GoFast® for Altera NIOS® II and GNU C Compiler

Features

- Fast
- Reentrant
- ROMable
- Conforms to IEEE 754
- "Link and Go" compiler support for GNU C/C++
- Includes startup code
- Includes complete source, test programs, and make file

Description

GoFast® for NIOS® II was carefully designed for high performance operation and ease of use including "link and go" compatibility with the GNU C compiler. GoFast provides ROMable, reentrant IEEE and ANSI compatible NIOS II floating point support.

Functionality

GoFast supports reentrant floating point calculations for the GNU C compiler. GoFast includes the following routines for both single and double precision in library format:

- **intrinsic basic operations + - * /**
- **intrinsic conversions**
- **sqrt**
- **sin, cos, tan**
- **asin, acos, atan, atan2**
- **sinh, cosh, atanh**
- **log, log10, exp, pow**
- **floor, ceils, fabs**
- **modf, fmod, frexp, ldexp**

Compiler

This GoFast library is for the GNU C compiler. There are two versions, one that uses neither a multiply nor a divide instruction (NIOSX), and one that uses both (NIOS II).

Timings

GoFast is primarily designed to facilitate embedded operation. However, it is also tuned for performance. The following table gives the timing of some floating point operations, both with the GoFast floating point library and the GNU C floating point library. The times, given in microseconds, were measured using the 24 MHz Altera Nios II IC12 standard evaluation board with no hardware multiply or divide.

Microsecond Timings

Function	Double-Precision		Single-Precision	
	GoFast	GNU	GoFast	GNU
add	0.7	2.1	0.3	1.1
subtract	0.7	2.1	0.3	1.1
multiply	3.2	10.9	0.9	3.0
divide	3.4	7.6	1.0	1.5
sqrt	6.3	7.4	3.2	1.7
exp	21.6	117.1	5.6	37.6
log	18.2	182.4	4.0	54.1
log10	20.4	199.8	4.8	60.8
sin	18.0	105.0	4.0	32.1
cos	16.0	120.9	4.0	38.4
tan	22.0	220.6	5.6	67.1
asin	32.4	213.1	8.8	64.1
acos	32.2	201.5	9.6	59.6
atan	18.8	209.5	4.9	61.4
atan2	21.9	223.4	5.8	64.4
pow	42.5	542.0	10.6	163.6