Proposal for C2x
WG14 N2078

Title: TS 18661-1
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Date: 2016-09-10
Proposal category: New features
Target audience: Users of standard binary floating-point arithmetic

Abstract: This proposal incorporates the changes specified in ISO/IEC TS 18661-1 into C2x. C currently supports the 1989 version of the IEC 60559 floating-point standard. The changes specified in TS 18661-1 update this support to the required features for binary floating-point arithmetic in the current IEC 60559 standard (2011). (Other parts of TS 18661 support decimal floating-point arithmetic and optional features in the floating-point standard.) The changes to C primarily include updates to annex F and new library features. They also include a pragma for constant (vs dynamic) rounding modes, and edits to allow optional support for signaling NaNs.

Prior art: A number of features from TS 18661-1 have been implemented in some form already. Examples are listed below:

GCC, HP, IBM: no exceptions for fabs

GCC, IBM: _Bool conversions for sNaNs with "invalid", canonical arguments for fprintf family of functions

HP: required rounding for character sequence conversion, compile-time control for rounding direction (as compile-line option)

Intel: Exact results for existing functions (examples include ceil, floor), minimum/maximum magnitude functions, total order functions, floating-point environment set/test functions, control modes, rounding to narrower type functions

Intel, IBM: New rounding functions (examples include roundeven*), next functions (examples include nextup, nextdown)