BLAS Fortran 77 prototypes

Level 1 blas: vector, $O(n)$ operations

name	(**dim**, **scalar**, **vector**, **vector**, **scalars**, **param**)	**description**	**equation**	**prefixes**
_rotg	(a, b, c, s)	generate plane rotation		s, d
_rotmg	(d1, d2, a, b, param)	generate modified plane rotation		s, d
_rot	(n, x, incx, y, incy, c, s)	apply plane rotation		s, d
_rotm	(n, x, incx, y, incy, param)	apply modified plane rotation		s, d
_swap	(n, x, incx, y, incy)	swap vectors	$x \leftrightarrow y$	s, d, c, z
_scal	(n, alpha, x, incx)	scale vector	$y = \alpha y$	s, d, c, z, cs, zd
_copy	(n, x, incx, y, incy)	copy vector	$y = x$	s, d, c, z
_axpy	(n, alpha, x, incx, y, incy)	update vector	$y = y + \alpha x$	s, d, c, z
_dot	(n, x, incx, y, incy)	dot product	$= x^t y$	s, d, ds
_dotu	(n, x, incx, y, incy)	(complex)	$= x^t y$	c, z
_dotc	(n, x, incx, y, incy)	(complex conj)	$= x^h y$	c, z
__dot	(n, x, incx, y, incy)	(?)	$= \alpha + x^t y$	sds
_nrm2	(n, x, incx)	2-norm	$= \|x\|_2$	s, d, sc, dz
_asum	(n, x, incx)	1-norm	$= \|\mathrm{Re}(x)\|_1 + \|\mathrm{Im}(x)\|_1$	s, d, sc, dz
i_amax	(n, x, incx)	∞-norm	$= i$ such that $\|\mathrm{Re}(x_i)\| + \|\mathrm{Im}(x_i)\|$ is max	s, d, c, z

Level 2 blas: matrix-vector, $O(n^2)$ operations

name	(**options**, **dim**, **bandwidth**, **scalar**, **matrix**, **vector**, **scalar**, **vector**)	**description**	**equation**	**prefixes**
_gemv	(trans, m, n, alpha, A, ldA, x, incx, beta, y, incy)	general matrix-vector multiply	$y = \alpha A^* x + \beta y$	s, d, c, z
_gbmv	(trans, m, n, kl, ku, alpha, A, ldA, x, incx, beta, y, incy)	(banded)	$y = \alpha A^* x + \beta y$	s, d, c, z
_hemv	(uplo, n, alpha, A, ldA, x, incx, beta, y, incy)	hermetian mat-vec	$y = \alpha A x + \beta y$	c, z
_hbmv	(uplo, n, k, alpha, A, ldA, x, incx, beta, y, incy)	(banded)	$y = \alpha A x + \beta y$	c, z
_hpmv	(uplo, n, alpha, Ap, x, incx, beta, y, incy)	(packed)	$y = \alpha A x + \beta y$	c, z
_symv	(uplo, n, alpha, A, ldA, x, incx, beta, y, incy)	symmetric mat-vec	$y = \alpha A x + \beta y$	s, d, (c, z)†
_sbmv	(uplo, n, k, alpha, A, ldA, x, incx, beta, y, incy)	(banded)	$y = \alpha A x + \beta y$	s, d
_spmv	(uplo, n, alpha, Ap, x, incx, beta, y, incy)	(packed)	$y = \alpha A x + \beta y$	s, d, (c, z)†
_trmv	(uplo, trans, diag, n, A, ldA, x, incx)	triangular mat-vec	$x = A^* x$	s, d, c, z
_tbmv	(uplo, trans, diag, n, k, A, ldA, x, incx)	(banded)	$x = A^* x$	s, d, c, z
_tpmv	(uplo, trans, diag, n, Ap, x, incx)	(packed)	$x = A^* x$	s, d, c, z
_trsv	(uplo, trans, diag, n, A, ldA, x, incx)	triangular solve	$x = A^{-*} x$	s, d, c, z
_tbsv	(uplo, trans, diag, n, k, A, ldA, x, incx)	(banded)	$x = A^{-*} x$	s, d, c, z
_tpsv	(uplo, trans, diag, n, Ap, x, incx)	(packed)	$x = A^{-*} x$	s, d, c, z

A^* denotes A, A^T, or A^H;
A^{-*} denotes A^{-1}, A^{-T}, or A^{-H}, depending on options and data type.
A is $m \times n$ or $n \times n$.

Level 2, continued

name (options, dim, scalar, vector, vector, matrix)	description	equation	prefixes
_ger (m, n, alpha, x, incx, y, incy, A, ldA)	general rank-1 update	$A = A + \alpha x y^T$	s, d
_geru (m, n, alpha, x, incx, y, incy, A, ldA)	(complex)	$A = A + \alpha x y^T$	c, z
_gerc (m, n, alpha, x, incx, y, incy, A, ldA)	(complex conj)	$A = A + \alpha x y^H$	c, z
_her (uplo, n, alpha, x, incx, A, ldA)	hermetian rank-1 update	$A = A + \alpha x x^H$	c, z
_hpr (uplo, n, alpha, x, incx, Ap)	(packed)	$A = A + \alpha x x^H$	c, z
_her2 (uplo, n, alpha, x, incx, y, incy, A, ldA)	hermetian rank-2 update	$A = A + \alpha x y^H + y(\alpha x)^H$	c, z
_hpr2 (uplo, n, alpha, x, incx, y, incy, Ap)	(packed)	$A = A + \alpha x y^H + y(\alpha x)^H$	c, z
_syr (uplo, n, alpha, x, incx, A, ldA)	symmetric rank-1 update	$A = A + \alpha x x^T$	s, d, (c, z)†
_spr (uplo, n, alpha, x, incx, Ap)	(packed)	$A = A + \alpha x x^T$	s, d, (c, z)†
_syr2 (uplo, n, alpha, x, incx, y, incy, A, ldA)	symmetric rank-2 update	$A = A + \alpha x y^T + \alpha y x^T$	s, d
_spr2 (uplo, n, alpha, x, incx, y, incy, Ap)	(packed)	$A = A + \alpha x y^T + \alpha y x^T$	s, d

Level 3 blas: matrix-matrix, $O(n^3)$ operations

name (options, dim, scalar, matrix, matrix, scalar, matrix)	description	equation	prefixes
_gemm (transa, transb, m, n, k, alpha, A, ldA, B, ldB, beta, C, ldC)	general matrix-matrix multiply	$C = \alpha A^* B^* + \beta C$	s, d, c, z
_symm (side, uplo, m, n, alpha, A, ldA, B, ldB, beta, C, ldC)	symmetric mat-mat	$C = \alpha AB + \beta C$	s, d, c, z
_hemm (side, uplo, m, n, alpha, A, ldA, B, ldB, beta, C, ldC)	hermetian mat-mat	$C = \alpha AB + \beta C$	c, z
_syrk (uplo, trans, n, k, alpha, A, ldA, beta, C, ldC)	symmetric rank-k update	$C = \alpha AA^T + \beta C$	s, d, c, z
_herk (uplo, trans, n, k, alpha, A, ldA, beta, C, ldC)	hermetian rank-k update	$C = \alpha AA^H + \beta C$	c, z
_syr2k (uplo, trans, n, k, alpha, A, ldA, B, ldB, beta, C, ldC)	symmetric rank-2k update	$C = \alpha AB^T + \bar{\alpha} BA^T + \beta C$	s, d, c, z
_her2k (uplo, trans, n, k, alpha, A, ldA, B, ldB, beta, C, ldC)	hermetian rank-2k update	$C = \alpha AB^H + \bar{\alpha} BA^H + \beta C$	c, z
_trmm (side, uplo, transa, diag, m, n, alpha, A, ldA, B, ldB)	triangular mat-mat	$B = \alpha A^* B$ or $B = \alpha BA^*$	s, d, c, z
_trsm (side, uplo, transa, diag, m, n, alpha, A, ldA, B, ldB)	triangular solve mat	$B = \alpha A^{-*} B$ or $B = \alpha BA^{-*}$	s, d, c, z

A^* denotes A, A^T, or A^H;
A^{-*} denotes A^{-1}, A^{-T}, or A^{-H}, depending on options and data type.
The destination matrix is $m \times n$ or $n \times n$. For mat-mat, the common dimension of A and B is k.

Prefixes

s – real (float)	d – double	
c – complex	z – complex*16	
ge – general	gb – general banded	
sy – symmetric	sb – symmetric banded	sp – symmetric packed
he – hermetian	hb – hermetian banded	hp – hermetian packed
tr – triangular	tb – triangular banded	tp – triangular packed

† LAPACK adds these complex symmetric routines.

Options

tranx = 'N'o transpose: A, 'T'ranspose: A^T, 'C'onjugate transpose: A^H
uplo = 'U'pper triangular, 'L'ower triangular
diag = 'N'on-unit triangular, 'U'nit triangular
side = 'L'eft: AB, 'R'ight: BA
ldA is major stride—number of rows of parent matrix A. Useful for submatrices.
For real matrices, transx = 'T' and 'C' are the same.
For Hermitian matrices, transx = 'T' is not allowed.
For complex symmetric matrices, transx = 'C' is not allowed.

Updated June 13, 2008. BLAS and LAPACK guides available from http://www.ews.uiuc.edu/~mrgates2/.
Reference: *BLAS Quick Reference Guide* from http://www.netlib.org/blas/faq.html