DPLASMA (Distributed Parallel Linear Algebra Software for Multicore Architectures) is the leading implementation of a dense linear algebra package for distributed heterogeneous systems. Unlike any predecessor, DPLASMA depicts algorithms using data flow principles, as pure data dependencies between BLAS kernels. The resulting dataflow depiction takes advantage of the state-of-the-art distributed runtime, PaRSEC, to achieve portable and sustained performance never seen before on heterogeneous distributed systems.

USER DEFINED DATA PLACEMENT

In addition to traditional ScalAPACK (block-cyclic) data distribution, DPLASMA provides interfaces to define arbitrary data collections with unrestrained distributions. The DPLASMA data flow algorithms transparently operate on local data, or introduce implicit communications to resolve dependencies, removing the burden of initial data re-shuffle, and providing the user a novel approach to address load balance.

FUTURE PLANS

- Two-sided Factorizations
- Distributed Sparse Solver
- More GPU kernels integration
- LU-RBT
- BLR Solver
- Eigenvalue Decomposition and Singular Value Decomposition

FUNCTIONALITY COVERAGE

<table>
<thead>
<tr>
<th>FUNCTIONALITY</th>
<th>COVERAGE</th>
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</thead>
<tbody>
<tr>
<td>Linear Systems of Equations</td>
<td>Cholesky, LU (inc. pivoting, PP), LDL (prototype)</td>
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<td>Least Squares</td>
<td>QR &amp; LQ</td>
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<td>Symmetric Eigenvalue Problem</td>
<td>Reduction to Band (prototype)</td>
</tr>
<tr>
<td>Level 3 Tile BLAS</td>
<td>GEMM, TRSM, TRMM, HEMM/SYMM, HERK/SYRK, HER2K/SYRK2</td>
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<tr>
<td>Auxiliary Subroutines</td>
<td>Matrix generation (PLRNT, PLGHE/PLGSY, PLTMG), Norm computation (LANGE, LANHE/LANSY, LANTR), Extra functions (LASET, LACPY, LASCAL, GED, TRADD, PRINT), Generic Map functions</td>
</tr>
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FEATURES

- Recursive DAG Instantiation, allowing heterogeneous tile size executions to tune for heterogeneous devices
- Covering four precisions: double real, double complex, single real, single complex (D, Z, S, C)
- Providing ScalAPACK-compatible interface for matrices in F77 column-major layout
- Supporting: Linux, Windows, Mac OS X, UN*X (depends on MPI, hwloc)
- Fine-grain Composition of Operations

ENERGY EFFICIENCY

- Solving Linear Least Square Problem (DGECRF)

SYSTEM
- System & Virginia Tech, 32-node, 256-core, Intel Xeon 2.8GHz, IB20G

FIND OUT MORE AT http://icl.cs.utk.edu/dplasma