
Integer args? Mixed FP types? Solution

yes yes int _isless(long double x, long double y);
#define isless(x,y) _isless(x,y)

This is the slowest as extra conversions would be done if x and y are the same type and not long double. It is the easiest to implement as no magic is required.

yes yes int _isless1(long double x, long double y);
int _islessd( double x, double y);
int _islesse( float x, float y);
#define isless(x,y) _tg_isless(x,y)

This treats isless(x,y) just like pow(x,y) in <tgmath.h>; they both use the same magic of type-generic macros.

yes yes ?< [[an operator in the language]]

This should be equivalent to the above unless the hardware supports compares between different FP types; in which case it would be faster as it avoids an explicit conversion. Unless the above were inline functions, this would be faster in that it avoids the function call overhead.

The above 3 are most general and slowest.

The next 2 honor the last sentence of 7.12.14 in that they require the arguments to be real floating types. Since they use compiler magic, they could result in inline instructions and avoid a function call.

no yes int isless(real-floating x, real-floating y);
#define isless(x,y) _cm_isless(x,y)
along with compiler magic

This is intermediate between the other two models. This is what Tydeman believes that C99 requires.

no no int isless(real-floating x, real-floating y);
#define isless(x,y) _cm_isless(x,y)
along with compiler magic

This is the most restrictive and the fastest (of the function based solutions) as no conversions need be done. I heard P.J. Plauger favor this model.

IEEE-754 only covers comparisons between floating-point values and comparisons involving mixed FP types shall be supported. So, C doing IEEE-754 comparisons where one operand is an integer value and the other is a floating-point value is an extension to IEEE-754.

The classification macros of 7.12.3 need similar compiler magic. fpclassify() and isnormal() are the only macros that truely require
magic as they must use the type of the argument (and isnormal() can be
done as fpclassify()==FP_NORMAL). The others can all be done using
functions of long double parameters: at a cost in performance.