearpool.io**	GB
Jan Tusil	Runtime Verification Inc	
Jason Merrill	Red Hat Inc	
Jayesh Badwaik	University of Würzburg	
Jean-Francois Bastien	Apple	
Jean-Paul Rigault	Université de Nice S.A.	FR
JeanHeyd Meneide		
Jeff Garland	Crystal Clear Software	
Jeff Snyder	PDT Partners	GB
Jeffrey Mendelsohn	Bloomberg	
Jens Gustedt		FR
Jens Maurer	Edison Design Group	
John Franklin Richard		
John Lakos	Bloomberg	
John McFarlane		GB
John Spicer	Edison Design Group	
Jolanta Opara		PL
Jonathan Caves	Microsoft Corporation	
Jonathan Madsen	Lawrence Berkeley National Laboratory	
Jonathan Müller		
Jonathan Wakely	Red Hat Inc	
Jonny Weir	clearpool.io	
Jorg Brown	Google	
Joshua Berne	Bloomberg	
Juan Alday	GreenWireSoft	

Name	Representing	NB
Kilian Henneberger		
Klaus Wittlich	SAE IT Systems	
Lars Gullik Bjønnes	Cisco Systems Inc	
Lawrence Crowl	Perennial	
Lewis Baker	Facebook	
Li-Ta Lo	Los Alamos National Laboratory	
Lisa Lippincott	Tanium	
Loïc Joly	Sonar Source	FR
Łukasz Bondyra	Motorola Solutions	PL
Łukasz Wojakowski		PL
Maged Michael	Facebook	
Marc Mutz	KDAB	
Marcin Grzebieluch	Sii Poland	PL
Marco Foco	NVidia Corporation	
Mark Zeren	VMware Inc	
Marshall Clow	C Plus Plus Alliance Inc	
Mateusz Pusz	EPAM Systems Inc	
Matt Calabrese	Google	
Matthew Butler	Laurel Lye	
Matthias Gehre		
Matthias Kretz	GSI	DE
Matti Rintala		FI
Michael Florian Hava		
Michael McLaughin		
Michael Spencer	Apple	

Name	Representing	NB
Michael Spertus	Symantec	
Michael Wong	Codeplay	CA
Michał Dominiak	NVidia Corporation	
Miguel Ojeda		
Mihail Mihaylov	VMware Inc	BG
Mikael Kilpeläinen	CryptoTec	FI
Mingxin Wang	Microsoft Corporation	
Nathan Burgers	Bloomberg	
Nathan Myers	Maystreet	
Nathan Sidwell	Facebook	
Nathaniel Goodspeed	Linden Research, Inc	
Neil Horlock		GB
Nevin Liber	Argonne National Laboratory	
Niall Douglas		
Nicolai Josuttis		DE
Nicolas Lesser	Albert-Ludwigs-Universität Freiburg	
Nina Dinka Ranns	Edison Design Group	GB
Odin Holmes	Auto-Intern GmbH	
Olga Arkhipova	Microsoft Corporation	
Olivier Giroux	NVidia Corporation	
Pablo Halpern	Halpern-Wight Inc	
Pal Balog		
Paolo Carlini	Oracle	
Pascal Menuet		FR
Paul McKenney	IBM Corporation	

Name	Representing	NB
Paul Preney	University of Windsor	CA
Peter Gottschling		DE
Peter Sewell	University of Cambridge	
Peter Sommerlad	HSR	CH
Phil Nash		GB
Philipp Krause	Albert-Ludwigs-Universität Freiburg	
Phillip Ratzloff		
Richard Corden	Programming Research Ltd	
Richard Kaiser		
Richard Smith	Google	
Robert Douglas	Aquatic Group	
Robert Schumacher	Microsoft Corporation	
Robert Steagall	KEWB Computing	
Roger Orr		GB
Rostislav Khlebnikov	Bloomberg	
Ruslan Arutyunyan	Intel Corporation	
Ryan McDougall	Aurora Innovation	CA
Sara Saa		
Sebastian Büttner		
Sebastian Messmer	Facebook	
Sergei Murylev	Yandex	
Shuo Feng Liu	IBM Corporation	CA
Simon Roth		
Sophia Poirier	Apple	
Stanimir Lukanov	VMware Inc	BG

Name	Representing	NB
Stefan Ivanov	Chaos Group	BG
Thomas Grützmacher		
Thomas Rodgers	Red Hat Inc	
Thomas Scogland	Lawrence Livermore National Laboratory	
Tim Northover	Apple	
Timothy Costa	NVidia Corporation	
Timur Doumler	Jetbrains	GB
Titus Winters	Google	
Tobias Loew		
Tom Honermann	Synopsys Inc	
Tomasz Kamiński	Sabre	PL
Victor Zverovich	Facebook	
Ville Voutilainen	Plum Hall Inc	
Vincent Reverdy	Paris Observatory	FR
Vito Giovanni Castellana	Pacific Northwest National Laboratory	
Vittorio Romeo	Bloomberg	
Volker Dörr		DE
Volker Vovula		
Wagoner Larry	United States Dept of Defense	
Walter Brown	Brown	
Wesley Maness	Schonfeld Tools LLC	
Will Deacon	ARM Ltd	GB
William Miller	Edison Design Group	
William Seymour	Seymour	
Wim Leflere		

Name	Representing	NB
Wyatt Childers	Lock3 Software	
Xiao Shi	Facebook	
Zachary Henkel	Microsoft Corporation	