Parallel & Distributed Computing: Lecture 33

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1 Julia's LinearAlgebra.jl

2 GraphBLAS Forum

Julia's LinearAlgebra.jl

Standard Library

https://docs.julialang.org/en/v1/stdlib/LinearAlgebra/

Low-level matrix operations

https://docs.julialang.org/en/stable/stdlib/linalg/#Low-level-matrix-operations-1

BLAS functions

How to Check If Julia Is Using OpenBLAS or Intel MKL

BLAS Functions

LinearAlgebra.BLAS provides wrappers for some of the BLAS functions. Those BLAS functions that overwrite one of the input arrays have names ending in '!'. Usually, a BLAS function has four methods defined, for Float64, Float32, ComplexF64, and ComplexF32 arrays.

LAPACK functions

LAPACK Functions

LinearAlgebra.LAPACK provides wrappers for some of the LAPACK functions for linear algebra. Those functions that overwrite one of the input arrays have names ending in '!'.

Usually a function has 4 methods defined, one each for Float64, Float32, ComplexF64 and ComplexF32 arrays.

Intel MKL linear algebra in Julia.

MKL.jl is a package that makes Julia's linear algebra use Intel MKL BLAS and LAPACK instead of OpenBLAS. The build step of the package will automatically download Intel MKL and rebuild Julia's system image against Intel MKL

Intel MKL linear algebra in Julia.

GraphBLAS Forum

GraphBLAS Forum

The GraphBLAS Forum is an open effort to define standard building blocks for graph algorithms in the language of linear algebra.

We believe that the state of the art in constructing a large collection of graph algorithms in terms of linear algebraic operations is mature enough to support the emergence of a standard set of primitive building blocks.

We believe that it is critical to move quickly and define such a standard, thereby freeing up researchers to innovate and diversify at the level of higher level algorithms and graph analytics applications.

This effort was inspired by the Basic Linear Algebra Subprograms (BLAS) of dense Linear Algebra, and hence our working name for this standard is "the GraphBLAS".

A key insight behind this work is that when a graph is represented by a sparse incidence or adjacency matrix, sparse matrix-vector multiplication is a step of breadth first search.

SUITESPARSE : A Suite of Sparse Matrix Software

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SuiteSparse:GraphBLAS

GraphBLAS Forum

1. Goals and premises
2. More information
3. Application Program Interface (API)
4. Reference Implementations
5. Projects developing implementations of the GraphBLAS
6. Graph analysis systems that integrate GraphBLAS
7. Workshops and conferences featuring the GraphBLAS (reverse chronological)
8. Blogs (and other interesting discussions) on GraphBLAS
9. GraphBLAS mailing list
10. Steering Committee