The Distributed Tasking for Exascale (DTE) project extends the capabilities of ICL’s Parallel Runtime and Execution Controller (PaRSEC) project—a generic framework for architecture-aware scheduling and management of microtasks on distributed, many-core, heterogeneous architectures. The PaRSEC environment also provides a runtime component for dynamically executing tasks on heterogeneous distributed systems along with a productivity toolbox and development framework that supports multiple domain-specific languages and extensions and tools for debugging, trace collection, and analysis.

**PaRSEC ENABLED LIBRARIES AND APPLICATIONS**

**ECP SLATE**

- **High level DAG, Cholesky factorization**
  - Dependencies are expressed between block columns of the matrix
  - High level tasks insert tile-level tasks, synchronize, or insert (a)synchronous communication tasks

**DPLASMA**

- **Hybrid Matrix-Matrix Multiply (GEMM)**
  - Double precision (dgemm) / 2-72 Nodes of Summit (40 cores + 6 V100s)
  - Tiled Algorithm, with tiles of 1024x1024 doubles

**NWChem INTEGRATION**

- PaRSEC Kernel inserted into existing NWChem codebase improves manycore scalability

**HiCMA Hierarchical Computations on Manycore Architectures**

- **Tile, Low-Rank, Cholesky Factorization for Large Matrices**
  - Shaheen II: 4096 nodes (32 cores each @ 2.30 GHz (Intel Haswell))
  - Numbers on points represent the number of Shaheen II nodes used to compute the factorization

- **Comparison with ScaLAPACK**
  - Shaheen II: 4096 nodes (32 cores each @ 2.30 GHz (Intel Haswell))

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**FIND OUT MORE AT**

http://icl.utk.edu/dte/