Product Brief

Intel Scientific Computers

IPSC-VX™ Vector Library (VecLib)

VecLib is the math library for the iPSC-VX™ vector processor. It contains a variety of functions and operations which have been organized to conform with the calling and naming conventions of the Basic Linear Algebra Subprograms (BLAS). Each of the routines in the library represent microcoded functions that reside in, and are executed by, the vector processor. In this sense, VecLib forms the access interface for the user to the vector processor. This access takes two forms: direct access using subroutine calls, and indirect access through the VAST-2™ FORTRAN vectorizer. The vectorized output of VAST-2 contains commands to execute VecLib routines on the vector processor.

VecLib is also supported in versions that can be used on standard iPSC nodes as well as a transportable FORTRAN version for use with the iPSC simulator. These versions of VecLib are intended for developing application programs and debugging programs ultimately targeted for the iPSC-VX.

The table shows a subset of the routines that make up VecLib. Performance numbers shown represent the peak performance or the performance which would be achieved if vector lengths were infinite ($R\infty$). Performance is shown for 32- and 64-bit operations with data residing both in the 1 Mbyte dynamic data memory and in the 16 KByte static (fast) memory.

Command	Description	32-Bit		64-Bit	
		Static	Dynamic	Static	Dynamic
xASUM	Sum absolute values	10.00 §	5.00 §	10.00	4.00
xAXPY	Constant times vector plus vector	6.67 §	3.33 §	6.67	2.67
xCLIP	Clip to interval	3.33	2.00	3.33	1.67
xCOPY	Copy vector				
xDOT	Dot product of two vectors	10.00 §	5.00 §	6.67	3.33
xFILL	Fill vector				
xGATHR	Vector gather				
xICLIP	Invert clip	3.33	2.00	3.33	1.67
xLBIDI	Solve a lower bidiagonal linear system				
xNEG	Change sign	5.00 §	2.50 §	5.00	2.00
xNRM2	Euclidean vector norm				
xRAMP	Ramp function	10.00	5.00	10.00	4.00
xROT	Apply a plane rotation				
xROTG	Construct Givens plane rotation				
xSCAL	Constant times a vector	5.00	2.50	3.33	1.33
xSCATR	Vector scatter				

x = S for single precision D for double precision

§ Denotes routines which have 2x performance for consecutive data organization (32-bit only)

Command	Description	32-Bit		64-Bit	
		Static	Dynamic	Static	Dynamic
xSUM	Vector sum	10.00	5.00	10.00	4.00
xSWAP	Swap vectors				
xTRIDI	Solve a positive definite tridiagonal linear sys.				
xUBIDI	Solve an upper bidiagnoal linear system				
xVABS	Element-wise absolute value	5.00	2.50	5.00	2.00
xVADD	Vector addition	3.33	1.67	3.33	1.33
xVAMAX	Vector element-wise maximum absolute value	3.33	1.67	3.33	1.33
xVAMIN	Vector element-wise minimum absolute value	3.33	1.67	3.33	1.33
xVATAN	Element-wise inverse tangent				
xVATN2	Element-wise inverse tangent, two operands				
xVCOS	Element-wise cosine	0.65	0.57	0.30	0.28
xVDIV	Vector division, element-by-element	0.67	0.56	0.28	0.25
xVEXP	Element-wise exponential	0.37	0.34	0.19	0.18
xVFIX	Truncate elements to integer values	5.00	2.50	5.00	2.00
xVFLOA	Convert integer to floating-point	5.00	2.50	5.00	2.00
xVLG10	Element-wise base 10 logarithm				
xVLOG	Element-wise natural logarithm	0.36	0.34	0.13	0.12
xVMAX	Vector element-wise maximum	3.33	1.67	3.33	1.33
xVMIN	Vector element-wise minimum	3.33	1.67	3.33	1.33
xVMUL	Vector multiplication, element-by-element	3.33	1.67	3.33	1.33
xVNEG	Negate vector				
xVPOLY	Vector polynomial evaluation				
xVPOW	Element-wise power function				
xVRECP	Vector reciprocal				
xVSIN	Element-wise sine	0.65	0.57	0.30	0.28
xVSQRT	Element-wise square root	0.43	0.40	0.26	0.24
xVSUB	Vector subtraction	3.33	1.67	3.33	1.33
xVVMVT	Vector minus vector quantity times vector				
xVVTVP	Vector minus vector quantity times vector				
xVVVTM	Vector minus quantity of vector times vector				
IxAMAX	Index of maximum absolute value	2.86	2.22	2.86	2.00
IxAMIN	Index of minimum absolute value	2.86	2.22	2.86	2.00
IxMAX	Index of maximum value	2.86	2.22	2.86	2.00
IxMIN	Index of maximum value	2.86	2.22	2.86	2.00
VDBLE	Convert single to double precision	5.00	2.50	5.00	2.00
VSNGL	Convert double to single precision	5.00	2.50	5.00	2.00
CFFT	Fast Fourier Transform		10.70*		
CIFFT	Inverse fast Fourier Transform		10.70*		

* 1024-point complex FFT