## ATLAS ANSI/ISO C LAPACK API REFERENCE

ROUTINE	(ARGUMENTS)	DESCRIPTION	PREFIXES
int clapack_ $\Diamond$ gesv	(const enum CBLAS_ORDER Order, const int N, const int NRHS, TYPE *A, const int lda, int *ipiv, TYPE	using $AP = LU, B \leftarrow A^{-1}B, A \leftarrow LU,$	S, D, C, Z
	*B, const int ldb )	$ipiv \leftarrow P$ ( <i>U</i> is unit diagonal, <i>P</i> pivots columns)	
int clapack_\$getrf	( const enum CBLAS_ORDER Order, const int M, const int N, TYPE *A, const int lda, int *ipiv )	using $AP = LU$ , $A \leftarrow LU$ , $ipiv \leftarrow P$	S, D, C, Z
		(U  is unit diagonal, P  pivots columns)	
int clapack_\$\text{\square} getrs	( const enum CBLAS_ORDER Order, const enum CBLAS_TRANSPOSE Trans, const int N, const int NRHS, const TYPE *A, const int lda, const int *ipiv, TYPE *B, const int ldb)	$B \leftarrow op(A)^{-1}B$ , assuming $A = LU$ , $ipiv = P$ , $op(X) = X, X^T, X^H$	S, D, C, Z
int clanack ∆getri	( const enum CBLAS_ORDER Order, const int N, TYPE *A, const int lda, const int *ipiv )	$A \leftarrow A^{-1}$ , assuming on entry $A = LU$ ,	S, D, C, Z
int chapacity getif	( const chain obblig-ordblit order, const me ii, i i i b ii, const me ida, const me ipiv)	ipiv = P	5, 2, 0, 2
int alamaal. A	( count course CDI AC ODDED Order count course CDI AC LIDI O Links count int N. count int MDIIC TWDE *A	D = A = 1D using $A = UTU = A$ .	c D C Z
int ciapack_⇔posv	( const enum CBLAS_ORDER Order, const enum CBLAS_UPLO Uplo, const int N, const int NRHS, TYPE *A, const int lda, TYPE *B, const int ldb )	$B \leftarrow A^{-1}B$ , using $A \leftarrow U^TU$ or $A \leftarrow LL^T$ or $A \leftarrow U^HU$ or $A \leftarrow LL^H$	S, D, C, Z
int clapack_◇potrf	( const enum CBLAS_ORDER Order, const enum CBLAS_UPLO Uplo, const int N, TYPE *A, const int lda )	$A \leftarrow U^T U \text{ or } A \leftarrow L L^T \text{ or } A \leftarrow U^H U$	S, D, C, Z
		or $A \leftarrow LL^H$	a D a z
int clapack_⇔potrs	(const enum CBLAS_ORDER Order, const enum CBLAS_UPLO Uplo, const int N, const int NRHS, const TYPE *A, const int lda, TYPE *B, const int ldb)	$B \leftarrow op(A)^{-1}B$ , assuming $A = U^TU$ or $A = LL^T$ or $A = U^HU$ or $A = LL^H$	S, D, C, Z
int clapack_♦potri	(const enum CBLAS_ORDER Order, const enum ATLAS_UPLO Uplo, const int N, TYPE *A, const int lda)	$A \leftarrow A^{-1}$ , assuming on entry $A = A$	S, D, C, Z
		$U^T U$ or $A = LL^T$ or $A = U^H U$ or	
1 1 1 1	/ AMIACODDED O 1 AMIACIDIO II 1 AMINDE *A AMIACIDIO II 1	$A = LL^H$	
* '	n(const enum ATLAS_ORDER Order, const enum ATLAS_UPLO Uplo, const int N, TYPE *A, const int lda)	$A \leftarrow UU^H \text{ or } A \leftarrow L^H L$	S, D, C, Z
ınt cıapack_⇔trtrı	( const enum ATLAS_ORDER Order, const enum ATLAS_UPLO Uplo, const enum ATLAS_DIAG Diag, const int N, TYPE *A, const int lda )	$A \leftarrow A^{-1}$ , given A is an Upper or Lower triangular matrix	S, D, C, Z
	int N, 111 L. A, const int ida )	Lower triangular matrix	
int clapack_♦gels	( const enum CBLAS_ORDER Order, const enum CBLAS_TRANSPOSE TA, const int M, const int N, const int	$B \leftarrow A^{-1}B$ (can be over- or under-	S, D, C, Z
	NRHS, TYPE *A, const int lda, TYPE *B, const int ldb )	determined), using $A \leftarrow QR$ or $A \leftarrow$	
int clapack_<	(const enum CBLAS_ORDER Order, const int M, const int N, TYPE *A, const int lda, TYPE *TAU)	$RQ$ or $A \leftarrow LQ$ or $A \leftarrow QL$ $A \leftarrow QR$ or $A \leftarrow RQ$ or $A \leftarrow LQ$ or	S, D, C, Z
ge[qr,rq,lq,ql]f	( const enum ODDAS_ORDER Order, const int M, const int M, 11FE A, const int ida, 14FE '1AU')	$A \leftarrow QR$ or $A \leftarrow RQ$ or $A \leftarrow LQ$ or $A \leftarrow QL$	$\mathcal{S}, \mathcal{D}, \mathcal{O}, \mathcal{L}$
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## NOTES:

- C interface DESCRIPTIONs assume Order == CblasRowMajor. For column-major descriptions, consult the Fortran77 descriptions.
- All C functions return LAPACK's INFO parameter
- C Calling routines should include the BLAS header file, cblas.h.
- ullet Cases seperated by or above depend on user input or data type.
- More information available at http://math-atlas.sourceforge.net/.

## PREFIX RELATED DEFINITIONS:

♦is	Data operated	TYPE	UTYPE	SCALAR
s	single precision real	float	float	const float
d	double precision real	double	double	const double
c	single precision complex	void	float	const void*
z	double precision complex	void	double	const void*

## ATLAS FORTRAN77 LAPACK API REFERENCE

SUBROUTINI	E (ARGUMENTS)	DESCRIPTION	PREFIXES			
$\Diamond \mathrm{GESV}$	(N, NRHS, A, LDA, IPIV, B, LDB, INFO)	using $PA = LU$ , $B \leftarrow A^{-1}B$ , $A \leftarrow LU$ , $IPIV \leftarrow P$ (L is unit diagonal,	S, D, C, Z			
♦GETRF	( M, N, A, LDA, IPIV, INFO )	P pivots rows)	S, D, C, Z			
*		using $PA = LU$ , $A \leftarrow LU$ , $ipiv \leftarrow P$ ( $L$ is unit diagonal, $P$ pivots rows) $B \leftarrow op(A)^{-1}B$ , assuming $A = LU$ , $ipiv = P$ , $op(X) = X, X^T, X^H$	, , ,			
♦GETRS	(TRANS, N, NRHS, A, LDA, IPIV, B, LDB, INFO)		S, D, C, Z			
♦GETRI	( N, A, LDA, IPIV, WORK, LWORK, INFO )	$A \leftarrow A^{-1}$ , assuming $A = LU$ , $ipiv = P$	S, D, C, Z			
$\Diamond POSV$	( UPLO, N, NRHS, A, LDA, B, LDB, INFO )	$B \leftarrow A^{-1}B$ , using $A \leftarrow U^TU$ or $A \leftarrow LL^T$ or $A \leftarrow U^HU$ or $A \leftarrow LL^H$	S, D, C, Z			
$\Diamond POTRF$	(UPLO, N, A, LDA, INFO)	$A \leftarrow U^T U \text{ or } A \leftarrow LL^T \text{ or } A \leftarrow U^H U \text{ or } A \leftarrow LL^H$	S, D, C, Z			
♦POTRS	(UPLO, N, NRHS, A, LDA, B, LDB, INFO)	$B \leftarrow op(A)^{-1}B$ , assuming $A = U^TU$ or $A = LL^T$ or $A = U^HU$ or	S, D, C, Z			
•		$A = LL^H$	, , , ,			
♦POTRI	(UPLO, N, A, LDA, INFO)	$B \leftarrow op(A)^{-1}B$ , assuming $A = U^TU$ or $A = LL^T$ or $A = U^HU$ or	S, D, C, Z			
		$A = LL^{H}$				
$\Diamond$ LAUUM	(UPLO, N, A, LDA, INFO)	$A \leftarrow UU^H \text{ or } A \leftarrow L^H L$	S, D, C, Z			
♦TRTRI	(UPLO, DIAG, N, A, LDA, INFO)	$A \leftarrow A^{-1}$ , given A is an Upper or Lower triangular matrix	S, D, C, Z			
$\Diamond \text{GELS}$	(TRANS, M, N, NRHS, A, LDA, B, LDB, INFO)	$B \leftarrow A^{-1}B$ (can be over- or under-determined), using $A \leftarrow QR$ or $A \leftarrow$	S, D, C, Z			
•		$RQ \text{ or } A \leftarrow LQ \text{ or } A \leftarrow QL$	, , , ,			
$\Diamond$	(M, N, A, LDA, TAU, INFO)	$A \leftarrow QR \text{ or } A \leftarrow RQ \text{ or } A \leftarrow LQ \text{ or } A \leftarrow QL$	S, D, C, Z			
GE[QR,RQ,LQ,QL]F						
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