



# DDHMC Lattice QCD Application Performance

Sep 2008



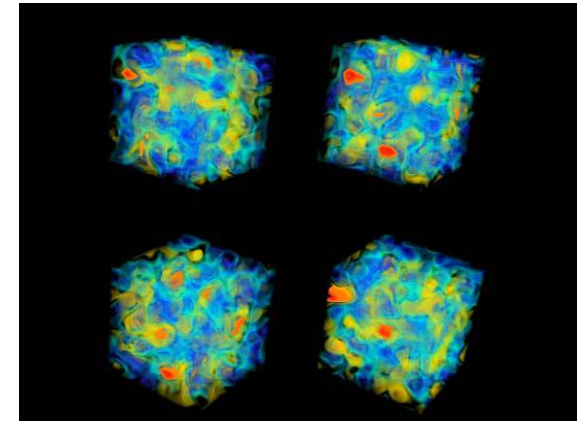
- **The following research was performed under the HPC Advisory Council activities**
  - Participating vendors: Sun, Mellanox
  - Compute resource - HPC Advisory Council Cluster Center
- **For more info please refer to**
  - [www.mellanox.com](http://www.mellanox.com), [www.sun.com](http://www.sun.com)

- **CAE related applications**
  - Computational Aided Engineering

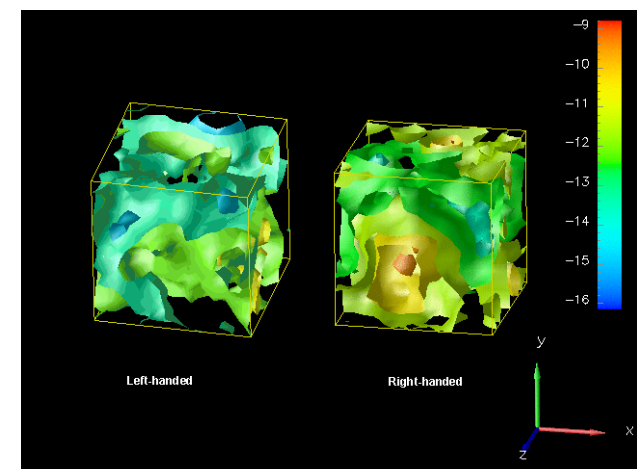
- **Lattice Quantum Chromo**

**Dynamics calculations are solving fundamental problems in particle and nuclear physics with large-scale computer calculations**

- Lattice QCD is a theory of quarks and gluons formulated on a space-time lattice



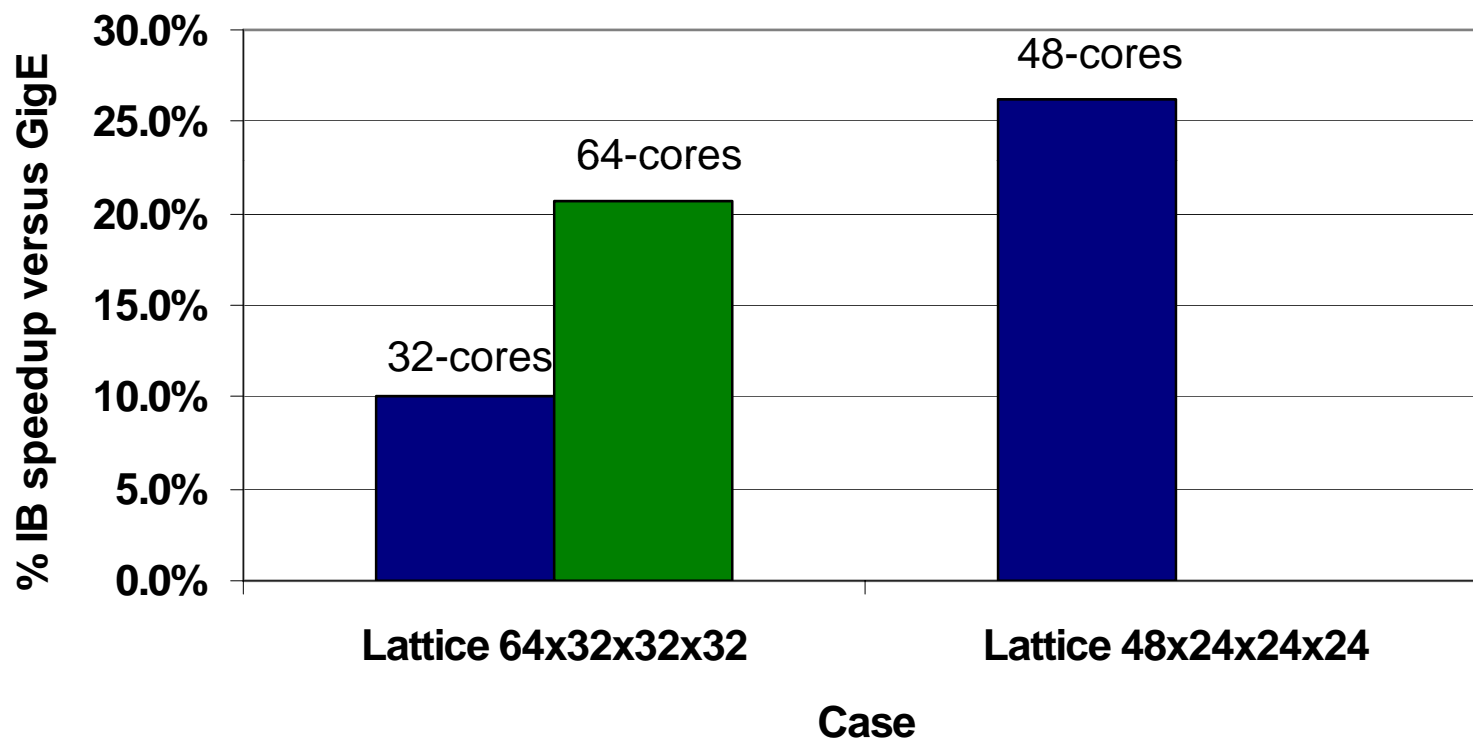
Data courtesy of M. McGuigan CSC and Taku Izubuchi RIKEN-BNL



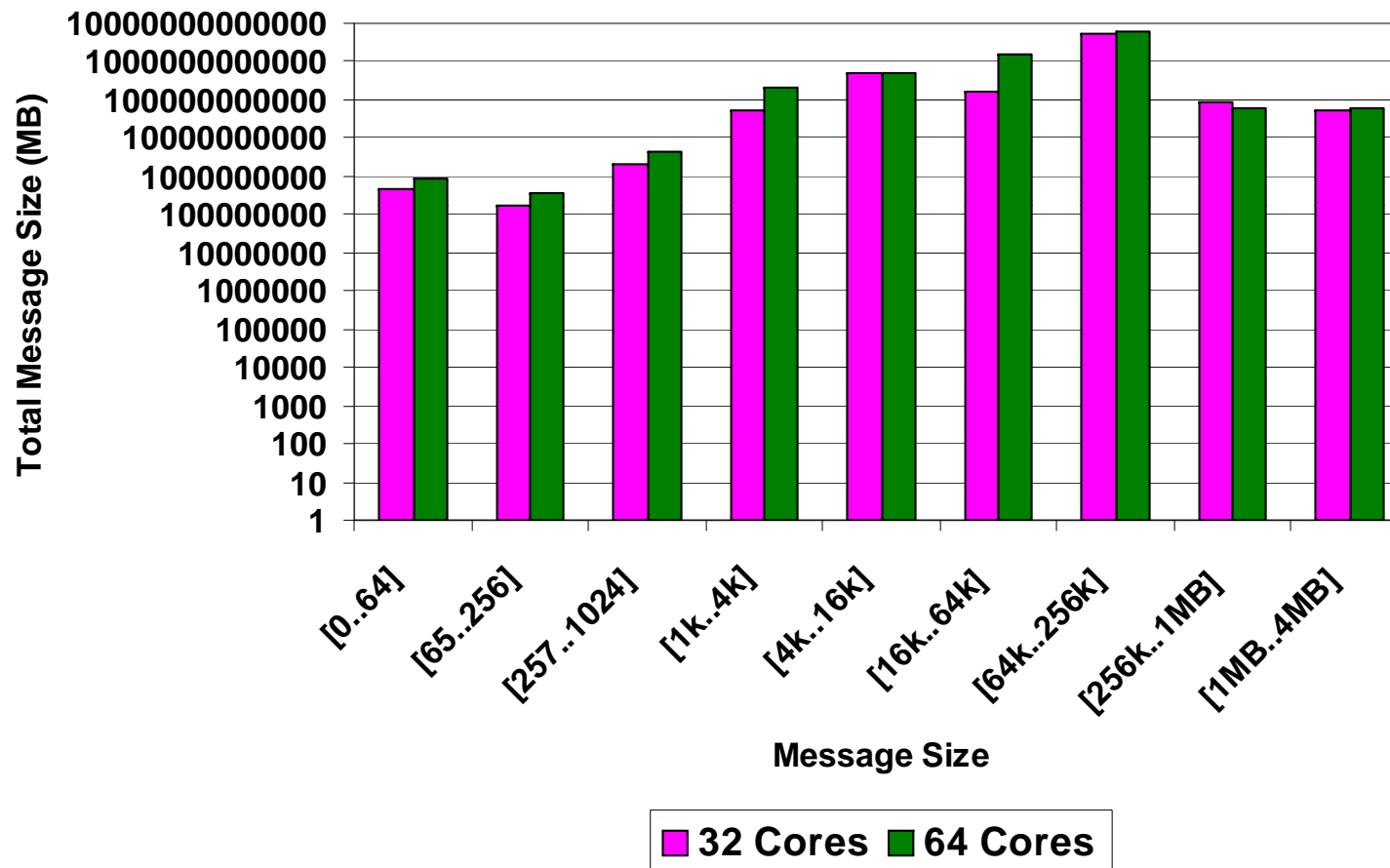
- **Lattice QCD performance comparison of IB versus GigE**
  - InfiniBand demonstrates higher performance for any case
  - Performance gap increases with cluster size
- **Case studies (few examples):**
  - Jefferson Lab
    - 396-node and 280-node InfiniBand clusters
  - Fermi National Accelerator Laboratory
    - 518-node and 600-node InfiniBand clusters



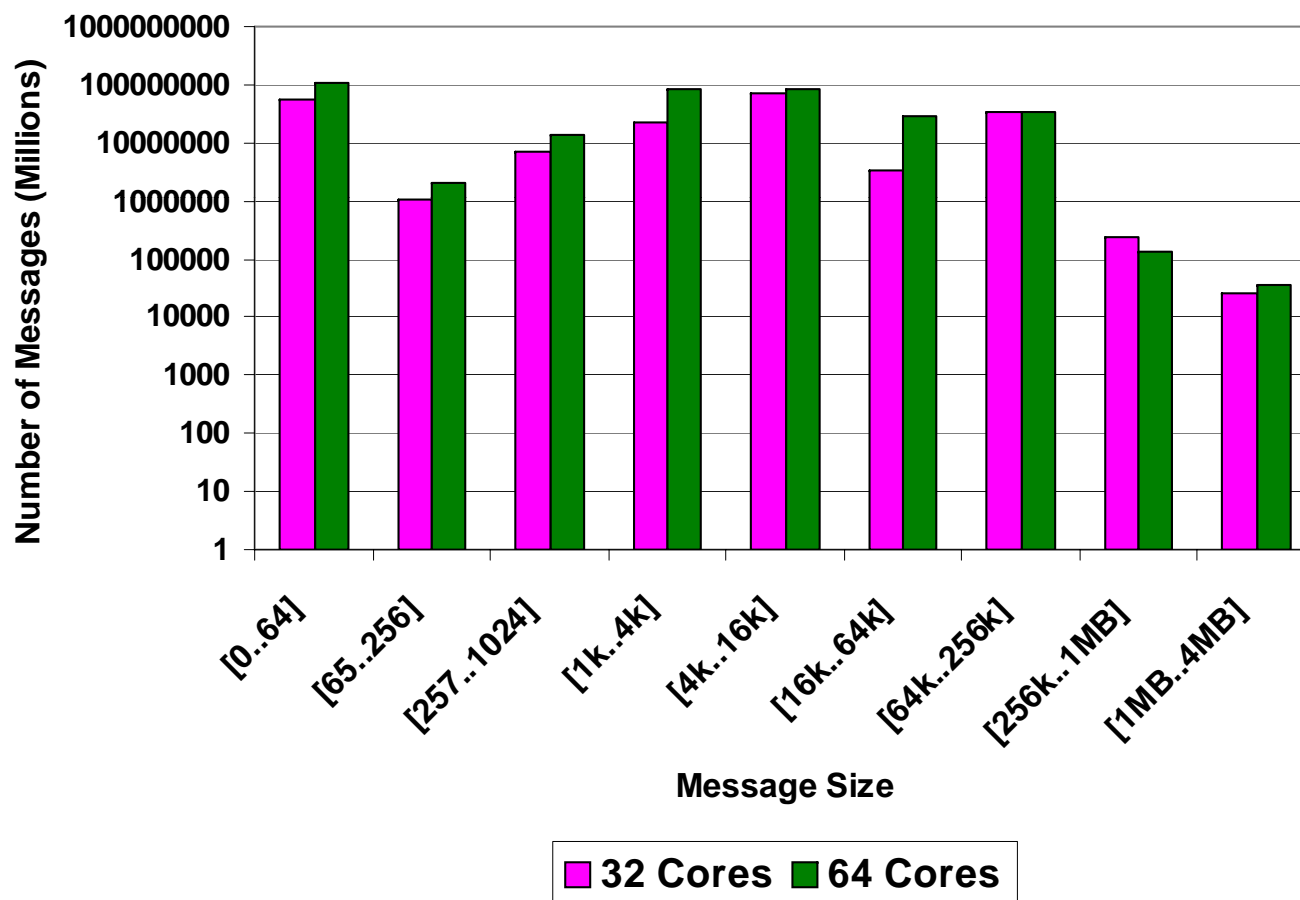
## Lattice QCD Performance Benchmarks



## Lattice-QCD Profiling Total Byte Send per Message Size



## Lattice-QCD Profiling Number of Messages Send per Message Size



# System Configurations

- Mellanox Cluster Center (HPC Advisory Council)
- 8 nodes SUN 2200 cluster
- Intel Xeon Quad-core X5472 CPUs
- Mem: 32GB
- Mellanox InfiniBand ConnectX DDR HCA
- OS: RH 5.1, compiler: gcc version 4.1.2
- MPI: OpenMPI

# Thank You

## HPC Advisory Council



All trademarks are property of their respective owners. All information is provided "As-Is" without any kind of warranty. The HPC Advisory Council makes no representation to the accuracy and completeness of the information contained herein. HPC Advisory Council Mellanox undertakes no duty and assumes no obligation to update or correct any information presented herein