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*****
18816 Tue Apr 30 23:31:41 2019
new/usr/src/head/iso/math_c99.h
10881 more C99 math macros should be compiler builtins
*****
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19 * CDDL HEADER END
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23 */
24 /*
25 * Copyright 2005 Sun Microsystems, Inc. All rights reserved.
26 * Use is subject to license terms.
27 */

29 #ifndef _ISO_MATH_C99_H
30 #define _ISO_MATH_C99_H

32 #include <sys/isa_defs.h>
33 #include <sys/feature_tests.h>

35 #ifdef __cplusplus
36 extern "C" {
37 #endif

39 #undef FP_ZERO
40 #define FP_ZERO 0
41 #undef FP_SUBNORMAL
42 #define FP_SUBNORMAL 1
43 #undef FP_NORMAL
44 #define FP_NORMAL 2
45 #undef FP_INFINITE
46 #define FP_INFINITE 3
47 #undef FP_NAN
48 #define FP_NAN 4

50 #endif /* ! codereview */
51 #if defined(_STDC_C99) || _XOPEN_SOURCE - 0 >= 600 || defined(__C99FEATURES__)
52 #if defined(__GNUC__)
53 #undef HUGE_VAL
54 #define HUGE_VAL (__builtin_huge_val())
55 #undef HUGE_VALF
56 #define HUGE_VALF (__builtin_huge_valf())
57 #undef HUGE_VALL
58 #define HUGE_VALL (__builtin_huge_vall())
59 #undef INFINITY
60 #define INFINITY (__builtin_inff())
61 #undef NAN

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62 #define NAN (__builtin_nanf(""))
63
64 /*
65  * C99 7.12.3 classification macros
66  */
67 #undef isnan
68 #undef isinf
69 #if __GNUC__ >= 4
70 #define isnan(x) __builtin_isnan(x)
71 #define isinf(x) __builtin_isinf(x)
72 #define fpclassify(x) __builtin_fpclassify(FP_NAN, FP_INFINITE, FP_NORMAL, \
73 FP_SUBNORMAL, FP_ZERO, x)
74 #define isfinite(x) __builtin_isfinite(x)
75 #define isnormal(x) __builtin_isnormal(x)
76 #define signbit(x) __builtin_signbit(x)
77 #else /* __GNUC__ >= 4 */
78 #else
79 #define isnan(x) __extension__( \
80 { __typeof(x) __x_n = (x); \
81 __builtin_isunordered(__x_n, __x_n); })
82 #define isinf(x) __extension__( \
83 { __typeof(x) __x_i = (x); \
84 __x_i == (__typeof(__x_i)) INFINITY || \
85 __x_i == (__typeof(__x_i)) (-INFINITY); })
86 #endif
87 #undef isfinite
88 #define isfinite(x) __extension__( \
89 { __typeof(x) __x_f = (x); \
90 !isnan(__x_f) && !isinf(__x_f); })
91 #undef isnormal
92 #define isnormal(x) __extension__( \
93 { __typeof(x) __x_r = (x); isfinite(__x_r) && \
94 (sizeof (__x_r) == sizeof (float) ? \
95 __builtin_fabsf(__x_r) >= _FLT_MIN : \
96 sizeof (__x_r) == sizeof (double) ? \
97 __builtin_fabs(__x_r) >= _DBL_MIN : \
98 __builtin_fabsl(__x_r) >= _LDBL_MIN); })
99 #undef fpclassify
100 #define fpclassify(x) __extension__( \
101 { __typeof(x) __x_c = (x); \
102 isnan(__x_c) ? FP_NAN : \
103 isinf(__x_c) ? FP_INFINITE : \
104 isnormal(__x_c) ? FP_NORMAL : \
105 __x_c == (__typeof(__x_c)) 0 ? FP_ZERO : \
106 FP_SUBNORMAL; })
107 #undef signbit
108 #if defined(_BIG_ENDIAN)
109 #define signbit(x) __extension__( \
110 { __typeof(x) __x_s = (x); \
111 (int)((unsigned *)&__x_s >> 31); })
112 #elif defined(_LITTLE_ENDIAN)
113 #define signbit(x) __extension__( \
114 { __typeof(x) __x_s = (x); \
115 (sizeof (__x_s) == sizeof (float) ? \
116 (int)((unsigned *)&__x_s >> 31) : \
117 sizeof (__x_s) == sizeof (double) ? \
118 (int)((unsigned *)&__x_s[1] >> 31) : \
119 (int)((unsigned short *)&__x_s[4] >> 15)); })
120 #endif /* defined(_BIG_ENDIAN) */
121 #endif /* __GNUC__ >= 4 */
122 #endif

121 /*
122  * C99 7.12.14 comparison macros
123  */
124 #undef isgreater

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125 #define isgreater(x, y)      __builtin_isgreater(x, y)
126 #undef isgreaterequal
127 #define isgreaterequal(x, y) __builtin_isgreaterequal(x, y)
128 #undef isless
129 #define isless(x, y)         __builtin_isless(x, y)
130 #undef islessequal
131 #define islessequal(x, y)    __builtin_islessequal(x, y)
132 #undef islessgreater
133 #define islessgreater(x, y)  __builtin_islessgreater(x, y)
134 #undef isunordered
135 #define isunordered(x, y)    __builtin_isunordered(x, y)
136 #else /* defined(__GNUC__) */
137 #undef HUGE_VAL
138 #define HUGE_VAL             __builtin_huge_val
139 #undef HUGE_VALF
140 #define HUGE_VALF           __builtin_huge_valf
141 #undef HUGE_VALL
142 #define HUGE_VALL           __builtin_huge_vall
143 #undef INFINITY
144 #define INFINITY             __builtin_infinity
145 #undef NAN
146 #define NAN                   __builtin_nan

148 /*
149  * C99 7.12.3 classification macros
150  */
151 #undef fpclassify
152 #define fpclassify(x)        __builtin_fpclassify(x)
153 #undef isfinite
154 #define isfinite(x)         __builtin_isfinite(x)
155 #undef isinf
156 #define isinf(x)            __builtin_isinf(x)
157 #undef isnan
158 #define isnan(x)            __builtin_isnan(x)
159 #undef isnormal
160 #define isnormal(x)         __builtin_isnormal(x)
161 #undef signbit
162 #define signbit(x)          __builtin_signbit(x)

164 /*
165  * C99 7.12.14 comparison macros
166  */
167 #undef isgreater
168 #define isgreater(x, y)      ((x) __builtin_isgreater(y))
169 #undef isgreaterequal
170 #define isgreaterequal(x, y) ((x) __builtin_isgreaterequal(y))
171 #undef isless
172 #define isless(x, y)         ((x) __builtin_isless(y))
173 #undef islessequal
174 #define islessequal(x, y)   ((x) __builtin_islessequal(y))
175 #undef islessgreater
176 #define islessgreater(x, y) ((x) __builtin_islessgreater(y))
177 #undef isunordered
178 #define isunordered(x, y)    ((x) __builtin_isunordered(y))
179 #endif /* defined(__GNUC__) */
180 #endif /* defined(__STDC_C99) || _XOPEN_SOURCE - 0 >= 600 || ... */

182 #if defined(__EXTENSIONS__) || defined(__STDC_C99) || \
183     (!defined(__STRICT_STDC) && !defined(__XOPEN_OR_POSIX)) || \
184     defined(__C99FEATURES__)
185 #if defined(__FLT_EVAL_METHOD__) && __FLT_EVAL_METHOD__ - 0 == 0
186 typedef float float_t;
187 typedef double double_t;
188 #elif __FLT_EVAL_METHOD__ - 0 == 1
189 typedef double float_t;
190 typedef double double_t;

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191 #elif __FLT_EVAL_METHOD__ - 0 == 2
192 typedef long double float_t;
193 typedef long double double_t;
194 #elif defined(__sparc) || defined(__amd64)
195 typedef float float_t;
196 typedef double double_t;
197 #elif defined(__i386)
198 typedef long double float_t;
199 typedef long double double_t;
200 #endif

164 #undef FP_ZERO
165 #define FP_ZERO              0
166 #undef FP_SUBNORMAL
167 #define FP_SUBNORMAL         1
168 #undef FP_NORMAL
169 #define FP_NORMAL            2
170 #undef FP_INFINITE
171 #define FP_INFINITE          3
172 #undef FP_NAN
173 #define FP_NAN                4

202 #undef FP_ILOGB0
203 #define FP_ILOGB0            (-2147483647)
204 #undef FP_ILOGBNAN
205 #define FP_ILOGBNAN          2147483647

207 #undef MATH_ERRNO
208 #define MATH_ERRNO           1
209 #undef MATH_ERREXCEPT
210 #define MATH_ERREXCEPT     2
211 #undef math_errhandling
212 #define math_errhandling     MATH_ERREXCEPT

214 extern double acosh(double);
215 extern double asinh(double);
216 extern double atanh(double);

218 extern double exp2(double);
219 extern double expm1(double);
220 extern int ilogb(double);
221 extern double log1p(double);
222 extern double log2(double);
223 extern double logb(double);
224 extern double scalbn(double, int);
225 extern double scalbln(double, long int);

227 extern double cbrt(double);
228 extern double hypot(double, double);

230 extern double erf(double);
231 extern double erfc(double);
232 extern double lgamma(double);
233 extern double tgamma(double);

235 extern double nearbyint(double);
236 extern double rint(double);
237 extern long int lrint(double);
238 extern double round(double);
239 extern long int lround(double);
240 extern double trunc(double);

242 extern double remainder(double, double);
243 extern double remquo(double, double, int *);

245 extern double copysign(double, double);

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246 extern double nan(const char *);
247 extern double nextafter(double, double);
248 extern double nexttoward(double, long double);

250 extern double fdim(double, double);
251 extern double fmax(double, double);
252 extern double fmin(double, double);

254 extern double fma(double, double, double);

256 extern float acosf(float);
257 extern float asinf(float);
258 extern float atanf(float);
259 extern float atan2f(float, float);
260 extern float cosf(float);
261 extern float sinf(float);
262 extern float tanf(float);

264 extern float acoshf(float);
265 extern float asinhf(float);
266 extern float atanhf(float);
267 extern float coshf(float);
268 extern float sinh(float);
269 extern float tanhf(float);

271 extern float expf(float);
272 extern float exp2f(float);
273 extern float expmf(float);
274 extern float frexpf(float, int *);
275 extern int ilogbf(float);
276 extern float ldexpf(float, int);
277 extern float logf(float);
278 extern float log10f(float);
279 extern float loglpf(float);
280 extern float log2f(float);
281 extern float logbf(float);
282 extern float modff(float, float *);
283 extern float scalbnf(float, int);
284 extern float scalblnf(float, long int);

286 extern float cbrtf(float);
287 extern float fabsf(float);
288 extern float hypotf(float, float);
289 extern float powf(float, float);
290 extern float sqrtf(float);

292 extern float erff(float);
293 extern float erfcf(float);
294 extern float lgammaf(float);
295 extern float tgammaf(float);

297 extern float ceilf(float);
298 extern float floorf(float);
299 extern float nearbyintf(float);
300 extern float rintf(float);
301 extern long int lrintf(float);
302 extern float roundf(float);
303 extern long int lroundf(float);
304 extern float truncf(float);

306 extern float fmodf(float, float);
307 extern float remainderf(float, float);
308 extern float remquof(float, float, int *);

310 extern float copysignf(float, float);
311 extern float nanf(const char *);

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312 extern float nextafterf(float, float);
313 extern float nexttowardf(float, long double);

315 extern float fdimf(float, float);
316 extern float fmaxf(float, float);
317 extern float fminf(float, float);

319 extern float fmaf(float, float, float);

321 extern long double acosl(long double);
322 extern long double asinl(long double);
323 extern long double atanl(long double);
324 extern long double atan2l(long double, long double);
325 extern long double cosl(long double);
326 extern long double sinl(long double);
327 extern long double tanl(long double);

329 extern long double acoshl(long double);
330 extern long double asinhl(long double);
331 extern long double atanh(l(long double);
332 extern long double coshl(long double);
333 extern long double sinhl(long double);
334 extern long double tanhl(long double);

336 extern long double expl(long double);
337 extern long double exp2l(long double);
338 extern long double expml(long double);
339 extern long double frexpl(long double, int *);
340 extern int ilogbl(long double);
341 extern long double ldexpl(long double, int);
342 extern long double logl(long double);
343 extern long double log10l(long double);
344 extern long double loglp(l(long double);
345 extern long double log2l(long double);
346 extern long double logbl(long double);
347 extern long double modfl(long double, long double *);
348 extern long double scalbnl(long double, int);
349 extern long double scalblnl(long double, long int);

351 extern long double cbrtl(long double);
352 extern long double fabsl(long double);
353 extern long double hypotl(long double, long double);
354 extern long double powl(long double, long double);
355 extern long double sqrtl(long double);

357 extern long double erfl(long double);
358 extern long double erfcl(long double);
359 extern long double lgammal(long double);
360 extern long double tgamma(l(long double);

362 extern long double ceill(long double);
363 extern long double floorl(long double);
364 extern long double nearbyintl(long double);
365 extern long double rintl(long double);
366 extern long int lrintl(long double);
367 extern long double roundl(long double);
368 extern long int lroundl(long double);
369 extern long double trunc(l(long double);

371 extern long double fmodl(long double, long double);
372 extern long double remainderl(long double, long double);
373 extern long double remquol(long double, long double, int *);

375 extern long double copysignl(long double, long double);
376 extern long double nanl(const char *);
377 extern long double nextafterl(long double, long double);

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378 extern long double nexttowardl(long double, long double);

380 extern long double fdiml(long double, long double);
381 extern long double fmaxl(long double, long double);
382 extern long double fminl(long double, long double);

384 extern long double fmal(long double, long double, long double);

386 #if !defined(_STRICT_STDC) && !defined(_NO_LONGLONG) || defined(_STDC_C99) || \
387     defined(_C99FEATURES_)
388 extern long long int llrint(double);
389 extern long long int llround(double);

391 extern long long int llrintf(float);
392 extern long long int llroundf(float);

394 extern long long int llrintl(long double);
395 extern long long int llroundl(long double);
396 #endif

398 #if !defined(__cplusplus)
399 #pragma does_not_read_global_data(asinh, exp2, expml)
400 #pragma does_not_read_global_data(ilogb, log2)
401 #pragma does_not_read_global_data(scalbn, scalbln, cbirt)
402 #pragma does_not_read_global_data(erf, erfc, tgamma)
403 #pragma does_not_read_global_data(nearbyint, rint, lrint, round, lround, trunc)
404 #pragma does_not_read_global_data(remquo)
405 #pragma does_not_read_global_data(copysign, nan, nexttoward)
406 #pragma does_not_read_global_data(fdim, fmax, fmin, fma)
407 #pragma does_not_write_global_data(asinh, exp2, expml)
408 #pragma does_not_write_global_data(ilogb, log2)
409 #pragma does_not_write_global_data(scalbn, scalbln, cbirt)
410 #pragma does_not_write_global_data(erf, erfc, tgamma)
411 #pragma does_not_write_global_data(nearbyint, rint, lrint, round, lround, trunc)
412 #pragma does_not_write_global_data(copysign, nan, nexttoward)
413 #pragma does_not_write_global_data(fdim, fmax, fmin, fma)

415 #pragma does_not_read_global_data(acosf, asinf, atanf, atan2f)
416 #pragma does_not_read_global_data(cosf, sinf, tanf)
417 #pragma does_not_read_global_data(acoshf, asinhf, atanhf, coshf, sinhf, tanhf)
418 #pragma does_not_read_global_data(expf, exp2f, expmf, frexpf, ilogbf, ldexpf)
419 #pragma does_not_read_global_data(logf, log10f, loglpf, log2f, logbf)
420 #pragma does_not_read_global_data(modff, scalbnf, scalblnf)
421 #pragma does_not_read_global_data(cbrtf, fabsf, hypotf, powf, sqrtf)
422 #pragma does_not_read_global_data(erff, erfcf, lgammaf, tgammaf)
423 #pragma does_not_read_global_data(ceilf, floorf, nearbyintf)
424 #pragma does_not_read_global_data(rintf, lrintf, roundf, lroundf, truncf)
425 #pragma does_not_read_global_data(fmodf, remainderf, remquof)
426 #pragma does_not_read_global_data(copysignf, nanf, nextafterf, nexttowardf)
427 #pragma does_not_read_global_data(fdimf, fmaxf, fminf, fmaf)
428 #pragma does_not_write_global_data(acosf, asinf, atanf, atan2f)
429 #pragma does_not_write_global_data(cosf, sinf, tanf)
430 #pragma does_not_write_global_data(acoshf, asinhf, atanhf, coshf, sinhf, tanhf)
431 #pragma does_not_write_global_data(expf, exp2f, expmf, ilogbf, ldexpf)
432 #pragma does_not_write_global_data(logf, log10f, loglpf, log2f, logbf)
433 #pragma does_not_write_global_data(cbrtf, fabsf, hypotf, powf, sqrtf)
434 #pragma does_not_write_global_data(erff, erfcf, tgammaf)
435 #pragma does_not_write_global_data(ceilf, floorf, nearbyintf)
436 #pragma does_not_write_global_data(rintf, lrintf, roundf, lroundf, truncf)
437 #pragma does_not_write_global_data(fmodf, remainderf)
438 #pragma does_not_write_global_data(copysignf, nanf, nextafterf, nexttowardf)
439 #pragma does_not_write_global_data(fdimf, fmaxf, fminf, fmaf)

441 #pragma does_not_read_global_data(acosl, asinl, atanl, atan2l)
442 #pragma does_not_read_global_data(cosl, sinl, tanl)
443 #pragma does_not_read_global_data(acoshl, asinhl, atanh, coshl, sinhl, tanhl)

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444 #pragma does_not_read_global_data(expl, exp2l, expml, frexpl, ilogbl, ldexpl)
445 #pragma does_not_read_global_data(logl, log10l, loglp, log2l, logbl)
446 #pragma does_not_read_global_data(modfl, scalbnl, scalblnl)
447 #pragma does_not_read_global_data(cbrtl, fabsl, hypotl, powl, sqrtl)
448 #pragma does_not_read_global_data(erfl, erfcl, lgammal, tgamma)
449 #pragma does_not_read_global_data(ceil, floor, nearbyint)
450 #pragma does_not_read_global_data(rintl, lrintl, roundl, lroundl, trunc)
451 #pragma does_not_read_global_data(fmodl, remainderl, remquol)
452 #pragma does_not_read_global_data(copysignl, nanl, nextafterl, nexttowardl)
453 #pragma does_not_read_global_data(fdiml, fmaxl, fminl, fmal)
454 #pragma does_not_write_global_data(acosl, asinl, atanl, atan2l)
455 #pragma does_not_write_global_data(cosl, sinl, tanl)
456 #pragma does_not_write_global_data(acoshl, asinhl, atanh, coshl, sinhl, tanhl)
457 #pragma does_not_write_global_data(expl, exp2l, expml, ilogbl, ldexpl)
458 #pragma does_not_write_global_data(logl, log10l, loglp, log2l, logbl)
459 #pragma does_not_write_global_data(cbrtl, fabsl, hypotl, powl, sqrtl)
460 #pragma does_not_write_global_data(erfl, erfcl, tgamma)
461 #pragma does_not_write_global_data(ceil, floor, nearbyint)
462 #pragma does_not_write_global_data(rintl, lrintl, roundl, lroundl, trunc)
463 #pragma does_not_write_global_data(fmodl, remainderl)
464 #pragma does_not_write_global_data(copysignl, nanl, nextafterl, nexttowardl)
465 #pragma does_not_write_global_data(fdiml, fmaxl, fminl, fmal)

467 #if !defined(_STRICT_STDC) && !defined(_NO_LONGLONG) || defined(_STDC_C99) || \
468     defined(_C99FEATURES_)
469 #pragma does_not_read_global_data(llrint, llround)
470 #pragma does_not_read_global_data(llrintf, llroundf, llrintl, llroundl)
471 #pragma does_not_write_global_data(llrint, llround)
472 #pragma does_not_write_global_data(llrintf, llroundf, llrintl, llroundl)
473 #endif
474 #endif /* !defined(__cplusplus) */

476 #if defined(_MATHERR_ERRNO_DONTCARE)
477 #pragma does_not_read_global_data(acosh, atanh, hypot, lgamma, loglp, logb)
478 #pragma does_not_read_global_data(nextafter, remainder)
479 #pragma does_not_write_global_data(acosh, atanh, hypot, loglp, logb)
480 #pragma does_not_write_global_data(nextafter, remainder)

482 #pragma no_side_effect(acosh, asinh, atanh, exp2, expml)
483 #pragma no_side_effect(ilogb, loglp, log2, logb)
484 #pragma no_side_effect(scalbn, scalbln, cbrt, hypot)
485 #pragma no_side_effect(erf, erfc, tgamma)
486 #pragma no_side_effect(nearbyint, rint, lrint, round, lround, trunc)
487 #pragma no_side_effect(remainder)
488 #pragma no_side_effect(copysign, nan, nextafter, nexttoward)
489 #pragma no_side_effect(fdim, fmax, fmin, fma)

491 #pragma no_side_effect(acosf, asinf, atanf, atan2f)
492 #pragma no_side_effect(cosf, sinf, tanf, coshf, sinhf, tanhf)
493 #pragma no_side_effect(acoshf, asinhf, atanhf, coshf, sinhf, tanhf)
494 #pragma no_side_effect(expf, exp2f, expmf, ilogbf, ldexpf)
495 #pragma no_side_effect(logf, log10f, loglpf, log2f, logbf)
496 #pragma no_side_effect(cbrtf, fabsf, hypotf, powf, sqrtf)
497 #pragma no_side_effect(erff, erfcf, tgammaf)
498 #pragma no_side_effect(ceilf, floorf, nearbyintf)
499 #pragma no_side_effect(rintf, lrintf, roundf, lroundf, truncf)
500 #pragma no_side_effect(fmodf, remainderf)
501 #pragma no_side_effect(copysignf, nanf, nextafterf, nexttowardf)
502 #pragma no_side_effect(fdimf, fmaxf, fminf, fmaf)

504 #pragma no_side_effect(acosl, asinl, atanl, atan2l)
505 #pragma no_side_effect(cosl, sinl, tanl, coshl, sinhl, tanhl)
506 #pragma no_side_effect(acoshl, asinhl, atanh, coshl, sinhl, tanhl)
507 #pragma no_side_effect(expl, exp2l, expml, ilogbl, ldexpl)
508 #pragma no_side_effect(logl, log10l, loglp, log2l, logbl)
509 #pragma no_side_effect(cbrtl, fabsl, hypotl, powl, sqrtl)

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510 #pragma no_side_effect(erfl, erfcl, tgamma)
511 #pragma no_side_effect(ceil, floor, nearbyint)
512 #pragma no_side_effect(rintl, lrintl, roundl, trunc)
513 #pragma no_side_effect(fmodl, remainderl)
514 #pragma no_side_effect(copysignl, nanl, nextafterl, nexttowardl)
515 #pragma no_side_effect(fdiml, fmaxl, fminl, fmal)

517 #if !defined(_STRICT_STDC) && !defined(_NO_LONGLONG) || defined(_STDC_C99) || \
518     defined(__C99FEATURES__)
519 #pragma no_side_effect(llrint, llround, llrintf, llroundf, llrintl, llroundl)
520 #endif
521 #endif /* defined(__MATHERR_ERRNO_DONTCARE) */
522 #endif /* defined(__EXTENSIONS__) || defined(_STDC_C99) || ... */

524 #ifdef __cplusplus
525 }
_____ unchanged_portion_omitted
```