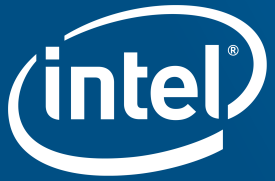

OpenSHMEM Birds of a Feather

November 15, 2017

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OpenSHMEM Involvement

Actively engaged in OpenSHMEM specification committee

- Lead effort to specify new communication management API (contexts)

Engaged in open source development targeting the Open Fabrics Interface

- Sandia OpenSHMEM (SOS) v1.3.4 (released Nov. 7)
  - Full support for OpenSHMEM 1.3 specification on OFI libfabric and Portals 4
  - Bugfix release with performance and stability improvements
- Sandia OpenSHMEM (SOS) v1.4.0a1 (released Nov. 9)
  - Full support for OpenSHMEM 1.4 draft specification
    - Sockets provider fully supported
    - PSM2 provider supported, SHMEM_THREAD_MULTIPLE support is work-in-progress
  - Performance tuning and support for additional providers is work-in-progress
- Available at: https://github.com/Sandia-OpenSHMEM/SOS

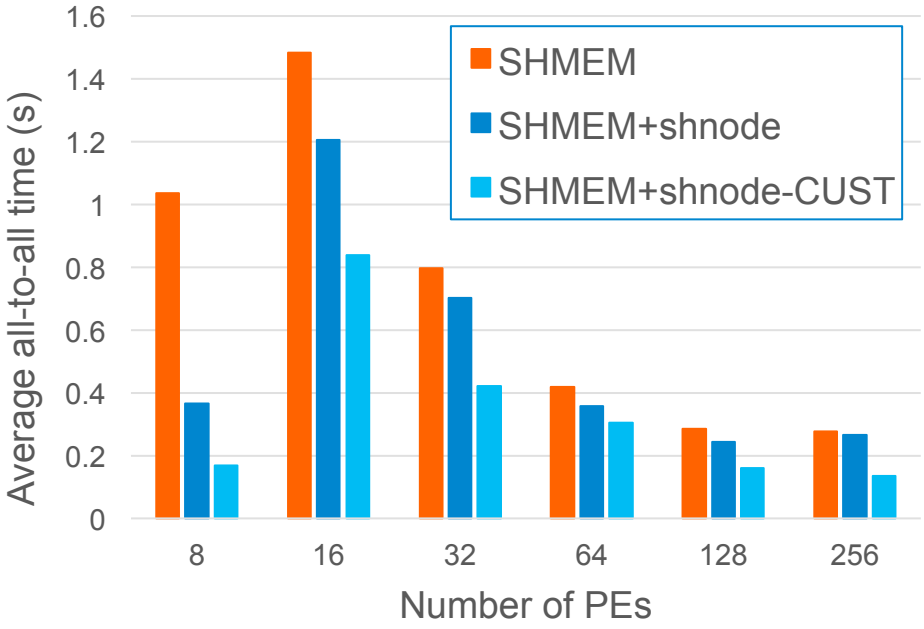
Exploring Locality/Topology Exposure in OpenSHMEM

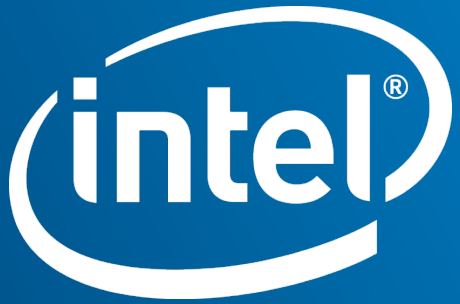
ISx strong scaling experiment

- Cori: Cray XC40, Cray SHMEM v7.5.5
- 4 nodes with 8 – 256 total PEs
- 1.5 billion data set

Application-level topology optimizations:

1. *SHMEM*: Baseline
2. *SHMEM+shnode*: On-node transfers use memcpy (communication avoidance)
3. *SHMEM+shnode-CUST*: Issue on-node transfers last to overlap with remote transfers (locality-aware overlap)

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LIBFABRIC SCALABILITY

CRAY XC40

SHMEM

Evaluate libfabric SHMEM performance on high-performance interconnect

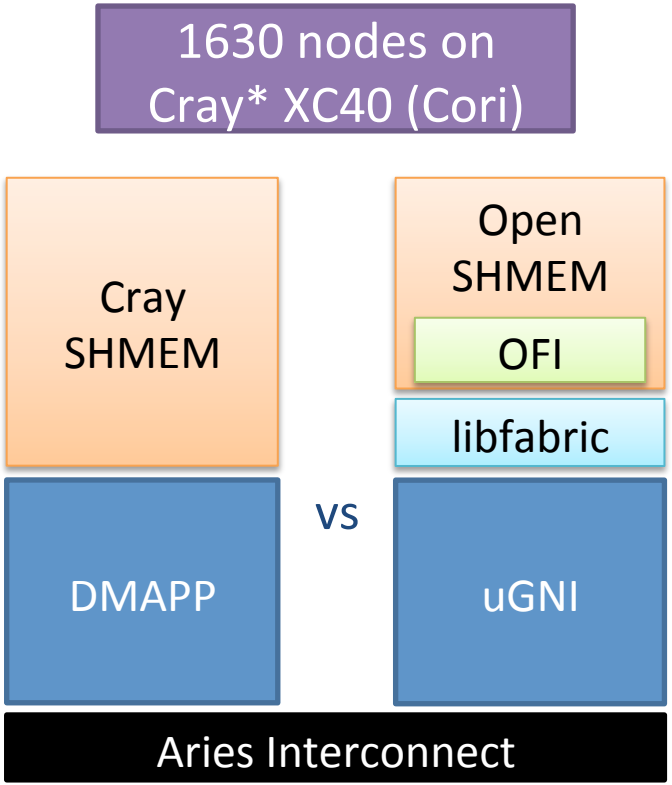
Provider implementation that uses the Cray* uGNI hardware and network interface for communication

* Other names and brands may be claimed as the property of others

LIBFABRIC SCALABILITY

CRAY XC40

SHMEM



- **Cray* SHMEM**
  - Cray* Aries, Dragonfly* topology
  - CLE (Cray* Linux*), SLURM*
  - DMAPP
    - Designed for PGAS
    - Optimized for small messages
- **Sandia* OpenSHMEM / libfabric**
  - uGNI
    - Designed for MPI and PGAS
    - Optimized for large messages
- https://www.nersc.gov/users/computational-systems/cori/configuration

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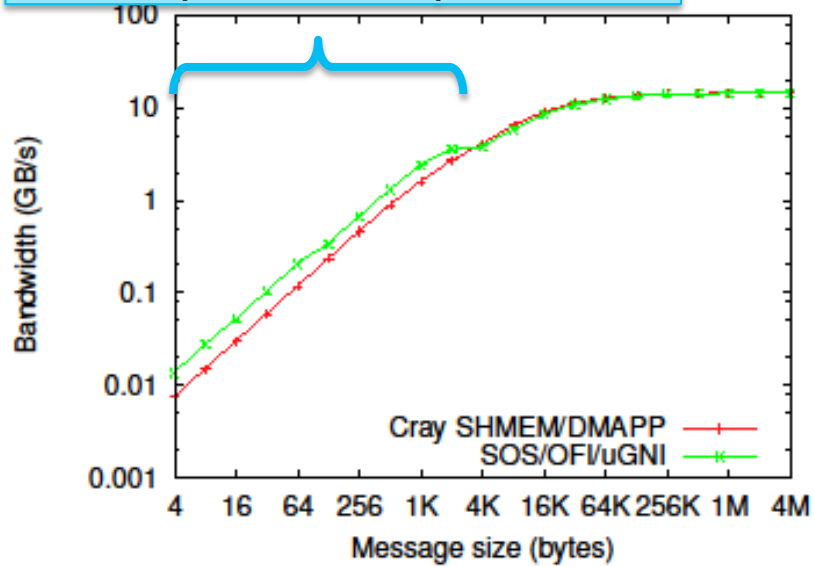
LIBFABRIC SCALABILITY

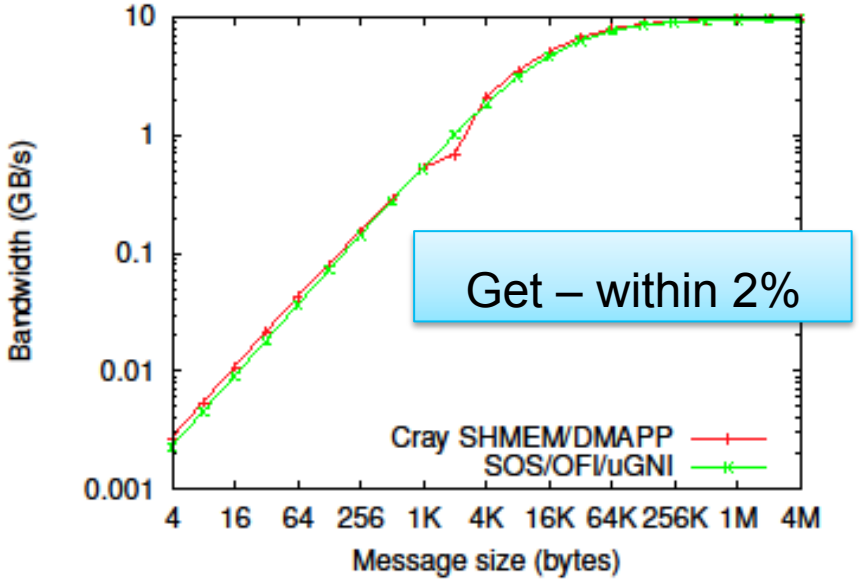
CRAY XC40

SHMEM

Blocking Get/Put B/W

Put – up to 61% improvement





Get – within 2%

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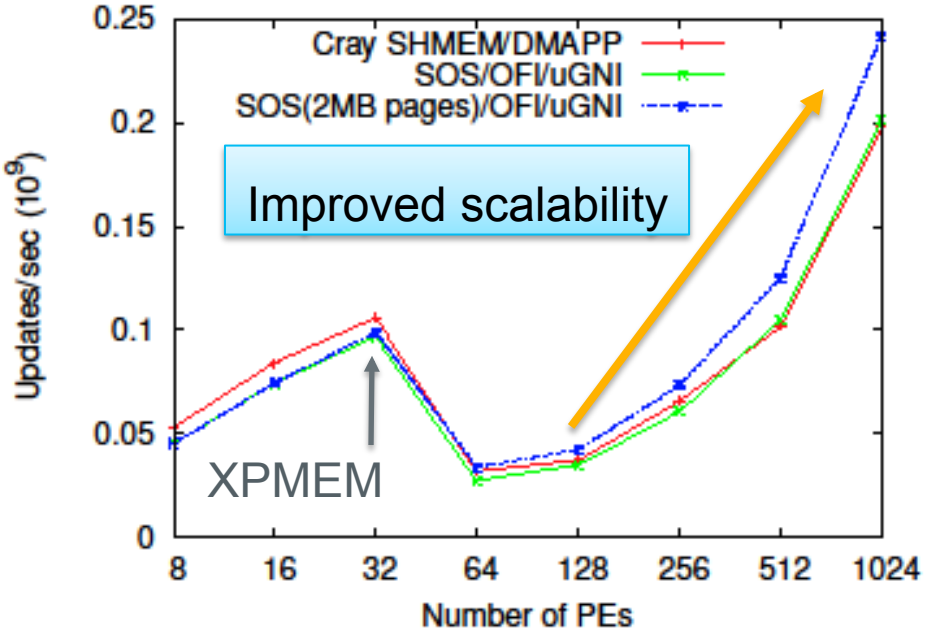
LIBFABRIC SCALABILITY

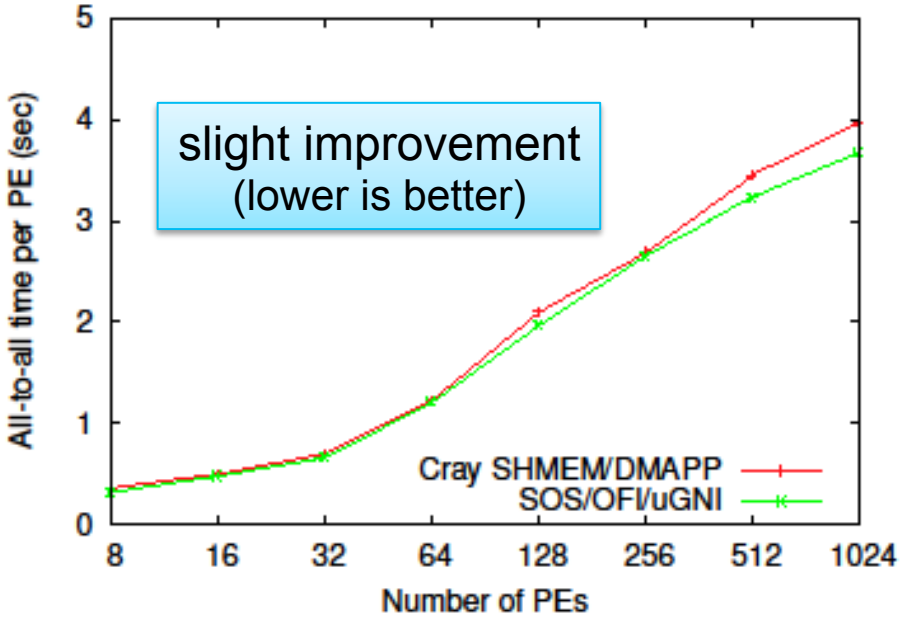
CRAY XC40

SHMEM

GUPS Scaling



NAS ISx (Integer Sort) weak scaling



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