Distributed Parallel Linear Algebra Software for Multicore Architectures (DPLASMA) 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, thereby removing the burden of initial data re-shuffle and providing the user a novel approach to address load balance.

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**Performance Results**

**Problem and Node Scaling of a Matrix Multiply (DGEMM)**
Summit: 2-72 nodes (40 cores each with 6 V100) with a 1024 x 1024 tile size

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**Problem Scaling of a Cholesky Factorization (DPOTRF)**
Shaheen II: 912 nodes (32 cores each) with a 400 x 400 tile size

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**Energy Consumption Solving a Linear Least Square Problem (DGELQRF)**

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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, and single complex (D, Z, S, C)
- Providing ScaLAPACK-compatible interface for matrices in F77 column-major layout
- Supporting: Linux, Windows, macOS, UN*X (depends on MPI, hwloc)
- Fine-grain Composition of Operations

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**Future Plans**
- Two-sided Factorizations
- Distributed Sparse Solver
- More GPU Sparse Solver
- LU+RBT
- BLR Solver
- Eigenvalue Decomposition
- Singular Value Decomposition