



Lenovo Solution for Low-Latency Trading

A comprehensive portfolio of servers, technologies and partners delivering performance and scalability for low-latency trading



Highlights

- Leading-edge, high-performance platforms optimized for low-latency trading and next-generation analytics
- Reduced latency and access times with the latest networking, flash and Lenovo XClarity systems management
- Broad portfolio of ISVs and business partners
- Choice of on-premise, co-location and managed options
- Expedited delivery of select server configurations for rapid implementation
- Industry-leading server reliability, availability and serviceability

Exchanges, investment banks and trading firms need to rapidly and regularly implement the latest technologies to create and upgrade their high-frequency trading platforms to seize emerging opportunities and maximize gains for first-mover advantage. For these organizations, the race to zero latency continues: they are constantly looking for new ways to increase workload performance, improve data throughput, and alleviate processing and network bottlenecks, all in an effort to achieve near-instantaneous decision making.

Lenovo and its ecosystem of partners offer a broad portfolio of solutions that can help financial services organizations create, deploy and operate the latest generations of technologies for low-latency trading. With these faster, more capable systems they can capture new opportunities and manage risk without becoming locked into expensive, complex proprietary environments. Solutions from Lenovo and its partners range from high-performance servers and storage systems to networking equipment and management software. These offerings enable organizations to accommodate compute and data-intensive applications, incorporate new and emerging data types, and deliver results rapidly (see Figure 1).

Built for speed
When microseconds count, get a jump on the competition with high-performance, low-latency systems from Lenovo.

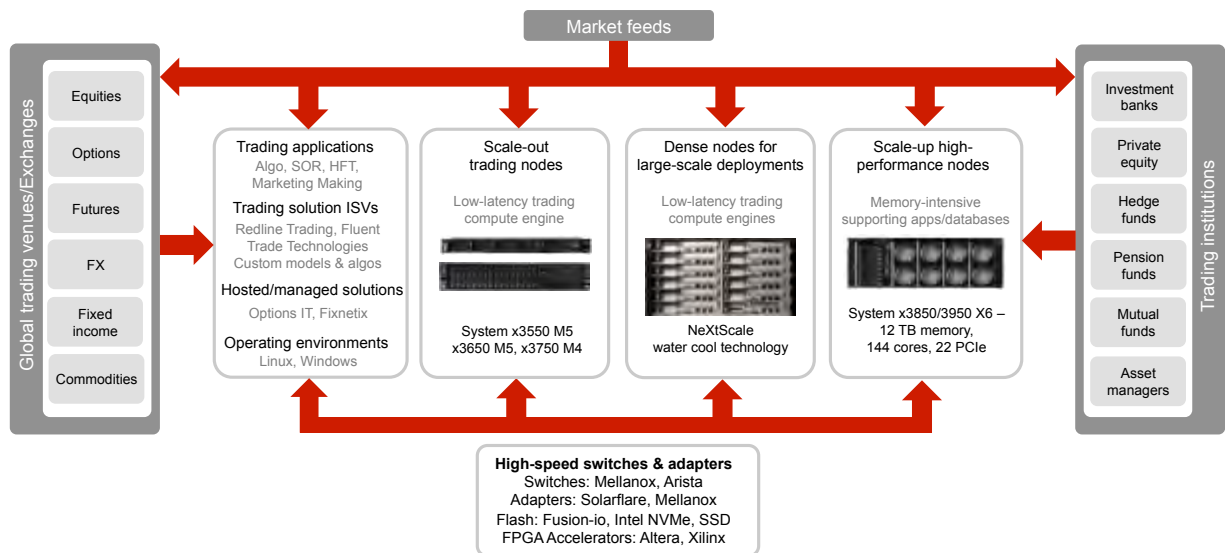


Figure 1: Lenovo Solution for Low-Latency Trading

The NeXtScale System with WCT and Intel Xeon E5-2698A v3 processors is the industry's highest-performing, two-socket server platform.¹

Accelerate decision making with high-performance servers and networking

Trading firms need compute resources that can process tremendous volumes of data and deliver results rapidly and reliably. System x M5 servers equipped with the latest Intel Xeon processor E5 v3 families, such as the **System x3550 M5 and x3650 M5**, provide the robust performance needed for low-latency, high-frequency trading. These servers are differentiated with unique capabilities; industry-leading reliability, availability and serviceability (RAS); and advanced management features. Examples of Lenovo advantages include light path diagnostics, predictive failure analysis, additional memory options, more PCIe slots, dual zone fans, the ability to operate at higher temperatures, flexible storage configurations, and worldwide service and support.

NeXtScale System M5 servers enable organizations to easily scale-out compute and grid infrastructure in a standard rack, and are available in air- or water-cooled configurations. Lenovo worked with Intel to create a special offering using the E5-2698A v3 processor in the NeXtScale nx360 M5 water cool technology (WCT) servers. Since this processor can run at anticipated speeds of up to 3.2 GHz with 16 cores, this can be an ideal platform for low-latency trading applications that require dense server configurations.

System x3750 M4 servers combine outstanding low-latency performance with a high-density design. Supporting up to 48 cores in a 2U form factor, these servers can help organizations contain power, cooling and real estate costs.

Low-latency server adapters and switches help eliminate networking bottlenecks. Solarflare adapters offer low-latency 10 or 40 Gb Ethernet and Precision Time Protocol (PTP) support, increasing accuracy from milliseconds to microseconds. Mellanox ConnectX-3 adapters support InfiniBand, Ethernet and PTP. ConnectX-4 adapters support EDR 100 Gb/s InfiniBand and 100 Gb/s Ethernet, as well as 10, 20, 25, 40, 50 and 56 Gb/s. Mellanox also offers low-latency switches, as does Arista.

In addition, Lenovo servers can support hardware accelerators such as FPGAs (field programmable gate arrays) from Altera or Xilinx through PCIe adapters from providers such as Nallatech and BittWare. FPGAs can be excellent for accelerating stream data processing from sources such as market data feeds, while NVIDIA GPUs (graphics processing units) or Intel Xeon Phi coprocessors can be useful in accelerating parallel processing such as Monte Carlo simulations for risk analytics, financial simulations and compliance workloads.

Speed access to data

Lenovo and partners also offer a full range of storage technologies to speed data access. For example, organizations can equip servers with Fusion-io PCIe Gen 3 cards to help accelerate I/O-bound applications. They can also incorporate solid-state drives (SSDs) into servers to improve performance compared to traditional hard disk drives.

An emerging standard is NVMe (Non-Volatile Memory express), which provides a standard PCIe interface to SSDs, enabling lower latency and better performance than devices connected through SATA or SAS interfaces. Lenovo is rapidly adding NVMe drives and add-in-cards to its Lenovo server portfolio.

Trading platforms and MSP options

Lenovo low-latency trading platform ISVs include [Redline Trading](#) and [Fluent Trade Technologies](#). In terms of hosted and managed low-latency trading, several firms offer the expertise and collocations required to enable rapid, successful deployments. Examples include [Options IT](#) and [Fixnetix](#), both of which have deployed and operate large infrastructures for major global investment banks and trading firms.

“We needed a server provider that was going to be reliable, efficient and backed by a company keeping up with changing trends—from adopting the latest Intel processors to keeping up with other specialist technologies.”

—**John Bryant**,
CTO, Options IT
news.lenovo.com/images/20034/systemx_options_it_cs.pdf

Top-rated reliability and customer satisfaction

In a recent survey by Technology Business Research Inc. (TBR), customers rated hardware quality, ongoing reliability, performance, virtualization, efficiency and scalability as the most critical attributes to consider when purchasing x86 servers. Results from the same survey showed System x servers achieved the top ranking across all attributes—earning it a No. 1 rating in overall customer satisfaction. The ranking demonstrates the ability of System x servers to meet the evolving demands of today's enterprises.²

Streamline deployment and simplify ongoing management

Lenovo Solution for Low-Latency Trading offers systems pre-configured and optimized for low-latency trading to speed time to value and lower risk. A special low-latency model is offered for quick shipment from Lenovo and select Lenovo Business Partners. For more complex trading platform requirements, the Intelligent Cluster provides pre-integrated and tested configurations with the ability to customize systems to meet your needs. XClarity resource management includes tools for monitoring and optimizing low-latency performance. Expertise from Lenovo and its partners is available to tune and configure your platform for optimal performance.

Industry-standard leadership

Given the expense and complexities of evaluating the latest technologies, the Securities Technology Analysis Center (STAC) was created to establish industry-standard benchmarks unique to the financial markets space. System x has been the leading server provider for [STAC benchmarks](#), and that leadership is expected to continue into the future.

A solid foundation for next-generation analytics

To expand from low-latency trading to handle online transaction processing (OLTP) or move into analytics to generate new insights, Lenovo servers are also well positioned for today's leading enterprise relational database management systems such as IBM DB2, Oracle and Microsoft SQL Server. For example, the enhanced **x3850 X6** provides an ideal choice to maximize in-memory scalability and compute requirements, as this platform can scale to 144 cores and 12 TB of memory available in the **x3950 X6**.

Next-generation in-memory databases such as SAP HANA and the open SQL database from EnterpriseDB are featured on the x3850 X6. Lenovo is also partnering with next-generation NoSQL ISVs such as MongoDB. And many financial market clients utilize the columnar Kx kdb+ database to rapidly analyze years of "tick data." Lenovo works closely with Kx and Intel on the STAC-M3 benchmarks, many of which utilize kdb+ on the x3850 X6.



“Lenovo has enormous expertise in tuning systems for low-latency, and offers support in financial centers worldwide.”

— **Lee Fisher**,
VP, Technical Marketing,
Redline Trading Solutions
news.lenovo.com/images/20034/systemx_redline_cs.pdf

Why Lenovo?

Lenovo is a global personal and enterprise technology company—the largest PC and systems company in the world—serving customers in more than 160 countries. Dedicated to building exceptionally engineered PCs, mobile Internet devices, workstations and servers spanning entry-level offerings through supercomputers, Lenovo has built its business on product innovation, a highly efficient global supply chain and strong strategic execution. The company develops, manufactures and markets reliable, high-quality, secure and easy-to-use technology products and services.

Lenovo recently acquired the IBM x86 server business. With this acquisition, Lenovo is adding a best-in-class x86 server portfolio, and it continues an aggressive leadership pace to adopt new technologies quickly. Lenovo brings this all together with financial services industry expertise to provide systems optimized for low latency, and a rich ecosystem of business partners and ISVs to provide leading-edge solutions for low-latency trading systems.

For more information

To learn more about solutions from Lenovo and its partners, please contact your Lenovo sales representative, or visit: www.lenovo.com/systems



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¹ "Lenovo Showcases High-Performance Computing Innovations at Supercomputing 2014," http://news.lenovo.com/article_display.cfm?article_id=1865

² System x Server White Paper, January 2015 ©2015 Technology Business Research Inc. www.lenovo.com/images/products/server/pdfs/whitepapers/systemx_top_customer_service.pdf

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