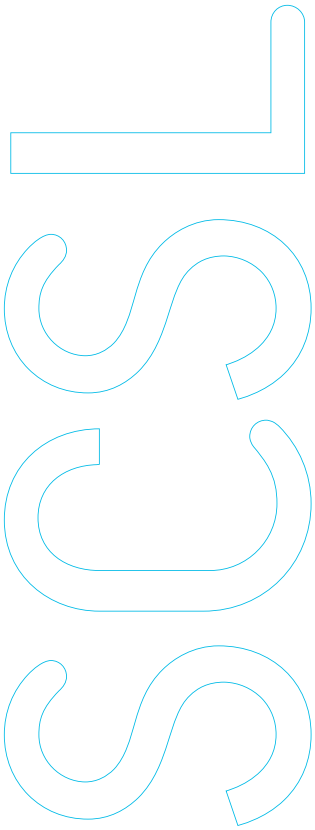
Datasheet

SGI™ Scientific Computing Software Library

Features

- Provides an extensive selection of scientific and mathematical functions
- Minimizes code development effort, saving programmers time and effort
- Maximizes code performance
- Provides shared-memory parallelism
- Provides same API for all supported SGI platforms for easy migration of code
- Supports de facto BLAS (basic linear algebra subprograms) and LAPACK (linear algebra package) standard
- Supports 64-bit integer arguments to facilitate porting from legacy platforms
- Supports single- and double-precision real and complex data types
- Callable from Fortran, C, and C++
- Tested extensively for reliability and accuracy



Enhance Performance with State-of-the-Art Software

SGI Scientific Computing Software Library (SCSL) is a comprehensive collection of scientific and mathematical functions that have been optimized for use on SGI™ systems, both MIPS® processor–based systems running the IRIX® operating system and Itanium™ processor–based systems running the Linux® operating system. SCSL greatly improves the performance and efficiency of applications through the use of blocked, multithreaded, and optimized subroutines.

SCSL is a collection of high-performance routines that provide support for mathematical and numerical techniques used in scientific and technical computing. SCSL encompasses a wide variety of industry-standard and proprietary scientific and math functions, including numerical linear algebra, large sparse systems of linear equations, and signal processing. The latest version of SCSL improves performance with a new algorithm for complex number multiplication that reduces the number of real multiplications from four to three. With this advantage, performance can increase by up to 30%.

Among the applications that benefit from SCSL are computational chemistry, computational fluid dynamics, structural analysis, seismic analysis, reservoir simulation and modeling, image processing, nuclear engineering, process simulation, and computational electromagnetics. Included in SCSL are the BLAS, LAPACK, and signal processing libraries and sparse direct solvers.

BLAS

The BLAS library is a collection of some 400 routines providing important building blocks. These operations include, but are not limited to, matrix multiply, rank updates, and dot products. Included are BLAS1, vector–vector operations; BLAS2, matrix–vector operations; and BLAS3, matrix–matrix operations.

LAPACK

LAPACK is a portable library of subroutines for solving the most common dense linear algebra problems, including systems of linear equations, linear least-squares problems, eigenvalue problems, and singular value problems. LAPACK consists of routines for symmetric and nonsymmetric linear systems of equations, symmetric and nonsymmetric eigenvector/value, singular value decomposition, and linear least-squares.

Signal Processing

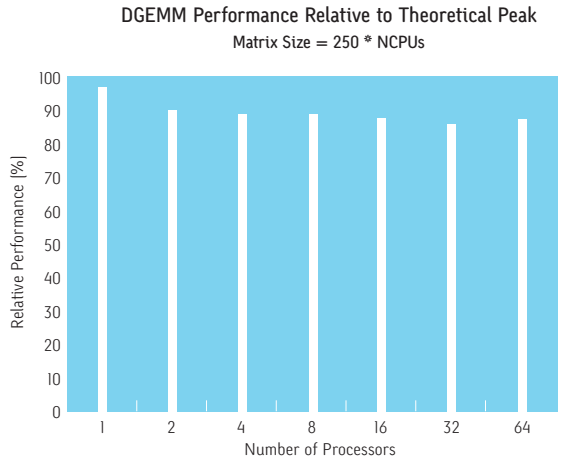
The signal processing library consists of routines that perform mixed-radix fast Fourier transforms (FFTs) as well as linear filtering operations such as convolution and correlation. Supported functions include one-, two-, and three-dimensional mixed-radix FFTs; multiple one-dimensional mixed-radix FFTs; one- and two-dimensional convolutions; multiple one-dimensional convolutions; one- and two-dimensional correlations; and multiple one-

dimensional correlations.

Sparse Direct Solvers

Sparse direct solvers rely on sophisticated combinatorial algorithms for effectiveness. The term sparse refers to the fact that most of the entries in the matrix are zeros. By storing only the nonzero terms, memory requirements are reduced. The SGI sparse direct solver consists of parallelized direct solvers for sparse systems of linear equations with symmetric nonzero structure and a high-performance out-of-core solver for sparse linear systems of equations.

The following figure illustrates the performance of the SCSL implementation of DGEMM, the level-3 BLAS routine for double-precision matrix multiplication. Square matrices of order 250 * NCPU are used in this example, where NCPU is the number of processors. Performance is expressed as a percentage of the theoretical peak that is attainable for NCPU processors. Note the uniprocessor performance exceeds 95% of peak; even at 64 processors, the relative performance exceeds 85%.



Product Availability

SCSL is available today for SGI computer systems running IRIX 6.4 and 6.5 with MIPS4 instruction set CPUs. In addition to SGI™ Origin™ family systems, this includes all Silicon Graphics® Onyx2®, Silicon Graphics® Octane®, and Silicon Graphics® O2® workstations. This allows SCSL to be used within applications running on these systems, as well as for application development targeted toward SGI Origin family systems. SCSL will also be available soon for Itanium processor–based SGI systems running Linux.

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