WG21 2022-01 Admin telecon minutes

1 Opening and introductions

Herb Sutter opens the meeting at 08:06 N.Am. Pacific Time

1.1 Roll call of participants

Billy Baker
Bjarne Stroustrup
Bryce Adelstein Lelbach
Christof Meerwald
Daveed Vandevoorde
Detlef Vollmann
Dietmar Kühl
Erich Keane
Fabio Fracassi
Gabriel Dos Reis
Guy Davidson
Hal Finkel
Hana Dusíková
Hans Boehm
Herb Sutter
Hubert Tong
Inbal Levi
J. Daniel Garcia
Jeff Garland
Jeff Snyder
Jens Maurer
John Spicer
Lucian Radu Teodorescu
Marco Foco
Maude Giroux
Michael Wong
Michał Dominiak
Nevin Liber
Nina Ranns
Olivier Giroux
Peter Kulczycki
Roger Orr

Thomas Köppe
Tom Honermann
Vassil Vassilev
William Miller

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

2. Status reports

2.0 Advisory subgroup status reports

• **AG**, Admin group: Hal Finkel

Hal Finkel presents.

We have not met recently. There were some recent changes to the mailing lists. James Riordon got back to me about doing further work on automating the paper system and the next set of updates we want to do there. We will be scheduling a set of follow up discussions in that regard

Tom Honermann : I have some time to make some progress on the Mattermost evaluation. I will follow up when I do.

• **DG**, Direction group: Roger Orr

Roger Orr presents.

The Direction Group (DG) has continued to meet regularly.
Since the last plenary we have issued P2000R3; the main changes are in section 6 (now renamed to Priorities for C++23 and C++26), including the impact of the pandemic on C++23 and C++26, and in section 7 (Process Issues), highlighting the creation of the Safety and Security group (SSRG) and the C/C++ Liaison SG (SG22 on the WG21 side).
We have had some internal discussion about the operation of WG21 when pandemic restrictions are lessened, but have reached no firm conclusions.

Email me or the direction group mailing list if you have any questions.

John Spicer : late comment on the status page - it doesn't seem to include C++23 information.

Herb Sutter : I will check that.

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

Daveed Vandevoorde present.

ARG (ABI Review Group) did not receive new queries since the last plenary meeting

• **SSRG**, Safety/security review group: Ryan McDougall

Ryan McDougal reports via email.

SSRG (Safety & Security Review Group) has had sporadic discussions on reflector, including request for comments on P1494R2 but has not met nor issued any consensus opinions.

Tom Honermann : Now that we have a CoC team, would it be appropriate to have them report too ?

Herb Sutter : CoC team and I are planning to discuss that after this meeting.

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

SGs 3, 8, and 11 are currently dormant and handled in the main subgroups. The active SGs are:

• **SG1**, Concurrency: Olivier Giroux, Hans Boehm

Olivier Giroux reports.

SG1 didn't meet, except as part of the LEWG joint sessions which LEWG will talk about.

• **SG2**, Modules: David Stone

No report.

• **SG4**, Networking: Jeff Snyder

Jeff Snyder reports.

SG4 has not met since the last plenary, and currently has no papers waiting to be reviewed. There was some activity in LEWG that may impact the future of networking - networking proposal is not consistent with the executors design the library wants.

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

Hans Boehm reports.

SG5 only met once, mostly to help with editorial issues for the TMv2 draft TS. The closest we got to a content discussion was a brief discussion of the feature test macro.

• **SG6**, Numerics: Lisa Lippincott, Matthias Kretz, John McFarlane

No report.

• **SG7**, Compile-time programming: Hana Dusíková, Daveed Vandevoorde

SG7 didn't meet recently, but we have planned two meetings about P1240. If we have a consensus, the plan is to push the paper to a joint session of LEWG and EWG.

• **SG9**, Ranges : Inbal Levi, Casey Carter

Inbal Levi reports.

"Ranges" have met 5 times since the last plenary session: 10-11, 11-08, 12-20, 01-03, 01-10 (second monday of each month + one extra meeting on January before the end of LEWG design phase)
We've forwarded 14 papers (P1206, P2286, P2408, P2165, P2374, P2440, P2442, P2443, P1899, P2302, P2486, P2494, P2474, P2404), among them 13 were forwarded by LEWG.
And Incubated 4 papers (P1664, P2375, P2164, P2483)

Detailed agenda: 2021-Telecons, 2022-Telecons
Full minutes: Wg21telecons2021/SG9, Wg21telecons2022/SG9
There's also a document summarising Ranges papers' status.

Please, feel free to approach me with any questions.

• **SG10**, Feature test: Barry Revzin, Jonathan Wakely

No report.

William Miller : we have a feature test paper that is approved by CWG - limited to one feature test macro

• **SG12**, Undefined and unspecified behavior, and vulnerabilities: Gabriel Dos Reis, Aaron Ballman, Michael Wong

Gabriel Dos Reis reports.

SG12 did not meet since the last plenary.

• **SG13**, HMI and I/O: Roger Orr

Roger Orr reports.

SG13 has not met since the last meeting; no papers have been published targeting SG13.

• **SG14**, Low latency: Michael Wong

Michael Wong reports.

SG14 continues to meet every month on the second Wednesday of the month at 2 PM ET. We routinely have 20-30 people calling in. We cycle through Games, Embedded, Finance/Low latency processing proposals for C++23/26/29. We have pushed forward colony/hive and 2 linear algebra proposals. The next call will be on February 9.

Detlef Vollmann : Was the executor proposal discussed in SG14 ?

Michael Wong : We reviewed it immediately after the super meetings. There were some concerns about latency and the tightness of the timeline.

Herb Sutter : Was SG14 asked for any decisions or recommendations ?

Michael Wong : Not at the moment, we will continue to monitor the progress of the proposal.

• **SG15**, Tooling: Michael Spencer, Ben Boeckel

Gabriel Dos Reis presents.

We met a couple of times. There was a meeting last friday and there is another meeting coming up. No significant progress on modules related issues, but we're looking at couple of papers on debugging.

• **SG16**, Unicode: Tom Honermann, Peter Brett

Tom Honermann presents.

SG16 has continued meeting twice monthly with a bit of a break over the end of the year holidays. We've held 7 telecons since the last plenary on 2021-10-04. Summaries of these meetings can be found at https://github.com/sg16-unicode/sg16-meetings and, for all but the most recent, in P2512R0.

SG16 forwarded 6 papers, 3 of which are on target for C++23 as detailed below. We continue to have no shortage of opportunities for more work in front of us.

Papers and issues we worked on during this time include:
- P1885: Naming Text Encodings to Demystify Them
  - Github issue
  - Approved by SG16 and LEWG via electronic polling; on target for C++23.
- P2071: Named universal character escapes
  - Github issue
  - Approved by SG16 and currently in electronic polling for EWG; on target for C++23.
- P2286: Formatting Ranges
  - Github issue
  - Approved by SG16 and currently in electronic polling for LEWG; on target for C++23.
- P2460: Relax requirements on wchar_t to match existing practices
  - Github issue
  - Approved by SG16 and LEWG via electronic polling; awaiting EWG.
- P1854: Conversion to literal encoding should not lead to loss of meaning
  - Github issue
  - Approved by SG16 and awaiting EWG.
- P2361: Unevaluated strings
  - Github issue
  - Approved by SG16 and awaiting EWG.
- P2491: Text encodings follow-up
  - Github issue
  - No longer being pursued due to recent changes made to P1885.
- P2498: Forward compatibility of text_encoding with additional encoding registries
  - Github issue

- ○ Awaiting further discussion in SG16.
- [LWG3576 (Clarifying fill character in std::format)](#)
  - ○ Awaiting further discussion in SG16.
- [LWG3639: Handling of fill character width is underspecified in std::format](#)
  - ○ Awaiting further discussion in SG16.

Continuing normal meeting cadence as usual.

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

No report. See EWG.

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

No report. See LEWG.

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

Michael Wong presents.

SG19 continues to meet every month on the second Thursday of the month at 2 pm ET. We average 10-15 people calling in. We cycle through Stats, Graph, RL/Differential calculus proposals for C++23/26/29. The stats proposal is waiting for an SG6 review. The next call will be on Feb 10.

• **SG20**, Education: JC van Winkel

JC van Winkel reports via e-mail.

SG20 has been meeting a couple of times. No real progress was made on defining new teaching topics but we are very close to having new automation that will make generating different versions of an end document much easier. There is also a plan (to be discussed in the next SG20 meeting) to get more progress in authoring teaching topics.

• **SG21**, Contracts: John Spicer, Ryan McDougall

John Spicer presents.

We have had 6 teleconferences since the last plenary.

The group decided to no longer attempt to target C++23 for any contract support.

The group is working on a minimum viable product (MVP) specification. We seem to be close to having agreement on the semantics. The remaining set of open issues (as specified in P2521R0) is:
- The choice of syntax.
- Side effect elision and duplication.
- The treatment of non-reference function parameters referenced in postconditions.

We hope to have an MVP proposal that can be forwarded to EWG fairly soon.

Thank you for everyone's contributions.

Bjarne Stroustrup : it's really hard to keep up with everything that is going on at the moment, unless you are focused on one or two topics.

• **SG22**, C/C++ liaison: Aaron Ballman,Thomas Koeppe, JeanHeyd Meneide, Richard Smith

Aaron Ballman reports via e-mail.

SG22 continues to meet on an almost monthly cadence and processes about three papers a month. Since our last report (Sept 2021), we've processed 9 papers and had one special session on the extended floating-point type names (P1467R4) in conjunction with the C Floating Point study group. Our focus has continued to be on papers for C++23 and C23, though we'll be switching gears after Feb to more forward-looking papers.
WG14 has had one plenary meeting since the last WG21 plenary meeting. The larger new changes to C coming out of those meetings were the adoption of the following proposals:

N2778 Variably-Modified Types
(N2778) -- makes variably-modified types mandatory in C23. They were made optional, along with variable length arrays, in C99. VLAs remain an optional feature in C23.

N2808 Allow 16-bit ptrdiff_t again
(N2808) -- C17 and earlier required ptrdiff_t to be at least 17 bits, and this restriction was relaxed to allow for 16-bit ptrdiff_t.

N2872 Require exact-width integer type interfaces v1
(N2872) -- this makes the exact-width integer types (intN_t) mandatory instead of optional if the implementation can do so without use of padding bits
for the type. It explicitly carves an exception out for intmax_t and uintmax_t to avoid an ABI break by requiring these types to change size or alignment.

N2837 Clarifying integer terms v2
(N2837) -- in addition to clarifying integer terms in the standard, this proposal removed Annex H from C23, which was an informative annex on language independent arithmetic. There are no known implementations of this annex in the wild and the efforts to maintain it were deemed a burden not worth continuing to bear.

Another paper of note is N2823 Proposal to update CFP freestanding requirements (N2823), which was proposed by the C Floating Point Study Group in response to some concerns from WG21 members about additional functionality in freestanding. Neither alternative as a whole proposed in the paper gained consensus in WG14, but some of the changes were accepted and there was sentiment to limit the scope of freestanding implementations with regards to IEC 60559 conformance in C23.

Given the cancellation of the face to face meeting originally planned for later this month, WG14 has elected to meet an additional week to make up time. Our next meetings will be held (virtually) the week of Jan 31 and the week of Feb 14 (one week break between meetings). We're still on track for shipping C23 on time, our current schedule can be found at: N2759. Note that our final mailing that will accept C23 proposals of any kind is Jun 17, 2022.

Thomas Koeppe : there's been broad agreement with the C committee on various issues. The big topic that came up is that C is doing extensive work on floating point in the upcoming standard, and that is potentially conflicting with what we might want to do in C++.

Gabriel Dos Reis : I'm curious about the status of the lambda proposal in C23 and how close it is to C++ lambdas.

Thomas Koeppe : I'm not aware of anything. This may come up in a future meeting.

2.2 Pipeline stage 2 groups: Design subgroup status reports

• **EWG**, Core evolution: JF Bastien, David Stone, Erich Keane

JF Bastien reports vie e-mail.

The latest EWG report is available here: P1018
While folks are paying attention, please consult the "polls" section, and make sure to vote!
Info on how to vote was sent to ext@ and polls@: https://lists.isocpp.org/ext/2022/01/18878.php

Herb Sutter : we are at the design cut off point. That does not mean that everything that has been approved by EWG and LEWG right now will make it into C++23.

• **LEWG**, Library evolution: Bryce Adelstein Lelbach, Fabio Fracassi, Ben Craig

Bryce Adelstein Lelbach presents.

Short summary of LEWG activities - the full report (e.g. P2400) won't be revised until later this week. I've had to focus on finishing up time-sensitive LEWG things that need to be done before the C++23 feature freeze; that should wrap up over the next few days and then I can produce the report.

~40 papers advanced to LWG since our last report for C++23
Primarily: Executors, Ranges, Formatting, Freestanding

~50 currently papers in LWG's backlog (~15 more likely to be added soon)

We've been making heavy use of mailing list reviews and electronic polls to advance smaller and non-controversial papers without spending precious telecon time.

Polls Completed: Executors/Networking (October), November, December, January
Polls Planned: Coroutines Library Support (January)

We've held a few two-day extended telecons to review larger proposals, which has been quite successful.

Supertelecons: October (Executors), December (Executors), January (Executors)

Future Plans: Feb/Mar will almost exclusively be C++23 design clarifications. C++26 work will likely not begin until at least Apr.

Detlef Vollman : I found the supertelecons very helpful. However, they were often on short notice. It would help if we can announce them earlier.

Bryce Adelstein Lelbach : We will do that in the future. We're hoping for 8 weeks in advance. In February/March I will start scheduling C++26 supertelecons and I will make sure there is ample notice time.

Herb Sutter : How long was the notice for the executors supertelecon ?

Bryce Adelstein Lelbach : 2-4 weeks.

Bryce Adelstein Lelbach : JF and I have tweaked the time of the EWG and LEWG so they will from now on happen in the same week.

2.3 Pipeline stage 3 groups: Wording subgroup status reports

• **CWG**, Core wording: William Miller, Jens Maurer

William Miller presents.
CWG has had three teleconferences since the October, 2021 plenary and will have one more before the February, 2022 plenary (on 2022-01-27).

We have approved two C++23 papers for vote at the upcoming plenary:
P2173R1: Attributes on Lambda-Expressions
P2493R0: Missing feature-test macros for C++20 core papers

We also approved the core language wording in the following paper and forwarded it to LWG for action:
P0533R9: constexpr for <cmath> and <cstdlib>

In view of the tight scheduling for C++23, we reviewed the wording in several papers that are in the current EWG poll but seemed likely to pass. The following papers are ready for Committee vote, assuming they are approved by EWG:
P2324R2: Labels at the end of compound statements (C compatibility)
P2362R3: Remove non-encodable wide character literals and multicharacter wide literals
P2468R2: The Equality Operator You Are Looking For

CWG reviewed and asked for revisions to the following papers in the same category:
P2448R0: Relaxing some constexpr restrictions
P2473R0: Support for #warning

In addition to possibly reviewing those revisions, we expect to review the following papers during the 2022-01-27 teleconference:
P2465R1: Standard Library Modules std and std.compat
P2327R1: De-deprecating volatile compound operations

CWG also currently has seven issue resolutions in "ready" status and may have some additional ones for vote at the plenary, depending on the availability of time for review of drafting during the 2022-01-27 teleconference.

Because of the tight schedule for C++23, we've done things slightly differently with regard to normal practice. We looked at several papers that we think are likely to pass EWG polling and suggested revision and/or approved the suggested wording. That way we can add them to the polls in the summer plenary without further action by CWG if EWG approves those papers.

This will be my last plenary cycle as the chair of CWG. Jens Maurer has agreed to take up the position afterwards.

Herb Sutter and John Spicer thank William Miller for his efforts in chairing CWG.
The group applauds.

• **LWG**, Library wording: Jonathan Wakely, Jeff Garland, Dietmar Kuehl

Jonathan Wakely reports via e-mail.

Apologies, I will not be able to attend the meeting.
LWG continues to meet weekly and has made some good progress. But we still have a huge backlog of papers, some left over from before C++20 was published, and many new ones. There is no chance we will review them all for C++23.

The 11 papers that have been reviewed and approved for the plenary are:
P0323 std::expected
P0533 constexpr for <cmath> and <cstdlib>
P0627 Function to mark unreachable code
P1206 ranges::to: A function to convert any range to a container
P1413 Deprecate std::aligned_storage and std::aligned_union
P2273 Making std::unique_ptr constexpr
P2387 Pipe support for user-defined range adaptors
P2440 ranges::iota, ranges::shift_left and ranges::shift_right
P2442 Windowing range adaptors: views::chunk and views::slide
P2443 views::chunk_by

You can find links to the latest revisions and the subgroup polls for them via:
https://github.com/cplusplus/papers/issues?q=is%3Aopen+is%3Aissue+label%3AC%2B%2B23+label%3ALWG+label%3Atentatively-ready-for-plenary

We have resolved a few library issues via mailing list polls, but those tend to be the simple and obvious fixes. As usual, there will be a plenary poll to accept all those Tentatively Ready issues. We have made little progress on the harder issues.

I'll get the library motions on the straw polls page in the next few days.

LWG have also reviewed and approved a large editorial paper from Jens:
P2416 Presentation of requirements in the standard library

This reformats our requirements tables so that we no longer have the problem of trying to fit long identifiers and expressions into a narrow column in less than a quarter of the page width. This is the presentation style we want to use for all requirements in future, instead of the traditional (and strongly disliked) tables. We do not feel this needs plenary approval because it's only an editorial re-arrangement. But it's a large editorial change so we want to call it out here. The latest draft of D2416R2 is attached to the LWG page of the 2022 Telecons wiki. My understanding is that Jens plans to apply this editorial change to the draft before the plenary. I would like to thank Jens for doing all the hard work on this valuable change

Herb Sutter : I like the fact we now have a link to the page that reflects the status of polls and issues. Thank you to everyone who made that possible.

Bjarne Stroustrup : Are we systematically looking into performance implications ?

Herb : Do you mean as part of LWG wording review ?

Bjarne Stroustrup : I mean at any stage of the development of a feature. I would expect LEWG most of that.

Bryce Adelstein Lelbach : it's on the checklist of things we look for when reviewing a paper.

Bjarne Stroustrup : Should I expect that every paper forwarded to the library has a performance section?

Bryce Adelstein Lelbach : Only for those for which this is applicable and in those cases we like to see benchmarks.

Jeff Garland : The backlog for LEWG for C++23 has been growing rapidly. We now have more content than we can address for C++23. We will need to make choices on which design papers to look at. If you have a paper in that group, be aware that this is the reality

Bryce Adelstein Lelbach : The 50 papers that are in that group are all classified according to the P0592 paper.

Jeff Garland : we also have a problem of size. Large papers are coming at expense of everything else. Consistency and completeness in certain parts of the library may affect the decisions.

2.4 SC22 report

Herb Sutter presents.

You may have noticed more than usual rants about WG21-related frustrations on social media such as Twitter and Reddit comments. Our CoC includes not just meetings and mailing lists, but also interactions between WG21 participants anywhere (even private email) when it's about WG21. The ISO and IEC CoCs specifically say they include social media, and that we must be professional and respectful there. And, generally, that we support the ISO dispute resolution process which means in ISO not on Twitter.

We do not want to over-police, the CoC should not become a cudgel that stifles speech. So to make sure we are not overstepping, I raised this all the way up to JTC1 chair and committee manager, with a set of six specific recent "rant" tweets from several different WG21 members, to ask them to rule whether or not this falls under the CoC. They said it clearly did.

WG21 members, anything we say reflects on the committee. Being a WG21 participant gives us rights, such as participating in standardization and on our email lists. It also gives us responsibilities, notably following the ISO and IEC CoCs including on social media. Some have asked, if a person who is not a WG participant is free to say disrespectful thing X on social media, does that mean that just being a WG participant means they no longer can say X? The answer is yes. We are required to be professional and respectful on social media if we are WG21 members.

Bryce Adelstein Lelbach : We have some participants who are not formal members. Perhaps this makes it a little bit murky on whether those who participate informally participate in CoC

Herb Sutter : CoC applies to all participants. I'm more worried that some of the incidents involve subgroup chairs.

Tom Honermann : Thank you for explaining this and for looking into this.

Herb Sutter : We would never think about bashing the committee work in a conference talk, which is seen by hundreds of people in the room and typically thousands of people viewing the online video. Yet saying the same thing in a tweet easily reaches tens of thousands of people.

from chat :

Dietmar: I too would love it if what Herb just said re social-media/etc could be made clear to the entire committee

Others on chat : +1

2.5 SC22/WG14 (C) report (covered in 2.1 / SG22)

3. New business

3.1 Review of priorities and target dates

• Status page
• P1000

Herb Sutter presents.

We are at a deadline for feature approvals. July is our deadline for merging the wording into the WD that we will send out for CD comment ballot.

3.2 Any other business

Bryce Adelstein Lelbach : I have made a presentation to the INCITS executive board to ask for JTC1 to have permission to make standards openly available. I do not expect much to come out of that as there have been similar efforts over the past 20 years.

Vassil Vassilev : Is there a reminder for this telecon or do we implicitly know when it is.
Herb Sutter : there is usually a reminder sent to the admin mailing list, but I'm not sure if everyone is on the mailing list. Please check if you are subscribed to the admin list.
Nina Ranns : it's usually 2 weeks before the plenary meeting.

4.1 Review and approve resolutions and issues

No discussion

4.2 Review action items

Herb Sutter to update the status page.

5. Closing process
5.1 Establish next agenda

Herb : I propose the same agenda with an update telecon link and paper number. Any objections ?

No objections.

Proposal accepted.

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

5.4 Adjourn

Meeting adjourned at 09:02 N.Am. Pacific Time