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## ***eXtremeDB Case Study***

### ***NSE.IT gains a competitive edge in algorithmic trading with ultra-fast, low-latency approach to risk management***

#### ***Industry Trend Toward Algorithmic Trading***

The era of algorithmic trading has begun. Algorithmic trading, also known as algo trading, is defined as the placement of a buy or sell order of a defined quantity into a quantitative model that can automatically generate the timing and size of orders based on parameters and constraints specified by the algorithm, to achieve a certain trading objective.

Financial markets with fully electronic execution and associated communications networks grew in the late 1980s and 1990s, facilitating the growth of algorithmic trading strategies. These strategies are more easily implemented by computer systems because the systems can react more rapidly to temporary mispricing and can examine prices from several markets simultaneously. In the early 2000s, algorithmic trading really started to take off as the execution product for the sell side. It soon became a product that was mass delivered to the buy side as the buy side became interested in handling the trading of some of its order flow, rather than sending all orders to broker-dealers. In recent years, the biggest growth trend in algorithmic trading has been in customization of algorithms. Algorithmic trading has spread across multiple asset classes — from equities to futures and options, and to foreign exchange — as people look for cross-asset trading opportunities in order to hedge their positions.

Algorithmic trading promises to cut costs, eliminate human error, and boost trading efficiency and productivity. The use of algorithms to make complex decisions and place thousands of orders in milliseconds has grown in popularity, particularly among equity and currency traders.

#### ***India's Transition to Algo Trading***

Algorithmic trading gained recognition in the Indian marketplace in 2009, when the Securities and Exchange Board of India formally approved the practice. Algo trading in India has been steadily catching up to its level of use elsewhere. In a significant development, both equity exchanges, the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE), now allow smart order routing from co-location facilities at one exchange to facilities at the other. There is also evidence that the adoption of algorithmic trading is changing the way the market works: manual arbitragers are heading towards extinction and arbitrage opportunities in general are becoming more difficult to find. Both are evidence that information flow between markets is becoming more efficient.

## *Product Overview*

NeatXS is a sophisticated front office suite targeting brokerages, specialized trading firms, asset management firms and hedge funds as part of NSE.IT's Algo Solution technology for algorithmic trading. The server-based NeatXS enables trading on multiple exchanges and multiple exchange segments, providing easy administration facilities along with built-in risk management and surveillance features.

## *Low Latency and NSE.IT's Approach to Algo Solutions*

Low-latency trading allows high-frequency traders to transmit huge volumes of trade orders at lightning speed. Low-latency trading is highly dependent on ultra-low latency networks. Such networks benefit the user by providing information, such as competing bids and offers, to trading algorithms microseconds faster than competitors can obtain the information. This revolutionary competition based on speed has led firms to co-locate their trading facilities with major exchanges (to shave off the milliseconds imposed by communicating orders over longer distances) and to adopt real-time trading platforms, in order to benefit from implementing high-frequency strategies.

NSE.IT 's Algo Solution technology combines an event-driven architecture for ultra-low latency processing of event data streams with real-time market data feed processing, automated execution management, order state handling and smart order routing to handle high frequency trading.

## *Challenge*

Risk management is a process of measuring and analyzing risk and then strategizing to cope with it while attempting to manage returns. Trading systems implement risk management to address a wide range of risks related to factors including order size, allocation of margins, gross and net exposure, options coverage, securities' mark-to-market value, and "fat fingers" keystroke errors.

In algorithmic and high-frequency trading, risk management is automated and requires analysis of orders after they are placed but before they are executed. Therefore, risk management poses a potential processing bottleneck. Providers of trading systems are challenged to find a way to execute comprehensive risk management at a faster pace in order to keep pace with low-latency algorithmic trading. A major component of this challenge lies in minimizing latency imposed by data management.

## *Solution*

After examining the field of in-memory database system (IMDS) products and developing a proof-of-concept, NSE.IT selected the *eXtremeDB* In-Memory Database System from McObject for latency reduction in NeatXS risk management features. Driving the decision were the performance advantages lent by all-in-memory data handling as well as several features that differentiated *eXtremeDB* from other IMDSs, including:

- Easy to implement, since a database schema is defined using a language very similar to class definition in most object-oriented programming languages, and the schema can be compiled into language specific APIs
- Proven at scale, with both 32-bit and 64-bit editions available
- Provides binding with almost all popular development languages/platforms like C/C++/Java/.NET
- Available support from McObject

### *Benefits*

- Faster throughput and ultra-low latency achieved, with trade execution reduced to sub-millisecond response time
- Comprehensive risk management from order placement to execution across all asset classes
- Provides transaction logging
- Seamless streaming of market data
- Allows lightning fast, strategy-based trading
- Reduced execution time provides more time for opportunity identification, resulting in better trades that increase profitability.

### *Testimonial*

*“eXtremeDB has enabled us to reduce latency to the sub-millisecond level per order while implementing a complex risk and compliance system, successfully positioning our Algo Solution in an increasingly competitive marketplace.” – Dr. Paresh Paul, Chief Delivery Officer, NSE.IT Limited*