SPIRENT Communications

Inspired Innovation

MarketStress
LOAD TESTING FOR TRADING APPLICATIONS AND NETWORKS

Spirent MarketStress is a load-testing appliance that simulates the high transaction volume and market data multicasts found in today's high-frequency electronic trading environment.

USERS AND USE CASES

Financial Services Industry Network and Application Engineers

- Creating and maintaining robust, low latency networks
- *Network engineering* – testing market data multicast, firewalls, trading network performance and failover
- *Systems architecture* – benchmarking performance and capacity of servers, database and DMA architecture, and FIX transaction monitoring solutions
- *Performance engineering* – end to end load testing for application-aware trading networks

Network Equipment Manufacturers

- Test trading networks with high transaction volume at extremely low latency
- Develop and deploy content-aware servers, routers, multicast switches and firewalls

Market Data Providers, Alternative Carriers that Provide Trading Extranets

- Deploy new feeds and services faster
- Reduce implementation risks
- Manage capacity with better benchmarking

Benchmarking network performance in the financial trading community is serious business, and rigorous testing is the only way to ensure that your network systems are up to the challenge. MarketStress from Spirent Communications enables engineers to test the capacity and latency of both individual devices and entire trading networks, delivering a new level of demonstrated reliability and effectiveness. CTOs can now be assured that networking solutions will meet demanding business goals.

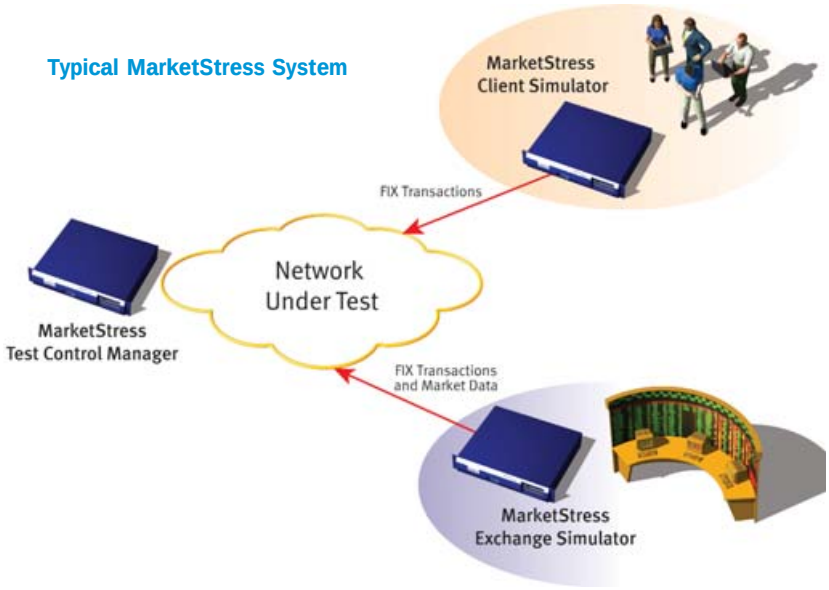
MarketStress supports industry-standard messaging protocols such as FIX (Financial Information Exchange), NYSE Group (SIAC), and NASDAQ.

THE CHALLENGE

The key to creating and managing effective trading systems is to ensure high volume, low latency throughput. As traders and money managers invent more exotic instruments and strategies, and devise new methods of electronic price discovery, the staggering volume of trades and market data continues to increase. Electronic price discovery produces a torrent of network traffic from orders that may simply be cancelled, while transactions resulting from algorithmic trading mean a higher frequency of smaller trade lots.

These activities are creating exponential growth rates for market data. As business opportunities continue to change in today's rapidly evolving marketplace, the result will be increases in data flow and processing loads.

Typical MarketStress System



Regulators are looking more closely at execution response time as a measure of how well your fiduciary responsibility to your clients is met. Electronic trading requires low latency and high throughput, and real-time market data delivery cannot tolerate delays, data loss or network dropouts caused by jitter, retransmissions and resets.

The dynamic, constantly evolving trading environment presents unique challenges to IT professionals. You need to move quickly to help your company capture trading opportunities, yet balance risk by deploying the right solutions. You need to design and support networks that can scale on demand. And you need to support existing production networks to ensure optimum performance and compliance with industry regulations.

THE SOLUTION

Spirent MarketStress enables you to test the capacity and latency of high performance trading networks, devices and application servers in the lab before deployment — ensuring that you'll be ready for market open. Using this next-generation testing approach delivers faster deployments, reduces the risk of downtime and network outages, and enables your business to deploy cost-effective solutions with confidence.

MarketStress generates both transaction data and market data at the high volumes needed to test today's networks and support tomorrow's growth. MarketStress allows you to test trading applications and the delivery network as a complete system, or each component in isolation when conducting network integration tests. The flexible, innovative MarketStress solution is ideal for performance testing teams comprised of network and systems development engineers.

The MarketStress Client generates FIX transaction load and acts as a market data subscriber. The generated order flow can be directed to test throughput of application gateways, an order router, or act as order input to your complete system. The MarketStress Client will track the application responses and response time quality of FIX messaging and market data delivery.

The MarketStress Server simulates multiple FIX route destinations, exchanges, and ECNs.

- For trading firms, MarketStress Server provides the liquidity and market activity seen in trading networks. Provides true FIX responses that contain the realism of actual order acknowledgements, cancellations, cancel/replace and detailed execution messages.
- For market data consumers, MarketStress Server provides the high-volume market data flows needed to test high-performance multicast networks.

MarketStress Test Control Manager (TCM) controls MarketStress. TCM provides a test repository and control mechanism for all MarketStress clients and servers in your environment. Test results are stored on test engineers' MarketStress GUI and can be viewed in any tool that reads comma separated format.

Depending upon your use case, MarketStress components can be used together or separately. For network engineers and developers, MarketStress creates all flows required for end-to-end network testing. And because MarketStress generates standards-based FIX transactions, you can test the throughput of applications supporting your FIX gateways, DMA gateways, and order routing and compliance software.

MarketStress Server data flows support multiple simultaneous protocols, supporting testing of applications such as best execution and order routing.

KEY BENEFITS

Unique Load-Testing Capability
MarketStress enables on-demand QA load testing that, until now, was limited to off-hours testing in production environments. By providing volumes of both transactional and market data in an easy-to-use appliance, MarketStress enables engineers to take control of testing with unlimited loads. Performance can be baselined by repeating tests after changes to code or the network environment have occurred, delivering a breakthrough enhancement to the QA network test lab environment.

Accelerated Testing Time
Currently, financial organizations are forced to conduct QA testing within the actual production network when the market is closed. Network engineers are unable to configure test cases or test data, and must make inferences regarding network and device behavior based on limited observation.

Because you can test when and how you want—testing efficiency will increase throughout your lab. And MarketStress allows you to easily repeat tests exactly over time, providing a measure to baseline performance after changes to the code or the network environment.

Reduced Engineering Costs
Deploying MarketStress will result in manpower savings for your company's core engineering, application development, and production support teams. As one engineer remarked, "Thank you for giving me back my Saturday nights!" Companies can realize benefits not only in customer satisfaction, but in employee satisfaction as well.

Reduced Capital Expenditures
Securities markets worldwide are constantly deploying and redesigning trading systems to support exponential growth in electronic trading. Purchasing decisions at investment and trading houses must be based on hard facts. CTOs need to correlate price and performance data to select the technologies they need to support business initiatives such as algorithmic trading and new stock and equities market data feeds. Only by testing with actual transactional data and market data loads can you ensure that your products and services will meet demanding financial and trading industry requirements.

Reduced Testing Costs
Lab managers can reduce testing costs by embedding specialized industry knowledge in automated test tools. Competing solutions require use of production data or networks during limited off-hours windows – or substantial investments to duplicate production servers in a network QA lab.

Accelerate Projects by Reducing Risk
To mitigate project and production risks, IT managers need to understand how networks work — or fail — in a test lab prior to production deployment. Implementing better test procedures early in the project helps create better trading systems at lower costs. Mitigating risks that can be incurred during decision-making and deployment helps to ensure smooth, trouble-free deployments.

Meet Testing Requirements in SEC Regulations
A typical system can be configured to exceed the stress described in ARP II SEC Policy Statement, Automated Systems of Self-Regulatory Organizations (II) Securities and Exchange Commission, release No. 34-29185; File No. S7-12-91. Statistics are rich enough to measure transaction latency per SEC regulation ATS.

Further information is available online at:

www.sec.gov/divisions/marketreg/arp-ii.htm

KEY FEATURES

Pushbutton Operation
Ideal for network and security engineers, MarketStress is pre-configured with the tests required to emulate high-volume order flow and complex market data. This pre-configured approach enables testing to commence almost immediately.

Realistic Tests in Complex Environments
Spirent MarketStress supports complex tests that are not possible on today's production stock markets. Financial and trading customers using this innovative solution need to design and test their trading systems to support high loads and deliver low latency. Firms must test at formidable levels, measured in order rate (thousands per second), customer response time (10ms average / 25 ms maximum trade execution time) and internal latency (less than 5ms per order).

Trading firms need to test peak loads at levels that are multiples of their current volume, and need to test a variety of trade/execution ratios. And firms must extend testing beyond the few test symbols available in the production environment of the exchanges. Only MarketStress provides a lab-based solution capable of producing the level of realism, complexity, and high traffic loading needed to fully test these scenarios.

Flexible Scheduling
Now you can run tests without using your production environment to create load, and without waiting for off-hours test windows. The intuitive GUI controls MarketStress test execution.

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Rich Statistics

MarketStress provides hard data on performance and response time, enabling network engineers to easily benchmark the performance limits of their network and systems. By baselining network performance, you can be confident that your systems will support the business requirement they were designed for. Error reporting provides valuable insights on how your systems will respond, or even fail, under heavy loads, and real-time statistics supply specific performance data for further analysis.

- Key totals statistics
  - Market data messages sent
  - Messages lost
  - Send errors / receive errors
  - Orders sent, acknowledged, rejected
  - Trades
- Key rate statistics
  - Message rate
  - Kilobit rate
  - Order rate
  - Error rate
- Key latency measurements
  - Application latency
  - Application response time

Simplified QA Architecture

MarketStress provides the market data and order flows required for your test bed, eliminating the need to use the production environment for QA testing.

SPECIFICATIONS

System Requirements

The MarketStress graphical user interface requires a 1 GHz (minimum) PC running Microsoft Windows XP, configured with 512 MB RAM.

Protocols Supported

- FIX 4.0, 4.1, 4.2, 4.3, 4.x and ARCA-FIX
- SIAC CQS/CTS, NASDAQ OpenView, and NASDAQ TotalView
- Multicast service Options Price Reporting Authority (OPRA)
- NASD NASDAQ Multicast Services include: NQDS, UQDF, UTDF, OMDF, Totalview, Openview

Projected Performance

- Up to 256 preconfigured tests
- Up to 32 Model 2700 appliances

MarketStress Client

- Up to 100 FIX clients
- Up to 12,000 FIX orders per second

MarketStress Server

- Multiple destinations
- Up to 12,000 FIX orders per second
- Up to 150,000 messages per second
- Generates up to 100 Mbps of multicast test traffic

Traffic Load

- Order flow traffic distribution: periodic, random, fixed, burst
- Market data traffic distribution: periodic, random, fixed, burst

Dimensions

- 3.485” H x 16.53” W x 19.75” D (8.851 cm H x 41.982 cm W x 50.165 cm D)
- Fits standard 19” rack, 3U high

Weight

- 22 lbs. (10 kg)

Operating Environment

- 41° to 104° F (5° C to 40° C)

Non-Operating Environment

- 32° to 122° F (0° C to 50° C)

Power Requirements

- 115-230 V, 50/60 Hz

Maximum Power Consumption

- 460 W

Regulatory Approvals:

- FCC Class A, CE, UL-1950, GS Mark

Network Interfaces

- Two (2) dual Gigabit Ethernet test interfaces
- One (1) Gigabit Ethernet management interface

SPIRENT GLOBAL SERVICES

Spirent Global Services provides a variety of professional services, support services and education services — all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at www.spirentcom.com/gs or contact your Spirent sales representative.

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