

Singapore Exchange

Singapore Exchange Builds the World's Fastest Order Execution Ever Tested with Mellanox InfiniBand and VMA™ Software



The Singapore Exchange (SGX) has created the world's fastest trading engine as part of a \$250 million initiative to secure its position as the best market for accessing Asia.

Named SGX Reach, this new trading engine uses Mellanox InfiniBand switches and VMA™ Message Accelerator software combined with NASDAQ OMX's Genium INET technology and HP ProLiant server blades. Benchmark testing achieved a record-breaking, average order response time of less than 90 microseconds door-to-door— the world's fastest order execution ever tested.

The Singapore Exchange Challenge

Singapore Exchange Limited (SGX) is Asia-Pacific's first demutualized and integrated securities and derivatives exchange. Inaugurated in December 1999, SGX is home to Singapore's leading listed companies. As of January 2010, the Singapore Exchange had 774 listed companies with a combined market capitalization of US \$650 billion.

In June 2010, SGX announced the "Reach" initiative, a \$250 million project to provide the world's fastest access to Asia. Designed to secure SGX's position as the Asian Gateway, the Reach initiative will create the world's fastest trading engine with the lowest trading latency, establish a world-class data center for SGX, and seamlessly connect trading communities in global financial hubs to Singapore.

The main component of the Reach initiative is a high performance trading engine called SGX Reach. SGX Reach requires a highly scalable architecture that can deliver the highest transaction volumes with the lowest possible

end-to-end latency.

To deliver this state-of-the-art solution, SGX turned to three technology providers widely recognized for their leading market data solutions: Mellanox, NASDAQ OMX, and HP.

The Mellanox/NASDAQ OMX/HP Solution

SGX Reach leverages the following technology to deliver its ultra-fast, next generation trading platform:

- Mellanox InfiniBand switches and VMA™ Messaging Accelerator software
- NASDAQ OMX's Genium INET technology
- HP ProLiant server blades

In May 2010, SGX conducted a benchmark test with its partners at the HP Capacity Planning Centre in Singapore and achieved a record-breaking, average order response time of less than 90 microseconds door-to-door. This will provide customers with the fastest execution capability in the world.

"SGX is investing in the most advanced trading technology to ensure that our customers enjoy ultra-fast trading and the best access to Asia," said Bob Caisley, chief information officer, SGX. "We are delighted to be leveraging on the low-latency characteristics of Mellanox's InfiniBand switches and software to ensure the success of this initiative."



OVERVIEW

In addition to providing the fastest order execution capabilities in the world, the Mellanox/NASDAQ OMX/HP solution delivers an ideal trading environment for global investors and brings better liquidity and greater velocity to the market.



Why Mellanox?

Mellanox pioneered the delivery of low-latency, InfiniBand-and 10 Gigabit Ethernet-based market data solutions to the financial services industry and today works with server OEMs such as HP to sell solutions to many of the world's top exchanges, banks and hedge funds.

Mellanox InfiniBand switches power the world's largest and fastest high performance computing systems and next generation data centers. With 20-40 Gb/s bandwidth, Mellanox InfiniBand switches remove I/O bottlenecks enabling applications to operate at maximum efficiency.

Mellanox's unique VMA software dramatically improves performance of high frequency trading and other multi-cast applications, further reducing latency and increasing application throughput per server. VMA increases maximum packet rates, provides consistently lower messaging latency and gives CPU cycles back to the application. As a result, VMA improves application performance by orders of magnitude—without modifying application code.

"We have been very impressed by how well Mellanox's VMA software has operated for us in the development and testing of SGX's new trading platform," said Mats Andersson, chief technology officer, NASDAQ OMX. "Mellanox's VMA software provided most of the latency improvement without requiring any changes to the application. With this solution, we are able to fully utilize the performance benefits of InfiniBand."



The Results

In addition to providing the fastest order execution capabilities in the world, the solution delivers an ideal trading environment for global investors and brings better liquidity and greater velocity to the market.

The Reach initiative will be rolled out in the first quarter of 2011. Migration of the securities trading engine will begin in 2011 followed later by the derivatives trading engine.



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