GoFast® for PowerPC C Compilers

Features

- Fast
- Reentrant
- ROMable
- Conforms to IEEE 754
- Includes single and double precision
- “Link and Go” compiler support
- Includes complete source, test programs, project files, and startup code

Compiler Support

GoFast libraries are designed for “link and go” operation with each compiler. These libraries provide the user with a significant speed advantage when no floating point coprocessor hardware is available. This is of particular significance in real-time embedded systems.

GoFast for PowerPC includes drop-in libraries for “link and go” seamless operation with Diab Data, GNU, IBM, Metaware, and Freescale PowerPC C compilers. The GoFast routines directly replace the compiler’s floating point runtime library routines. Two types of interfaces are provided. The first is an emulator interface, which uses a processor interrupt to pick up the floating-point instructions and emulate them in software. Separate subdirectories in the GoFast distribution contain an emulator specific to the PowerPC 602 and an emulator, which supports other variants of the PowerPC. The second interface is through callable libraries. The product distribution contains directories that are specific to each C compiler supported. The Embedded Application Binary Interface (EABI) is supported for both Metaware and Diab Data compilers and the emulator library interface is supported for the IBM compiler.

Functionality

GoFast contains the following floating point routines in both single and double precision:

- add, subtract, multiply, divide
- conversion operations
- compare operations
- sin, cos, tan
- asin, acos, atan, atan2
- sinh, cosh, tanh
- log, log10
- exp, pow
- fabs, ceil, floor
- modf, fmod, frexp, ldexp

Timings

The following table gives the times for all floating point operations, for GoFast and the GNU floating point library. The times, in microseconds, were measured using the indicated processor and board.

Microsecond Timings

PPC440GX EVB, External SDRAM

	Double-Precision		Single-Precision	
Function	**GoFast**	**GNU**	**GoFast**	**GNU**
add	0.150	0.454	0.121	0.387
subtract	0.156	0.478	0.123	0.395
multiply	0.157	0.532	0.110	0.265
divide	0.552	2.141	0.284	0.641
sqrt	0.928	1.981	0.385	2.452
exp	0.878	16.203	0.303	16.548
log	1.230	16.891	0.445	17.353
log10	1.296	20.064	0.459	20.517
pow	2.101	56.297	0.769	56.752
sin	0.710	15.297	0.281	15.763
cos	0.696	15.585	0.281	16.072
tan	1.247	28.076	0.475	28.498
asin	1.192	18.128	0.925	18.568
acos	1.102	16.798	1.089	17.295
atan	1.414	16.270	0.537	16.780
atan2	1.849	21.077	0.725	21.635
sinh	1.283	27.025	0.507	27.521
cosh	1.254	19.363	0.486	19.882
tanh	1.322	26.158	0.644	26.539
modf	0.285	0.891	0.103	1.380
fmod	1.058	1.511	0.816	2.258
fabs	0.064	0.079	0.058	0.555
floor	0.095	0.824	0.080	1.302
ceil	0.096	0.823	0.081	1.308
ldexp	0.083	0.708	0.080	1.177
frexp	0.077	0.134	0.072	0.645
feq/gt/lt...	0.102	0.252	0.083	0.252
fp to long	0.068	0.145	0.062	0.154
fp to ulong	0.067	0.392	0.062	0.404
long to fp	0.072	0.962	0.070	0.185
ulong to fp	0.080	1.135	0.084	0.255
fp to llong	0.739	3.195	0.771	3.326
fp to ullong	0.628	2.963	0.689	3.132
llong to fp	0.588	3.388	0.677	3.584
ullong to fp	0.662	3.578	0.749	3.763
sgl to dbl	0.067	0.214	–	–
dbl to sgl	0.081	0.184	–	–

Times were measured on a 440GX board with GCC v3.4.2 using uClibc v0.9.28.