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ISO/IEC 9899 editor report November 2019

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The November 2019 working draft is now available. It contains some of the changes to ISO 9899 that have been voted in WG14 meetings up to the Ithaca meeting, Fall 2019:

N2454 – ISO/IEC 9899 working draft November 2019

The following document contains change marks to C17:

N2455 – ISO/IEC 9899 working draft November 2019, diffmarks

These diffmarks are not perfect (and cannot be) as they also show differences that are only markup, and as some changes in code snippets (examples, synopsis) are difficult to capture as textual differences. Please verify in the full document before reporting any oddities. Beware that, although these documents only present editorial changes or changes that have been voted into C2x, subsequent changes to the same parts of the document may still occur in later stages of the process. In particular, the naming of the new floating point functions should not yet be considered stable.

1. PROGRESS ON VOTED AND PROPOSED CHANGES

1.1. Integrated changes

The following resolutions to clarification requests (DR) and new features (N-documents) have been integrated in these documents:

- 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 20.* changes for obsolescing **DECIMAL_DIG**
- FP DR 21.* **printf** of one-digit character string
- FP DR 23.* **llquantexp** invalid case
- FP DR 24.* **remainder** NaN case
- FP DR 25.* **totalorder** parameters
- N2124 and N2319.* rounding direction macro **FE_TONEARESTFROMZERO**
- N2186.* Alternative to N2166
- N2212.* type generic **cbrt** (with editorial changes)
- 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
- 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

The integration of *TS 18661-1* and *TS 18661-2* (and even more *TS 18661-2*) has serious issues concerning the invention of about 500 (1700) new identifiers, many of which had not previously been reserved. Thus they intrude the user name space and as a whole may have a non-negligible risk of name collision. This risk has not yet been evaluated. Several ideas have been discussed to resolve these issues, but none has yet resulted in a proposal that would find consensus. See papers **N2409** and **N2426** for discussions of these issues.

1.2. Voted but still missing changes

Because of lack of work force the following voted changes have not yet been integrated into the documents:

1.2.1. Fall 2019 meeting

Direct changes to ISO 9899:

- N2379. SD3#1 (DR 440): FP types being 60559
- N2380. printf of NaN() (new wording needs new N-number)
- N2384. F.8 update
- N2400. why no wide string strfrom functions (subject to rewording by CFP)
- N2406. **SNAN**: initialization and unary +
- N2416. floating-point negation and conversion
- N2424. footnote about why **logp1**

1.2.2. Spring 2019 meeting

Direct changes to ISO 9899:

- N2342. TS 18661-3 as annex (see also **N2426**)
- N2112. change bullet points in annex J to referable labels or numbers (see also **N2427**)

The following resolutions to CR/DR for the floating-point specifications TS18661-x have been adopted. Since these specifications are now integrated in large parts into C2x, this also induces changes, there.

- FP DR 13.* Type-generic macros for functions that round result to narrower type
- FP DR 26.* **rootn** case differs from IEEE 754

1.3. Held back

The following changes have been voted into C2x but held back

- N2412.* Two's complement sign representation for C2x. Will be integrated into C2x for the pre-Freiburg mailing if there are no new objections raised before Feb. 2, 2020.

2. EDITORIAL IMPROVEMENTS

The document has undergone some editorial changes, namely:

- Improvement of the “diffmark” procedure to produce the document with diffmarks. In particular the page layout should be stabilized.
- Improvements for the categorization of identifiers that occur both as functions and as macros.
- Correction of some LaTeX coding. In particular the identification of terminal punctuators in the syntax and the miss-interpretation of `--` (decrement operator) as `-` (long hyphen).

Other editorial changes are a bit more involved.

2.1. Library function synopsis

A lot of function synopsis in the library clause have been reworked editorially. Annex B is now mostly produced automatically, such that we may avoid inconsistencies in the future. The dependency of the availability of certain interfaces is systematically classified by means of feature test macros.

2.2. Lists of reserved identifiers

The discussion of the integration of *TS 18661-1* has brought to light that there might be large difference in perception among the committee and the public about the impact of changes to the document in terms of reserved identifiers. This impact may be important, in particular if short abbreviated identifiers or common English words are added. This has lead us to the addition of a new non-normative clause J.6 to Annex J (Portability) that categorizes identifiers used by the document. It consists of a list of 38 regular expressions that systematically reserve 631 identifiers. Not matched by these regular expressions are 1193 identifiers. The lists and corresponding counts are generated automatically such that their maintenance should not add work for future editors.

2.3. Member declarations

The discussion about possible future integration of the *attribute* construct with its author Aaron Ballmann have brought to light that there has been a set of misnomers of syntax terms that were particularly annoying, namely four terms that describe different syntax levels for **struct** and **union** members. As historical artifacts these bare all the non-word *struct* in their names, leading to the confusion that they might actually talk about **struct** themselves, and that they would not apply to **union**.

Thus, we proceeded to a systematic text replacement of the syntax terms “*struct declaration*”, “*struct declaration list*”, “*struct declarator*”, and “*struct declarator list*” to the more appropriate “*member declaration*”, “*member declaration list*”, “*member declarator*” and “*member declarator list*”, respectively.

2.4. `cbrt` example in N2212

N2212 and FP DR 16 were still not completely correct in the way they expressed the dealing with the rounding modes. Namely, the identifiers inside the `_Generic` are evaluated much later than preprocessing, so referring to macros that would magically implement the rounding properties correctly made no sense.

For the final patch:

- We replace references to macro properties by function calls with the required rounding properties
- We added crossreferences to and from the example in the clause for `_Generic`

3. SUBMISSION OF CHANGE SETS

3.1. Contents of the changes

Please, provide titles for your documents that clearly indicate the subject of the change, and *not* something that refers to our process of changes. “New version of NXYZ0” is *not* a good title, “A second attempt to specify the toto feature” is much better and comprehensive for everybody.

Please, try to adapt your language to the normative context where it is applied. Don’t use unspecified terms but use the terms as introduced by the document, even if it sounds repetitive.

Clearly distinguish normative and non-normative parts. Non-normative text belongs in footnotes, “Notes” and “Examples”.

Usage of the verb forms “must”, “shall” and “may” is quite regulated in ISO text and should be applied with care. The preferred form to express a normative requirement is “shall”. If found inside a “Constraint” section it is a normative constraint and requires a diagnostic, if applied in other places it makes a non conforming program or execution undefined.

Avoid to add requirements for which the violation “only” results in undefined behavior. In particular, any erroneous construct that can always be detected at translation time, should be a constraint violation. Undefined behavior (implicit or explicit) should only be introduced to fulfill one of the following:

- A violation (runtime or translation) is not detectable in all cases, because the sought property is not constructive or has a high verification complexity.
- Implementations may use their own definitions to extend the C standard.

Remember that “undefined behavior” is not a thing but the absence of a thing, so there is no “undefined behavior” but only behavior that is undefined.

3.2. Submission format for changes

Authors of papers that are supposed to change the document and that have access to the source repository (all members of WG14 should), should apply their changes there and submit patches to the editors. Such a procedure ensures a seamless integration into the text and often reveals dependencies to other parts of the document that need to be explored. Such patches need not to be perfect, usually simple text level integration is a good start for the editors. The \LaTeX sources can be seen as pure text for which it should be easy to apply modifications for any person with programming skills. Please contact the editors if you have any doubt or question about such a procedure.

If for some reason that procedure does not seem feasible for you, please submit your changes with enough care, such that the editors may easily track modifications down to the word level: it is very tedious and error prone to scan entire paragraphs for single words that might have changed.

- Use a color scheme to mark deleted words and a different one for added words.

- Have your change sets left adjusted, ideally in a mono-space font, such that it is easy to spot changes.
- Mark all special words (identifiers, keywords) with some easily identifiable markup
- Footnotes that change, are deleted or added, should immediately follow the paragraph to which they apply. The spot of insertion should be clearly marked.
- If possible, give indications where your text introduces new definitions of terms, and when the renewed usage of a term should be listed in the index.
- If you are changing the document structure, by deleting or inserting new elements (such as paragraphs, sections, clauses) invent a numbering scheme that helps to uniquely identify old and new elements (e.g p8a for a paragraph inserted after old paragraph 8).