



# InfiniBand Solutions Brief

## Higher Education

### Challenge

Institutes of higher education are focused on testing boundaries, breaking records and exploring new discoveries in their quest to be the best in their field of expertise. Whether it's fluid dynamics or molecular bonding, academics are driven to push the "edge of the envelope". These endeavors require computational capabilities that surpass the typical IT organization and need to be built within strict educational price/performance budgets. It is these computational tools that enable institutions to advance their selected fields of research with important discoveries.

Often times academic institutions work closely with private sector companies to lease computational resources, run applications and help solve specific problems. Their expertise and world class computing infrastructure also helps companies develop products faster and more efficiently. This symbiotic relationship assists the academic institution in funding their High Performance Computing Clusters (HPCC) environments so they have the requisite industry-leading tools for cost-effective problem solving. The ability to run more application jobs in a shorter period of time is paramount to realizing their goals. Increasingly, they rely on InfiniBand technology to optimize job completion time by moving data faster within their server clusters and storage systems, turning problems into solutions.

In fact, one such showcase example is the University of Cambridge, where the academic team built an HPCC from 585 Dell servers and QLogic InfiniBand products to produce a 27 Tflop computational unit. Their configuration gave them a 20th place ranking in the Top500 list of the most powerful supercomputers in the world!

### Solution

QLogic has a number of key solutions for the Academic field to address the challenges facing them.

#### Interprocess Communications (IPC)

QLogic's InfiniBand-based IPC solutions deliver high-speed (up to 40 Gbps), low latency Message Passing Interface (MPI) communications between compute nodes to maximize utilization of the servers for application processing. The improved network efficiency provided by QLogic IPC solutions results in optimal compute job runtimes. QLogic's IPC solutions also provide unmatched scalability to support HPCCs with thousands of CPUs by maintaining network performance.

#### File System Scalability

Traditionally, NFS over GigE was the preferred method for compute clusters to share data through a common file system. However, optimizing NFS creates two critical problems: bandwidth and scalability limitations. The solution is large scale parallel file systems such as: Lustre, HP SFF and IBM GPFS to enable the performance of HPCC. By moving to parallel file systems over InfiniBand, users can achieve greater scalability and efficiency. QLogic's InfiniBand products provide the ideal operational characteristics to support large scale file systems deployments.

### Virtualized I/O

Traditionally, to avoid congestion of network traffic HPC deploys separate fabrics for storage and IPC – one for application MPI traffic and one for storage data traffic. Sometimes even a third network is deployed to further isolate general network traffic. This scheme compromises the cost/performance objectives of HPC by adding cost and complexity in the configuration. QLogic incorporates a unique multi-protocol Virtualized I/O controller (VIC) technology in their InfiniBand switches, providing transparent access to Fibre Channel and Ethernet networks. VIC technology reduces the cost, complexity, and operational overhead of running multiple physical server connects for storage, network and Interprocess communications. Additionally, with VIC technology each virtual network can scale independently over a single wire connection further improving cost and operational characteristics.

### Results

The QLogic solutions for the Academic field offer a number of benefits to users.

#### Scalable Interconnect

QLogic's InfiniBand solutions provide the foundation for users to build large clusters and grids made up of hundreds and thousands of CPUs. QLogic's complete line of TrueScale ASICs are specifically designed to provide constant and predictable ultra-low latency (below 140 ns) even as the cluster traffic increases to fully loaded bandwidth conditions. QLogic TrueScale products also boast industry leading message rates of 40 million packets/second. This industry-leading capability enables faster and more complex calculations helping educational institutes to meet their research objectives. Fully utilizing the massive amount of processing power that can be brought to bear on a problem creates a deeper understanding of the problem and how to solve it.

### High Bandwidth

QLogic's InfiniBand solutions offer 10 – 40 Gbps, providing the necessary bandwidth to run computational analysis quicker ensuring the fastest problem solving profile for private sector clients. Solving problems quicker will secure repeat business from companies, that in-turn will offset the costs of their computing environment.

### Flexibility

QLogic InfiniBand solutions offer a family of switches to meet every need. Products scale from low-cost edge to director-class switches, as well as the industry's highest message rate host channel adapters (HCAs). Users can start with a low cost, high performance 36-port configuration to construct a small InfiniBand fabric. Investment protection is tantamount as the same switch can be used to build larger fabrics deploying the same switch as an edge switch in a larger fabric. Director class chassis products and expand as high as 864 ports. Built for business-critical application environments, the QLogic line of InfiniBand switches feature redundant, hot-swappable power and cooling elements with the ability to non-disruptively upgrade the operating code. Academic institutions can start on a small scale and grow larger as required, without costly disruptions.

### Manageability

QLogic's InfiniBand solutions provide the most complete data transport and management solution available for HPC, database clustering and grid networks. QLogic's unique management tools simplify and streamline IT operations so they can focus on solving problems, not managing the cluster. The InfiniBand Fabric Suite (IFS) simplifies management with its built-in intelligence to enable rapid, error-free installation and provisioning of small to extremely large server clusters with thousands of nodes. Highly-advanced verification features ensure that fabrics are deployed to specifications and operate at optimal levels. This allows the rapid introduction of the cluster into a production environment and maintains maximum performance over the life of the fabric.

QLogic is a leader in the HPC industry, with a strong, leading-edge portfolio of InfiniBand products including host channel adapters (HCAs) and multi-protocol fabric directors and switches.



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