WG21 Pre-Autumn 2020 telecon minutes

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Convener: Herb Sutter
SC22/WG21 pre-meeting telecon
Monday 2020-10-26
08:00 N.Am. Pacific Time

1 Opening and introductions

1.1 Roll call of participants

Herb Sutter
Hana Dusíková
Nevin Liber
Bryce Adelstein Lelbach
Ben Craig
Billy Baker
Erich Keane
Fabio Fracassi
John Spicer
Michael Hava
Ville Voutilainen
William Miller
Barry Revzin
Tom Honermann
Hubert Tong
Vassil Vassilev
Botond Ballo
Billy Baker
Inbal Levi
Jeff Garland
Michael Wong
Michael Spencer
Walter E. Brown
Olivier Giroux
Jonathan Wakely
Detlef Vollmann
Peter Brett
Michał Dominiak
Hal Finkel
Hans Boehm
Nina Ranns
Bjarne Stroustrup
JF Bastien
Barry Hedquist

JC van Winkel

1.2 Adopt agenda

No objection to approval of agenda. Agenda adopted.

1.3 Approve minutes from previous meeting (deferred to face- to-face meeting)

1.4 Review action items from previous meeting (deferred to face-to-face meeting)

1.5 Review of project editor and liaison assignments

Status page

Herb presents. We're looking at a change of editorship.

2. Status reports

2.0 Advisory subgroup status reports

• **DG**, Direction group: Michael Wong

Michael Wong presents. We have been meeting every 2 weeks. We have a document P2000 which is continuing progress and has been recently updated. We're planning to publish an update to it.

We're looking at ABI, reflection, size of the committee, C compatibility, and issues such as burn out. We recognize a lot has been going and in the current situation it's difficult to do substantial reviews. We are thankful for all the effort people are putting into making progress.

• **ARG**, ABI review group: Daveed Vandevoorde

Daveed Vandevoorde report in an e-mail. We haven't discussed any topics of late (nor been asked to do so).

2.1 Pipeline stage 1 groups: Specialist subgroup status reports (Sgs)

SGs 3, 8, 9, and 11 are currently dormant and handled in the main subgroups.

The active SGs are:

• **SG1**, Concurrency: Olivier Giroux

Olivier Giroux presents.

SG1 is meeting every other week, and has done so since early summer. We always make quorum with 15-25 people, almost all SG1 regulars with only 2 new faces since Prague. Overall I think the subgroup is operating just as it does in person, albeit at a much reduced pace.

We reviewed and polled on these papers:

- P2019 -- Usability improvements for std::thread
- P0493 -- Atomic maximum/minimum
- P2155 -- Policy property for describing adjacency
- P2066 -- Suggested draft TS for C++ Extensions for Transaction Memory Light

We reviewed these WIP papers:

- P1898 -- Forward progress delegation for executors
- P1780 -- Modular Relaxed Dependencies: A new approach to the Out-Of-Thin-Air Problem
- P2181 -- Correcting the Design of Bulk Execution
- P2209 -- Bulk Schedule
- P2215 -- "Undefined behavior" and the concurrency memory model
- P2079 -- Parallel Executor
- P2224 -- A Better bulk_schedule

We did not discuss this informational paper, but it may be of wide interest:

- P2219 -- P0443 Executors Issues Needing Resolution

We discussed one issue:

- LWG3288

Coming up next:

- P2226 -- A function template to move from an object and reset it to its default constructed state
- P2235 -- Disentangling schedulers and executors
- Revisit LWG3288 and discuss LWG3485

I'm very pleased with the progress we are making.

Ville Voutilainen : The scheduler and executors paper has been discussed in LEWG. Please take a look at the notes.

Olivier : this would have been our meeting slot. We will not meet for another month.

• **SG2**, Modules: David Stone

No report.

• **SG4**, Networking: Jeff Snyder

Jeff Snyder reports by e-mail. SG4 has been meeting as-needed, up to once a fortnight, since mid-April. We have held 8 meetings in total, typically with 7-14 attendees each time.

Our focus has been on reviewing papers aimed at addressing issues identified with by the review of the Networking TS that was initiated by LEWG prior to SG4 being re-started.

The papers we have discussed are:

P2149R0 - Remove system_executor

P2161R1 - Remove Default Candidate Executor

P1861R1 - Secure Networking in C++

P0958R2 - Networking TS changes to support proposed Executors TS

P1322R2 - Networking TS enhancement to enable custom I/O executors

Of these, we approved P2161R1 and P1322R3 for being forwarded to LEWG, and P2149 was dropped in lieu of P2161.

SG4 is still actively discussing P0958.

The discussion of P1861R1 (Secure networking in C++) resulted in some directional changes being recommended to the authors to make it more in keeping with the existing TS

• **SG5**, Transactional memory: Hans Boehm

Hans Boehm presents. We have generally been meeting monthly, commonly now with 5 or 6 attendees.

We're continuing to discuss and revise the TM-lite proposal P1875 (discussion) and P2066 (wording). After EWG feedback, we revised the transaction syntax, and are in the middle of another round of implementation-focused discussion about transaction-safety for the standard library.

We expect to be in EWG in not too distant future.

- **SG6**, Numerics: Lisa Lippincott

No report.

Bryce : a few of the papers for the proposed Numerics TS have been updated, but I'm not aware of any review that has happened to them.

- **SG7**, Compile-time programming: Hana Dusíková

Hana Dusíková presents. We didn't meet since Prague due zero paper addressed to us. In last mailing we got one big paper (P2237R0) for which we are going to meet in next weeks.

We have a date for the discussion of P2237R0 – November, 18th.

- **SG10**, Feature test: Barry Revzin

Barry Revzin presents. We haven't met since Prague (or even in Prague) although we have had a few mailing list discussions, about how to handle freestanding feature-test macros and several other features that may or may not need a feature test that we may or may not want to add.

The feature-test macro document (which can be found at https://wg21.link/sd6) had a few things corrected in the last few months as well.

There is one paper that EWG will try to move, P1847. We need to decide if that paper needs a feature test macro.

- **SG12**, Undefined and unspecified behavior, and vulnerabilities: Gabriel Dos

Reis

Gabriel Dos Reis reports by e-mail. SG12 has had no meeting. A new paper (P2234R0) just hit the latest mailing. It is subject of ongoing discussion/feedback. We will schedule meetings to handle it as appropriate.

- **SG13**, HMI and I/O: Roger Orr

Roger Orr reports by e-mail. There has been only one paper targeting SG13 since the last meeting (an R1 update to P2054), and no meetings.

- **SG14**, Low latency: Michael Wong

Michael Wong presents. We convened business as usual and held 5 monthly meetings averaging 15-25 people in our usual time slot, every 2nd Wednesday of the month at 1800 UTC-2000 UTC except one meeting which was inverted for Asia/Pacific time.

We started with an in-depth look at Deterministic Exception for embedded systems, Affinity as well as the Assumption paper to inform the groups.

We used this opportunity to focus on each domain monthly in turn taking advantage of the shutdown to be more deliberate, as well as hold an inverted meeting friendly to Asia Pacific times and have different domain chairs lead each meeting.

Time: June 11, 2020 02:00 AM Eastern Time (US and Canada) 0600 UTC : Games: Chaired by Guy; looked at Colony, affinity
Time: Jul 8, 2020 02:00 PM Eastern Time (US and Canada) 1800 UTC : Embedded: Chaired by Ben Craig; looked at Freestanding, Ring Buffer, Audio, Linear Algebra
Time: Aug 12, 2020 02:00 PM Eastern Time (US and Canada 1800 UTC) : Finance: Chaired by Steffan TJ; looked at ring buffer, pipe, hot/cold for data

Dec 9 02:00 PM ET 1800 UTC : Security: Chaired by Matthew Butler

Jan 13 02:00 PM ET 1800 UTC : Games:

Feb 10 02:00 PM ET 1800 UTC : Embedded

Apr 7 02:00 PM ET 1800 UTC: Finance,

We also held unofficial extra meetings to re kick-start ring-buffer design thanks to Inbal Levi, Matthew Butler, Guy, and many others.

As usual, as we have done for the last 5 years, we hold no meetings during DST craziness month (when different continents go on DST at different times) of March and November to avoid people missing by an hour or disadvantaging one group who will have the meeting moved on top of local meetings which do not move with DST craziness, as we have always had a truly global audience.

A future meeting is proposed to look at Security on December 9th which is a possible new area of interest.

Please see the minutes which will be published subsequently.

D2244r0.pdf

Herb : regarding security. Please make sure this is well publicized so anyone who is interested can join. I will consult EWG and LEWG chairs to see if they want to handle this topic. If not, we'll see if we need a new SG or can make use of an existing one.

JF: Please invite me and Bryce to the discussion. It would be good to have a call for papers to see the topics people want to bring to the discussion.

Michael : I will do that.

• **SG15**, Tooling: Michael Spencer

Michael Spencer presents. We haven't had papers in a while. The only active thing is the modules report which hasn't made much progress. We're waiting for new papers related to it before we meet again.

Herb Sutter: Do the relevant experts know you are waiting for papers ?

Michael Spencer : I have not sent out a request for papers. I will do that.

- **SG16**, Unicode: Tom Honermann

SG16 has continued to meet twice a month since Prague; 16 meetings in total. Attendance has ranged from 7 to 14 with an average of 9.8 across 24 unique individuals. Summaries of the first 12 of these meetings are available in P2179 and P2217; more recent meetings will be accounted for in a future paper.

In March we met with members of the Unicode Message Format Working Group (MFWG)to familiarize each other with what we are working on and potential opportunities for future collaboration. Peter Brett continues to monitor their activity.

In April, when it became clear that there would be no face-to-face meetings for quite a while, we adopted new operating procedures to guide polling and decision making.

Our focus for C++23 so far has been to address core language concerns such as those discussed inP1949,P2029,P2178, andP2201. This is expected to continue for some time.

The focus of our upcoming meetings will be on the use of Unicode to describe source code translation in the standard and portable support for UTF-8 encoded source files.

Papers that we've discussed in some capacity include:

- P1040: std::embed

- P1275: Desert Sessions: Improving hostile environment interactions

- P1953: Unicode Identifiers And Reflection

- P1628: Unicode character properties

- P1629: Standard Text Encoding

- ~~P1844: Enhancement of regex~~

- P1854: Conversion to execution encoding should not lead to loss of meaning

- P1859: Standard terminology for execution character set encodings

- ~~P1880: uNstring Arguments Shall Be UTF-N Encoded~~

- P1885: Naming Text Encodings to Demystify Them

- P1949: C++ Identifier Syntax using Unicode Standard Annex 31

- P2029: Proposed resolution for core issues 411, 1656, and 2333; numeric and universal character escapes in character and string literals

- P2071: Named universal character escapes

- P2124: std::regex should be deprecated starting in C++23

- P2139: Reviewing Deprecated Facilities of C++20 for C++23

- P2178: Misc lexing and string handling improvements

- P2194: The character set of C++ source code is Unicode

- P2201: Mixed string literal concatenation

Most of the above papers are still being actively pursued or have been forwarded. The ones we have forwarded since Prague are:

- P1949: C++ Identifier Syntax using Unicode Standard Annex 31

- •P2201: Mixed string literal concatenation

The papers that we have spent the most time on are:

- •P1859: Standard terminology for execution character set encodings

- •P1949: C++ Identifier Syntax using Unicode Standard Annex 31

- •P2178: Misc lexing and string handling improvements

Other issues that we've discussed:

- •Core issue 1871: Non-identifier characters in ud-suffix

Peter Brett : our work has deviated. We expected to spend time on library stuff, but we have spent time on core language stuff.

Tom Honermann : Peter Brett has stepped forward to be an assistant chair for SG16.

• **SG17**, EWG incubator: Botond Ballo

Botond Ballo presents. SG17 has not met since Prague independently. SG17 designated papers have been reviewed with regular evolution papers in EWG meeting.

• **SG18**, LEWG incubator: Billy Baker

Billy Baker presents. Review of proposals for LEWG(I) has mostly shifted to the mailing list with Inbal Levi and Corentin Jabot leading the effort. Two proposals should be under mailing list review at any time. After the two proposals currently under review, the scheduling queue has three proposals. The unscheduled queue has 17 proposals. https://github.com/cplusplus/ has more details on the proposals for mailing list review.

The SG18 chairs have been rotating with the LEWG chairs leading LEWG weekly virtual meetings.

• **SG19**, Machine learning: Michael Wong

We convened business as usual and held 6 monthly meetings averaging 5-10 people in our usual time slot, every 2nd Thursday of the month at 1800 UTC-2000 UTC.

We started with an extensive review of Stats with additional interested parties, specially invited.

We used this opportunity to focus on each paper monthly in turn taking advantage of the shutdown to be more deliberate:

Apr 9, 2020 02:00 PM ET 1800 UTC: stats paper

May 14, 2020 02:00 PM ET 1800 UTC : Stats Paper rewrite based on Apr feedback

Jun 11, 2020 02:00 PM ET 1800 UTC : Graph paper

Jul 9, 2020 02:00 PM ET 1800 UTC : Stats paper

Aug 13, 2020 02:00 PM ET 1800 UTC : Reinforcement Learning and Differential calculus

Oct 8, 2020 02:00 PM ET 1800 UTC : Graph paper

Future meetings:

Dec 10 02:00 PM ET 1800 UTC : Stats Paper

Jan 14 02:00 PM ET 1800 UTC : Reinforcement Learning and Differential Calculus

Feb 11 02:00 PM ET 1800 UTC : Graph Paper

Apr 8 02:00 PM ET 1800 UTC: Stats Paper,

The Graph paper is nearing completion. But we plan to split it up into separate papers for Directed Graph, Undirected Graph, Algorithm, and Design Rationale.

There is interest in adding more units for Stats.

Stats will likely have a full review on December 10th and it will be ready for another full review soon and we will contact the interested parties again.

As usual, as we have done for the last 2 years, we hold no meetings during DST craziness month (when different continents go on DST at different times) of March and November to avoid people missing by an hour or disadvantaging one group who will have the meeting moved on top of local meetings which do not move with DST craziness, as we have always had a truly global audience.

Please see the minutes which will be published subsequently.

D2245r0.pdf

Michael Wong : DST stands for daylight saving time.

Ville : I advise caution with the graph paper split as it seems premature. Those topics are closely related.

Bryce : what shipping vehicle is intended for the graph stuff ?

Michael : we're thinking of TS, but I will leave this for discussion with LEWG. It's a huge paper. It's relatively isolated.

Herb : LEWG and EWG will recommend the ship vehicle, but it's always nice to ask experts for their input

- **SG20**, Education: JC van Winkel

JC van Winkel reports by e-mail. SG20 has met a number of times since Prague. We make slow progress, but there is some progress. We now have curriculum guidelines for a num-

ber of topics in github at https://github.com/cplusplus/SG20. We want to continue to steadily keep adding more guidelines. The work is highly paralellizable, but so far we do not have a lot of volunteers writing actual topics.

Herb : I had someone from a well know news organization reach out to me to make a C++ introduction guide. If anyone else wants to engage with that, I can connect you to that person.

- **SG21**, Contracts: John Spicer

John Spicer presents. We had a teleconference in early October to review papers oriented toward defining what a minimal viable set of features might be, a proposed set of minimal use cases, and use case categorization.

We took a two polls to guide future work. The polls had very strong consensus in support of the proposed direction for future work.

Additional details are available on the SG21 page of the Spring/Summer telecon wiki:

minutes link.

We are trying to find a slot for a regular meeting that works for majority.

2.2 Pipeline stage 2 groups: Design subgroup status reports

- **EWG**, Core evolution: JF Bastien

JF Bastien presents. EWG has a report that will be in the next mailing -   P1018r7

We have been meeting most weeks. We tried to follow the priorities in Ville's plan for C++23. We had 50 issues total. We haven't voted anything out. We will do electronic voting. We acted both as EWG and EWGI. We looked at papers that are not ready for C++23. Once we do electronic polling, there will be a poll for each paper.

We keep github updated, that's where you can find the latest status of any paper.

Herb : thank you for JF and Bryce for working through the innovation of polling methods to try. Also, thank you to everyone for your support in trying out these experiments. This is going to be really important as it is unclear when we will have the next face to face meeting.

- **LEWG**, Library evolution: Bryce Adelstein Lelbach

Bryce Adelstein Lelbach reports. We will publish a report (currently in draft as D2447RO). We have been meeting via telecons since March. P2145 described our process and procedures.

We meet once a week for 90 minutes. We started doing mailing list reviews. The rate of reviewing papers dropped due to lack of F2F meetings; our backlog was increasing.

Corentin and Inbal started managing the mailing list reviews. With the addition of that we are able to look at 3 to 4 papers per week. That rate is enough to decrease the backlog.

We have been rotating chair in each telecon. That spreads the burden and makes life easier.

We started the electronic polling. More details on electronic polling can be found in [P2195R0].

We're getting between 20-30 people in each telecon. We are happy with the numbers. There is a regular group that consist of people who would be in the regular group in the face to face meeting.

Ville : you should get an update on the standard library modules.

Bryce : I wanted to bring up one more paper from the report. P2138 - proposal for rules of engagement for evolution groups and wording groups. It is another paper that people would be familiar with.

2.3 Pipeline stage 3 groups: Wording subgroup status reports

• **CWG**, Core wording: Mike Miller

CWG has continued to meet virtually at least monthly since the Prague meeting, with additional teleconferences scheduled as needed for specific purposes. We've had generally good participation, averaging a dozen or so on most calls.

Our biggest effort during this period has been reviewing and revising P1787, dealing with name lookup. Name lookup has been under-specified, sometimes with self-contradictions, since the earliest days of the Standard and has been the subject of many core issues. P1787 is a massive effort to put name lookup on a firm foundation. With the current version of the paper running to 80 pages, we felt the only way to deal effectively with it was to devote a concentrated period of time to it in order to establish a critical mass of comprehension and momentum. We decided to meet for two hours each day during the week that would have been the Varna meeting. At the end of that week the review was nowhere near complete, so we scheduled daily teleconferences, 90 minutes each, every day for the following week and four days of the week after that, which finally completed our initial pass through the document. We then scheduled two additional two-hour teleconferences to consider the changes resulting from the initial review of the document. We are happy with the result and are bringing it forward for adoption in the November plenary, resolving 60-odd existing core issues.

We also devoted several hours over a number of teleconferences to review and revise P2029, concerning escape sequences in character and string literals. We are

recommending this paper as well for adoption at the November plenary, resolving several open core issues.

In addition, we are bringing forward a couple of papers that have been in process for several meetings, as well as an omnibus motion that resolves a half-dozen open core issues.

We will plan the new meetings in the next few weeks.

Ville : regarding the lookup paper, P2138 strongly suggests that this should be moved in the plenary after this upcoming one. We haven't discussed or adopted P2138 as process.

Mike : we have discussed the timing. We felt that getting it into the working paper now when working paper is pristine would be good. It will be a big task to rebase after changes, so we felt it was better to get it in sooner rather than later. We have a lot of time to make corrections.

Ville : that makes sense. The grace period is for reviewers outside of core. We need to tell hypothetically interested audience that the paper is ready for plenary. Please send a heads up about that paper being ready for plenary both to evolution and core reflector instructing people to read it if they are interested.

John Spicer : thank you to Davis for the paper, and Mike Miller for the sessions. We worked an hour to two hours for 14 consecutive days. It was quite an effort, but a great outcome.

• **LWG**, Library wording: Jonathan Wakely

LWG was slower to start holding regular telecons than the other main groups, but we got there eventually. We've had telecons on Friday most weeks, with reasonable attendance and enough subject matter exports to have quorum. We've also been doing online reviews of proposals, where a small group of LWG regulars perform a thorough review of a proposal prior to spending telecon time on it. While the process isn't perfect, it has definitely made better use of our telecon time.

Papers that passed review and are going to be in the plenary straw polls:
- P1679 String Contains function
- P0881 A Proposal to add stacktrace library
- P0943R6 C compatible atomics
- P2227R0 Update normative reference to POSIX

Reviews of several other papers are ongoing but not ready for plenary yet.

We also completed a review of my P2171 paper to modernize the Networking TS spec (without affecting the design). That doesn't need a plenary vote, as we don't intend to create a new working draft of the TS. The goal of the paper is to give the Networking study group (SG4) a modernized basis for their work.

Dozens of issues have been resolved since Prague, see P2236R0 in the October mailing. That list includes issues that were moved to "Ready" status in Prague, which were expected to be voted into the draft in Varna, as well as issues that were moved to "Tentatively Ready" or "Tentatively NAD" in LWG telecons or polls on the reflector. We aren't going to ask the plenary to vote on Tentatively NAD or NAD decisions, because those aren't actually going to result in changes to the working draft, and a NAD issue can always be reopened later if somebody thinks we got it wrong. They are included in the paper for extra visibility, because the unusual circumstances this year make it hard to keep track of what the various groups are doing. The list of issues includes one for the Library Fundamentals TS (3413) and one for the Networking TS (3414) which will be separate polls from the issues for the IS. If they should be in separate papers, I can do a revision of P2236 without those issues, just let me know.

There are also 11 issues currently in Tentatively Resolved status, which I didn't include in the paper, see Tentatively Resolved

Those are all issues we believe will be resolved by other changes (many of them in the P2236R0 list). I'll move those to Resolved after the issues they depend on are resolved.

If you want motions to be separated, please let me know.

Peter : Is the LEWG prioritization effort helping you manage the workload ?

Jonathan : It's helping us to figure out in which order to process the papers. It isn't making process papers faster.

Peter : authors are likely to be dissuaded if their paper is not look at for a long time. Should we look into expanding the throughput or managing expectations ?

Jonathan : I'm not sure what we can do to expand the throughput. We should probably start managing expectations. LEWG could possibly look at the papers again to see if the wording in the papers could be improved.

Herb : we look at parallelizing, but it doesn't look like we have a quorum to do that. We are trying to get the design groups to approve wording, not just the design. Bryce, how is that going ?

Bryce : we are committed to sending papers to LWG with higher standard of wording. It's hard to improve throughput, we should start managing expectations.

Jonathan : we do have library review guidelines. it's pretty bare bones. It would help if we could capture more of our knowledge in that list.

Bryce : that would also help LEWG chairs.

Jonathan : I will try and improve the current list and publicize it.

Herb : LEWG can recommend if TS can be produced or not. You can decide if we should be working on large thing X if we don't have bandwidth, and if not what we can do instead.

Bryce : it's expectation management. If we decide something is not a good use of our time, it's difficult to figure out how to do so without making anybody feel that they have been over-ridden or that there are late surprises.

Herb : ongoing communication between the chairs is important.

Bjarne : we used to have a central point for information. Is anybody working on a page where we can go in and start looking for such information ?

Hal : we have been trying to keep the meeting independent page with information like calendar and procedures. We do need to add new procedures there.

Bryce : most of the things are on isocpp.org. In the future we might centralize all things under one infrastructure.

Ville : P2138 contains instructions on how to solve parts of wording review problem. The general consensus is that we can not drastically improve bandwidth, we can shift some of the work to LEWG. There's an ongoing effort to fix this problem.

Ben : I did take a look at each of the papers targeting a TS and audited them to see if they mention the questions that were supposed to be answered by their inclusion in a TS and if there is implementation experience. I emailed some authors and asked them to consider targeting an IS. There has been some movement into not putting things into TS when we can experiment outside of the standard process

John : we could change wiki landing page to have more descriptive information. I can do that.

2.4 SC22 report

Final ballot for C++20 is done.

We've sent in the final text and got lots of requests for changes. We're working on it.

We're having conversations on how we can improve working together in this stressful situation. A little patience goes a long way. We should try and stick together and be a functioning group that trusts each other.

2.5 SC22/WG14 (C) report

Michael Wong presents.

I attended all the C virtual plenary calls -Oct 2019, and in 2020 Apr/May, August, Oct, as official C Liaison

Content started to be injected in Oct 2019.

I noted the following:

1. C has started an initiative to be closer in C++ given recent issues with attributes and past issues so that it is even more active than the official ISO liaison. There were a discussion and a proposal in the August 2020 call for a joint C and C++ SG that actively process C/C++ inter-operability with Aaron Ballman as chair of both SGs. This group will meet virtually mostly but occasionally F2F whenever that is possible.

2. Our friend in C++ JeanHyde Meneide is now also the C editor. Thank you JeanHyde.

3. C is heading towards C23. There is initial content in this current draft

October 2019 Meeting:
DR 476 volatile semantics for lvalues
DR 488 c16rtomb() on wide characters encoded as multiple char16_t
DR 494 Part 1: Alignment specifier expression evaluation
DR 496 offsetof and subobjects (with editorial modification)
DR 497 "white-space character" defined in two places
DR 499 Anonymous structure in union behavior
DR 500 Ambiguous specification for FLT_EVAL_METHOD
DR 501 make DECIMAL_DIG obsolescent
FP DR 13 totalorder parameters
FP DR 20 changes for obsolescing DECIMAL_DIG
FP DR 21 printf of one-digit character string
FP DR 22 changes for obsolescing DECIMAL_DIG, Part 2
FP DR 23 llquantexp invalid case
FP DR 24 remainder NaN case
FP DR 25 total order parameters
N2124 and N2319 rounding direction macro FE_TONEARESTFROMZERO
N2186 Alternative to N2166
N2212 type generic cbrt (with editorial changes)
Abstract i
ISO/IEC 9899:202x (E) working draft — October 1, 2020 N2573
N2260 Clarifying the restrict Keyword v2
N2265 Harmonizing static_assert with C++
N2267 nodiscard attribute
N2270 maybe_unused attribute
N2271 CR for pow divide-by-zero case
N2293 Alignment requirements for memory management functions
N2314 TS 18661-1 plus CR/DRs for C2X
N2322 preprocessor line numbers unspecified
N2325 DBL_NORM_MAX etc
N2326 floating-point zero and other normalization
N2334 deprecated attribute
N2335 attributes
N2337 strftime, with'b' and'B' swapped
N2338 error indicator for encoding errors in fgetwc
N2341 TS 18661-2 plus CR/DRs for C2X
N2345 editors, resolve ambiguity of a semicolon

N2349 the memccpy function
N2350 defining new types in offsetof
N2353 the strdup and strndup functions
N2356 update for payload functions
N2358 no internal state for mblen
N2359 part 2 (remove WANT macros from numbered clauses) and part 3 (version macros for
changed library clauses)
N2401 TS 18661-4a for C2X
N2408 The fallthrough attribute
N2412 Two's complement sign representation for C2x
N2417 Section 6: Add time conversion functions that are relatively thread-safe
N2418 Adding the u8 character prefix
N2432 Remove support for function definitions with identifier lists
N2508 Free Positioning of Labels Inside Compound Statements
N2554 Minor attribute wording cleanups
The following documents have been applied to this draft from the October 2019 Meeting:
N2379 *_IS_IEC_60559 Feature Test Macros.
N2416 Floating Point Negation and Conversion.
N2384 Annex F.8 Update for Implementation Extensions and Rounding.
N2424 Why logp1 as a Function Name.
N2406 Signaling NaN Initializers.
N2393 _Bool Definitions For true and false.

The following documents have been applied to this draft from the March/April 2020 Virtual
Meeting:
N2444 More optionally per-thread state for the library.
N2446 printf of NAN().
N2448 [[nodiscard("should have a reason")]].
N2459 Add an interface to query resolution of time bases, v3.
N2464 Zero-size Reallocations are Undefined Behavior.
ii Abstract
N2573 working draft — October 1, 2020 ISO/IEC 9899:202x (E)
N2476 Names and Locations of Floating Point Entities.
N2480 Allowing unnamed parameters in function definitions.
N2490 Why no wide string strfrom functions.

The following documents have been applied to this draft from the August 2019 Virtual
Meeting:
N2491 powr justification
N2492 Note About Math Function Properties.
N2506 Range Errors in Math Functions.
N2508 Free Positioning of Labels.
N2517 Clarification Request for C17 Example of Undefined Behavior.
N2532 Min-max Functions.
N2553 Querying Attribute Support.
N2554 Minor Attribute Wording Cleanup.

Herb : EWG/LEWG , do you want to handle C/C++ inter-operability in your groups or spin of a new group?

JF : a separate group would be good.

Bryce : that makes sense.

Herb : Is there any objection to setting up a new C++ study group with the same chair as in C ?

No objection.

Herb: i'll kick of a new study group.

Detlef: there has been some dicussion about withdrawing range, co-routines and special math. Do we have an opinion ?

John : we're withdrawing ranges and co-routines because they are already in the working draft. Should we also withdraw special math ?

Jonathan : There were a couple of function that didn't make it into IS.

Bryce : There's work involved to keeping it. If we don't need it, we should withdraw it.

Jonathan : if we're going to keep it, we need to trim it down the just the bits that are not in the IS.

Herb : if you want to trim it down, that would be making a new revision.

Bryce : we can stabilize it, which removes some overhead, but doesn't withdraw it.

VIlle : it's reasonable to withdraw it. If implementations exist, it's not going to remove them. Users are going to be relying on facilities that are in C++17 anyway.

Barry: it comes down to how much of math functions have been incorporated in the standard. If not a lot, we should stabilize it. Otherwise we should withdraw it.

Jonathan : there are 21 math special functions (with 3 overloads each) in the ISO/IEC 29124:2010 standard and we added them all to C++17. The functions we didn't add were in TR1, and never got into ISO/IEC 29124:2010 (conf_hyperg and hyperg). We should withdraw it.

3. New business

3.1 Review of priorities and target dates

- **Status page**
- **P1000**

Herb presents. We've agreed not to change the release plan due to the pandemic. 3 year model is working well for us. I'm not proposing any changes to that.

We could make a small tweak. Because of the time DIS ballot takes, I suggest we ship the DIS during the last meeting of 2022, instead of the first meeting in 2023. I'm not asking for a decision now, I would like us to think about it.

Ville : We may need to move the wording deadline too.

Herb : we should talk to wording group chairs and see what they think.

John : if we do that, we also need to move at least the CD ballot a meeting earlier.

Mike Miller : crunch at the end of the cycle has not been too bad. People have been much more cooperative than before.

Herb : I believe feature freeze deadline in EWG helped with that.

Ville : i don't know if we need to change the plan of the timing, we just need to check it.

Herb : I do not see the need for change. I will look to the chairs if they have any suggestions.

John : if we're not ready to announce a change to the schedule, we can give people a heads up.

Bryce : I prefer we don't do that unless we know we will change the schedule. It may cause unnecessary stress.

Ville : I am concerned about this change.

Herb : are we ok if ISO puts an N+1 publication year on a standard ? Is there any objection to ignoring the difference between the date on the document and the year of the standard ?

Ville : so far, it has been manageable. It would be awkward, but we can live with it.

John : perhaps we can have an additional meeting in 2021

3.2 Any other business

Tom Honermann : there have been concerns of CoC violations in the cpplang slack chat. Slack has been good to increase cohesiveness of group. We will continue using a chat service in some way. It was suggested that WG21 hosts a chat service that we can use for SG

and face to face meetings for communication and presentation. I know there are other SG that are interested in having a chat service too.

Herb : I would be open to hosting something that is internal. This is worthy of an admin telecon. Can we schedule one ? Tom, write a paper we can discuss . Hal, schedule an admin meeting.

4. Review

4.1 Review and approve resolutions and issues
4.2 Review action items

- Michael Wong - regarding SG14 Security meeting, please invite JF and Bryce
- Michael Wong - regarding SG14 Security meeting, publish call for papers
- Michael Spencer - regarding SG15, publish call for papers
- Bryce Adelstein Lelbach - send LEWG report to mailing list/Nina
- Mike Miller - send a heads up for anyone wanting to review the lookup paper
- Jonathan Wakely - improve LWG guidelines
- Herb Sutter - setup the new SG for C/C++ inter-operability
- John Spicer - improve the information on the wiki landing page
- Tom Honermann - write a paper on the chat issue for an admin telco
- Hal Finkel - schedule an admin telco on the topic of WG21 chat service

5. Closing process
5.1 Establish next agenda

Herb : I propose the same agenda with SG22 added. Any objections ?

No objections.

5.2 Future meetings (deferred to full meeting)
5.3 Future mailings (deferred to full meeting)
5.4 Adjourn

Meeting adjourned at 10:08 N. Am.