Alternate TC for TS 18661 DR 9 **WG14 N2127**
C FP group
2017-03-05

The TC in DR 501 includes two changes to TS 18661-3, one for the usual arithmetic conversions, the other for type-generic math. The first change fills in missing conversions for new types in TS 18661-3. The second change simplifies type-generic math by referencing the usual arithmetic conversions, and thereby also fills in missing type-generic math rules for arguments of the new types.

This is a proposal for an alternative change to type-generic math. The original change was proposed for TS 18661-3, where the new types where introduced. However, the change can be made in TS 18661-2, where it is easier to understand and leads to a simplification in TS 18661-3.

Alternative to second change in TC:

In TS 18661-2:

In 12.9, change the introduced [3c] from:

> [3c] Except for the macros for functions that round result to a narrower type (7.12.13a), use of a type-generic macro invokes a function whose generic parameters have the corresponding real type determined by the corresponding real types of the arguments as follows:
>
> — First, if any argument for generic parameters has type **`_Decimal128`**, the type determined is **`_Decimal128`**.
>
> — Otherwise, if any argument for generic parameters has type **`_Decimal64`**, or if any argument for generic parameters is of integer type and another argument for generic parameters has type **`_Decimal32`**, the type determined is **`_Decimal64`**.
>
> — Otherwise, if any argument for generic parameters has type **`_Decimal32`**, the type determined is **`_Decimal32`**.
>
> — Otherwise, if the corresponding real type of any argument for generic parameters is **`long double`**, the type determined is **`long double`**.
>
> — Otherwise, if the corresponding real type of any argument for generic parameters is **`double`** or is of integer type, the type determined is **`double`**.
>
> — Otherwise, if any argument for generic parameters is of integer type, the type determined is **`double`**.
>
> — Otherwise, the type determined is **`float`**.

to:

> [3c] Except for the macros for functions that round result to a narrower type (7.12.13a), use of a type-generic macro invokes a function whose generic parameters have the corresponding real type determined by the types of the arguments for the generic parameters as follows:
>
> — Arguments of integer type are regarded as having type **`_Decimal64`** if any argument has decimal floating type, and as having type **`double`** otherwise.
>
> — If the function has exactly one generic parameter, the type determined is the corresponding real type of the argument for the generic parameter.
>
> — If the function has exactly two generic parameters, the type determined is the corresponding real type determined by the usual arithmetic conversions (6.3.1.8) applied to the arguments for the generic parameters.
>
> — If the function has more than two generic parameters, the type determined is the corresponding real type determined by repeatedly applying the usual arithmetic conversions, first to the first two arguments for generic parameters, then to that result type and the next argument for a generic parameter, and so forth until the usual arithmetic conversions have been applied to the last argument for a generic parameter.

In TS 18661-3:

In 15, remove the change in 7.25#3c to replace the bullets.