

## WG14 N3515

### Meeting notes

## C Floating Point Study Group Teleconference

2025/02/12: 8 AM PST / 11 AM EST / 4 PM UTC

### Attendees

Jim Thomas, Rajan Bhakta, Jerome Coonen, Fred Tydeman, Joshua Cranmer, Damian McGuckin, David Hough, Mike Fairhurst, Tue Ly

### New agenda items

<https://wiki.edg.com/pub/CFP/WebHome/CFP%20meeting%20agenda-20250212-update.pdf>

SIGFPE

### Previous meeting notes

[https://wiki.edg.com/pub/CFP/WebHome/CFP%20Meeting%20notes%202025\\_01\\_08%20--%20Rev.%202.pdf](https://wiki.edg.com/pub/CFP/WebHome/CFP%20Meeting%20notes%202025_01_08%20--%20Rev.%202.pdf)

### Study group logistics

Next meeting: 12 March 2025, 8:00 AM PDT

ISO Zoom teleconference

Please notify the group if this time slot does not work.

Jim: David has been fighting DDOS attacks on the servers he provides to support CFP.

### C documents

There is a new C2Y draft 3435 Jan 2025. <https://www.open-std.org/jtc1/sc22/wg14/www/docs/n3435.pdf>

C23 has been published ISO/IEC 9899, available for purchase. <https://www.iso.org/standard/82075.html>

### IEEE 754 liaison

Jerome & Damian: Approved improvements to 5 definitions. Rejected a proposal re. signs of NaNs and their ordering. Discussed removal of "outdated" items -- extended formats in the mix. Jim Demmel is leading an effort to look at complex arithmetic.

Tue: Google is working on complex functions corresponding to the math functions in math.h.

Jim, et al.: Although the imaginary type is in C23, Tue reports that the discussion to remove the imaginary type from the C2Y working draft has caused them to back off on their implementation. So the circle completes, because lack of implementation is the reason for WG14 to remove imaginary from the standard.

### C++ liaison

Joshua: Meeting in progress in Austria. FP on agenda maybe tomorrow...

### WG14

Next meeting is Feb 24-28.

Several items in the discussion that follows refer to topics Rajan and/or Fred will bring to the meeting – **due to**

**Rajan by Wed. 19 Feb.**

### C23 integration

None.

### Carry-over action items from last meeting

David: Will draft reply for Rajan to take to WG14 re midpoint and interpolation. The idea is that, generally, it is not a good idea to put extensive library support into languages (e.g. LAPACK). Midpoint and interpolation are complicated, especially in decimal, and are beyond what anyone would ever put in hardware.

Damian: Split doc into 3 documents: complex.h intro, cproj, and editorial suggestions

Damian: cproj -- have worked with Jerome on proposal to be put on wiki; editorial suggestions -- working with Jerome; complex.h intro -- coming.

Jim: Will keep as a carry-over item.

#### Action items from last meeting

Damian: Prepare cproj proposal for WG14. Done.

Jim: Submit [Cfp-interest 3337] related to complex literals to WG14. Done

N3452 2025/01/12 Thomas, Proposal for C2Y - Complex literals warning. Done.

All: Continue study of the imaginary I macro and i suffix issues, noting that the I macro may be removed from C. Ongoing.

#### TS-4 and TS-5 revisions

Jim: Have been published, completing the task of IEEE 754 bindings.

Rajan: There have been comments from WG14. Would like to have feedback by 22 Feb.

#### Discussion of issues

Comment on CFP proposal

[cfp-interest 3369] Fwd: [[SC22WG14.28504](#)] 2024/12/01 Thomas, Proposal for C2Y - Improved treatment of error conditions for functions that round result to narrow type Jim Thomas

Jim, Jerome: Feedback about unclear wording inspired a re-do of the document with more explicit language. That language raises the spectre of unsigned infinities in fsub.

Group: Consensus is to step lightly on unsigned infinities, saying as little as possible to cover the case of INF-INF. Jim proposes that we tweak all 5 items to achieve more parallel structure.

Rajan: Want something for the WG14 meeting. (New action item entered.)

cproj cleanup

Covered in carry-over action items.

Errors in draft 3435

[[Cfp-interest 3360](#)] Errors in N3435 changes Jim Thomas

[[Cfp-interest 3361](#)] Re: [SC22WG14.28105] Errors in N3435 changes Joseph Myers

Jim: The changes suggested in the 33360 mail were not made correctly. Mail 3361 requests changes to fix the fiexes. Joseph fixed the typeface problem.

Rajan: Worked with WG144 to get the other issue, the parenthetical comment removal, complete.

Jim: Finally done.

CFP proposal updates

[[Cfp-interest 3362](#)] CFP proposal updates Jim Thomas

Jim: Have added comment for future directions regarding the obsolescent feature. Already submitted.

Fred: Would it help to note that the obsolescent range error has been replaced by a domain error?

Jim: (After further discussion and wordsmithing.) We will leave as is and consider Fred's suggestion.

Jim: There is an inconsistency in the last two bullets, namely, the extra " , the difference". The fix is to remove the extra text.

Fred: Looks good.

Reply to WG14 re midpoint and interpolation

Covered above.

Imaginary I macro and i suffix issues

[[cfp-interest 3366](#)] complex suffix specification Jim Thomas

Jim: Suggest paragraph break to split suffix from next para. Also, fix wording to avoid specifying a type the implementation does not provide.

Group: An existential crisis seems to arise because, on a system supporting decimal floating types (DF), there "can't" be complex decimal floating types because the standard doesn't define any. The suffix DFI is suggestive, but actually doesn't designate a type at all since C doesn't specify decimal complex types.

Rajan: Suggest paper to expose this to everyone. In a system without decimal, DFI suffix specifies a type that is not supported, so it must lead to a diagnostic. The fact that it COULDN'T be support is irrelevant. Whether there is a constraint violation if decimal is supported might depend on interpretation.

Jim: (Following some wordsmithing.) Let's leave this for further discussion.

[[cfp-interest 3368](#)] removing imaginary I Jim Thomas

Jim: Suggest 1.OfI for implementations that want the I macro.

Damian & Jim: As a note vs. footnote.

Jim: The I macro is used in cproj, but we are about to replace that with a much improved version that omits the I macro. Let's leave cproj as is, pending that proposal.

Rajan: Will mention all these issues in the WG`14 meeting.

SIGFPE

<https://wiki.edg.com/pub/CFP/WebHome/n3378c.htm>

Fred: Joseph Meyers prefers to avoid implementation-defined in options 3 and 4. He prefers option 1, which is my choice. There is no indication of breaking anything.

Tue: Functions receiving signaling NaNs might raise SIGFPE.

Fred: Standard C does not allow SIGFPE -- you should be raising Invalid Operation in 60559.

Rajan: So we are settling on option 1.

Fred & Tue: Prefer option 1.

Jim: Note this is at the edge of CFP. It's being presented as a C issue, not a CFP issue.

CFP accomplishment and future

[[cfp-interest 3374](#)] CFP accomplishment and future Jim Thomas

[[cfp-interest 3377](#)] Re: CFP accomplishment and future Damian McGuckin

[[cfp-interest 3378](#)] Re: CFP accomplishment and future Damian McGuckin

[[cfp-interest 3379](#)] Re: CFP accomplishment and future Mike Cowlshaw

Jim: C23, TS5, and TS6 cover the goal of CFP. Started in 2009. C23 was the first major revision, so finally chance to get the bindings.

Rajan: Great chance to report to CFP. For future, do we want to address fixed point.

Tue: Google has started fixed point, matching the fixed point TS.

Rajan: IBM also has a fixed point implementation.

Joshua: Fixed point types and other fixed point TS issues are tied to embedded implementations.

Group: Fixed point falls outside the floating domain. This merits a new working group with a new charter.

Jim: Mike Cowlshaw has suggested considering moving some C floating-point features to annexes or TSes or removing them altogether. There is sentiment for similar changes in 754.

#### Other issues:

Correctly rounded math functions

[[cfp-interest 3372](#)] Accuracy of Mathematical Functions Paul Zimmermann

#### Adjournment

10:08 AM PST

-----

#### Action items to be carried over:

Damian: complex.h intro, cproj, editorial suggestions.

#### New action items:

David: Draft statement on midpoint and interpolation.

Jim: Review the comments on TS 5.

Jerome: Rework the proposal for functions rounding to a narrow type. Finish by 19 Feb for Rajan to take to WG14 meeting.

Jim: Write a paper proposing editorial changes for imaginary suffix, emphasizing editorial changes vs. technical changes.

Fred: Prepare SIGFPE proposal based on WG14 feedback and CFP discussion.

**Discussion issues to be carried over:**

None.

Respectfully submitted.

-Jerome Coonen  
650.996.4738  
[jcoonen@gmail.com](mailto:jcoonen@gmail.com)