



ANSYS Teraflop Simulations

ANSYS 12 and QLogic TrueScale InfiniBand

Executive Summary

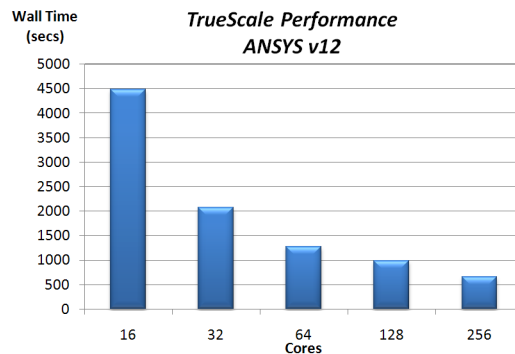
Today's challenging economic climate and globally competitive markets make lowering manufacturing costs more critical than ever. Whether you're an aerospace engineer designing a new wing for the latest commercial jet or an automotive engineer simulating multi-car crashes for the next generation of hybrids, the ability to run simulations faster will increase productivity, speed time-to-market, and improve your company's bottom line.

High Performance Computing (HPC) is a valuable tool, assisting organizations with improving product design and product quality, while reducing cost. QLogic TrueScale InfiniBand, along with the latest in multi-core processor technology makes teraflop computing available to organizations at affordable prices.

HPC clusters utilizing the QLogic InfiniBand TrueScale interconnect can exploit ANSYS Mechanical improvements developed for HPC environments. ANSYS Mechanical has improved the Dsparse solver, memory handling, load balancing and input/output (I/O) processing giving it the ability to scale across an increased number of nodes and processors, delivering performance in excess of a teraflop. ANSYS 12 improved features, along with affordable HPC clusters, enable organizations to make use of more complex models characterized by millions of degrees-of-freedom (MDoF).

QLogic, working in concert with ANSYS and AMD, tested ANSYS v12 on a range of configurations and interconnects. The results of this testing demonstrated that ANSYS 12 can run effectively on a high-core-count cluster in a multi-user/multi-job environment without impacting individual job performance. This testing demonstrated the potential to expand the scope and scale of ANSYS Mechanical when run on HPC cluster implementations.

For more detailed information, please refer to the White Paper - *TA-WP09001 - QLogic Truescale for Ansys Mechanical*.



Business Results

Improve Time-to-Solutions by Completing Simulations Faster

- 90 times faster than a single workstation/server.
- Up to 300% faster using TrueScale InfiniBand versus Gigabit Ethernet

Maximize Designer/Engineering Productivity through Simultaneous Use of the Cluster

- Concurrent simulations execute within 2 to 5% of their single run times. Shared resources deliver performance that makes the entire engineering team more effective and productive.

Better Designs by Running Larger Data Sets in a Fixed Amount of Time

- Results for large models are delivered faster. A 3M Degrees-of-Freedom model completes in less than eleven minutes of wall clock time.

Reduce Product Development Costs

- Reduce the need for physical prototyping by leveraging more complex models in a compressed timeframe. This approach can reduce or eliminate much of the need to do physical prototyping.

Reduced Costs of Computing Infrastructure

- TrueScale-based cluster reduces the number of servers needed to produce the same level of performance of an Ethernet cluster.
- TrueScale InfiniBand protects your cluster investment by delivering real performance when incremental computation resources are added, unlike gigabit Ethernet which only provides marginal performance gains after 16-nodes/128-cores.

Benchmark Test

The configuration tested consisted of 32 compute nodes and one NFS server node. Each compute node was comprised of dual Quad-Core AMD Opteron™ 2360 SE “Barcelona” CPUs and 16 GB of DDR2-667Mhz memory. The HPC cluster had a total of 256 cores and 512GB of memory. TrueScale InfiniBand provided a 20Gbps interconnect between each node for MPI and file system I/O traffic. The standard on-board gigabit Ethernet interconnect was tested for comparison purposes.

ANSYS 12.0 using HPMPPI was used to execute the BIGBM-7 benchmark test. This test is a 3 MDoF model using the direct-sparse solver of a solid 95 elements problem. This presents a worst case scenario for a direct-solver problem.

ANSYS Corporation

ANSYS, Inc. develops and globally markets engineering simulation software and technologies widely used by engineers and designers across a broad spectrum of industries. The company focuses on the development of open and flexible solutions that enable users to analyze designs directly on the desktop, providing a common platform for fast, efficient and cost-conscious product development, from design concept to final-stage testing and validation. The

company and its global network of channel partners provide sales, support, and training for customers.

AMD

Advanced Micro Devices (NYSE: AMD) is an innovative technology company dedicated to collaborating with customers and technology partners to ignite the next generation of computing and graphics solutions at work, home and play. For more information, visit <http://www.amd.com>.

QLogic – High Performance Cluster Technology

QLogic offers a comprehensive end-to-end product portfolio that includes Multi-Protocol Fabric Directors, Edge Fabric Switches, Host Channel Adapters (HCAs), and a complete software suite to install, operate and maintain your high performance interconnect fabric. QLogic offers the most comprehensive and flexible interconnect fabric solutions on the market. Application requirements from 12 to 864 InfiniBand ports can be supported in a single chassis. Multi-chassis fabrics that support thousands of host nodes can be constructed to meet the most demanding compute cluster requirements. This offering, combined with the industry’s only Fabric Management tools that enable an administrator to install and boot a fabric in minutes, helps to satisfy the growing demand for high-performance computational clusters and grids.

TrueScale InfiniBand Benefits

1. Significantly improves application performance for faster time-to-solution
2. Provides fabric and application scaling to 1000s of CPUs
3. Simplifies data center design and reduces operating costs
4. Eliminates the need for separate physical server connections to storage and network resources
5. Scale servers and I/O independently while facilitating the pooling and sharing of I/O resources between servers



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