

Elastic Application Platform for Market Data Real-Time Analytics

Can you deliver real-time pricing, on high-speed market data, for real-time critical decisions?

Market Data Analytics applications face an escalating need for performance, while data quantities grow exponentially and the need for real-time reports is increasingly urgent.

Market Data Analytics applications demand higher throughput to handle millions ticks per second and lower latency than ever, to meet the challenge of processing terabytes of data, from various sources, which must be available to multiple processes, making system management increasingly complex. Moreover, the ability to mitigate risk and make fast trading decisions requires gaining meaningful information from these vast data streams in real time.



Compute grids are unable to handle these exacting requirements – they are expensive and difficult to maintain, failing to meet the tera-data and real-time challenges. Nor can all system components scale together to meet actual needs.

GigaSpaces XAP provides an end-to-end solution for all analytics requirements – functional, scaling, provisioning, and load-balancing – in a single, in-memory platform.

GigaSpaces XAP is built to run real-time, event-driven analytics in memory, co-located with the data. XAP has built-in multi-tenancy support, enabling multiple analytics processes to run on a shared infrastructure while maintaining strict isolation. The result – a more complete solution, providing faster results, at a lower cost, while preserving transactional integrity.

GigaSpaces XAP is the only single-product solution that provides true end-to-end scalability, delivering:

- **Dynamic provisioning** to meet fluctuating loads.
- **High performance** data Query data access for latency-sensitive environments.
- **Continuous uptime/high availability** through automatic failover and self-healing.
- **Cost efficiencies** through maximum resource utilization, standard development and deployment environments, and advanced management tools.

GigaSpaces is a mature, robust, proven solution, deployed over hundreds of financial enterprises worldwide, running their mission-critical applications.

Market Data Management

Quantitative strategies are increasingly complex. The explosive growth of market data volumes are driving the need for combined analysis of real-time market data with historical data fast storage and data access. Both buy and sell-side tools require developing algorithmic trading strategies in very short timeframes who run queries against two real-time market data and large historical databases. Financial companies demand ability to easily perform algorithmic trading executing strategies developed via back testing using historical Feeds. These must be deployed on daily bases to allow users to enhance and mature their strategies to adapt fluctuating market conditions.

GigaSpaces XAP allow financial companies a reliable and scalable platform that deliver all the required tools to build algorithmic and quantitative strategies, run back-testing scenarios with large volumes historical feeds, and rapidly deploy these modified trading strategies to match current market conditions.

Deliver Pricing that deals with volatile market

- Use share nothing approach and partition your data in-memory.
- Co-locate the validation, normalization, consolidation and pricing code with the data avoiding transferring data across the network via 3rd party systems.
- Use in-memory map/reduce architecture to deal with many-to-many relationships.
- Schema-less data model smoothly adds new reference and pricing data types and attributes without downtime.
- Rich indexing capabilities, including on nested collections and objects allowing blazing fast data query.

Predictive deterministic behavior leveraging state-of-the-art Management

- Use XAP dynamic SLA manager to proactively provision more resources as load increase.
- Enjoy XAP real-time synchronization and self-healing mechanism to prevent cascading failure or data lose.
- Enjoy XAP built in alerting and monitoring mechanism to supervise the production environment.

Business Use Cases

Reliable Pricing and Risk Calculation

To perform reliable pricing and risk calculations (VaR , Basel) you must have reliable high quality market data. GigaSpaces XAP helps financial companies to meet business objectives and time to market, manage the fast growth of the types of instrument and data sources. Pricing system using GigaSpaces XAP provides flexibility and customization for growth locally, to provide intraday and End of day valuation, market risk analysis with access to historical data to calculate the market risk stress testing.



Trading Strategies Development Made easy

GigaSpaces XAP enables financial companies developing sophisticated trading strategies quickly and easily. With today's economy where time to market is a key competitive advantage, it is an essential component of any successful trading environment. Flexibility to handle any new reference data item or pricing data item without any downtime is critical.

Unlimited Back-Testing with Low-Latency Data Access

Trading strategies feed into XAP can be processed and execute back-testing leverage in-memory data processing technology supporting fast data access to intra-day and historical data provided by tick feeds. Intelligent analysis identifies the optimized trading strategies leveraging historical data using GigaSpaces as the storage medium both for the raw and processed market data.

Agile Trading Strategies Deployment

Optimized trading strategies created via back-testing cycles can be deployed immediately while the market is active. While these trading systems are running users may update these in real-time to cope with market changes. Once transactions executed GigaSpaces XAP stores trading results and track the impact of the trading algorithms to compare with historical performance.

Meeting Market Data Analytics Challenges

Challenge	How GigaSpaces XAP addressing it?
<p>Quickly identify discrepancies – reducing risk and increasing transparency.</p>	<p>Market data analytics and pricing systems involve real-time calculations on rapidly changing market data feeds, which goes orders of magnitude beyond RDBMS processing capabilities.</p> <p>GigaSpaces XAP provides high performance in-memory data management technology optimized for large, complex data sets:</p> <ul style="list-style-type: none"> ▪ Data is partitioned to allow for faster parallel processing. ▪ In-memory data grid is co-located with pricing algorithms avoiding moving large amounts of data over the network. ▪ SQL Query language leverage Multi-indexing per data type across large complex data model. ▪ XAP is 100% transactional ensuring full data consistency.
<p>Ensuring business continuity as market data volumes grow to peak levels with flexibility to handle new data items without downtime or schema changes.</p>	<p>Data volumes processed by market data and pricing system can quickly peak during times of market turmoil. These systems need to scale in order to prevent losses and regulatory penalties – presenting a challenge to maintaining high availability and data integrity.</p> <p>GigaSpaces XAP guarantees high availability and data integrity at any volume:</p> <ul style="list-style-type: none"> ▪ Built-in linear scalability, real-time replication, and self-healing capabilities. ▪ End-to-end elasticity – all system components scale out as resource requirements increase, ensuring SLAs. ▪ Schema-less data model support allowing the system to handle new instruments, new reference data item or pricing data items.
<p>Reducing IT costs</p>	<p>Your market data system architecture must cope with an ever-growing, changing business environment, avoiding the need for re-engineering and constant tuning, enabling you to focus development resources on core business logic.</p> <p>GigaSpaces XAP optimizes your system with fully dynamic provisioning, in a simple-to-manage production environment:</p> <ul style="list-style-type: none"> ▪ Maximize resource utilization with predefined SLA rules that trigger elastic resource allocation. ▪ Save cost of expensive RDBMS and storage HW/SW. ▪ Advanced end-to-end service management and monitoring capabilities ensure quick error detection and fault resolution. ▪ Hot deployment for agile application evolution and transparent upgrade.
<p>Coping with the increased complexity and risk of global deployments.</p>	<p>When operating across regions, rules execution and pricing calculation must be executed successfully within a short time window – requiring a fast, reliable, automated process that shares data with remote systems distributed across different geographies.</p> <p>GigaSpaces XAP provides ultra-fast processing with reliable multi-site synchronization over the WAN</p> <ul style="list-style-type: none"> ▪ Support synchronous replication within the LAN and reliable asynchronous replication across the WAN. ▪ Use In-Memory Map/Reduce approach for parallel processing massive amounts of data.

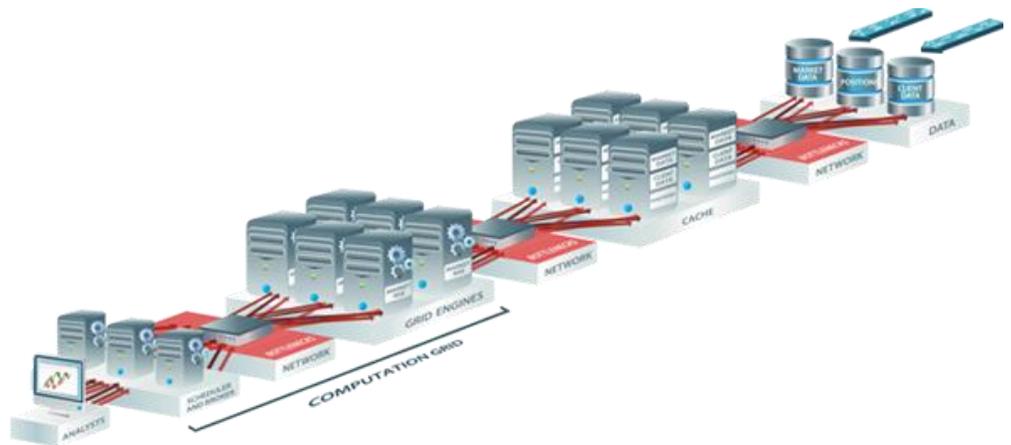
Solution Architecture

Traditional Market Data Analytics Today – RDBMS and Network are your Bottleneck!

Traditional Market Data Analytics applications running on computation grids generally require dedicated hardware leveraging centralized relational databases management systems. For the incoming market data you may have validation, normalization, consolidation and data distribution process that heavily interacts with the database constantly.

End-of-day analytics process is complex: Tasks are scheduled and assigned to analytics engines, which must then retrieve data from the database. Only in this point the required calculation is performed – a process requiring multiple network hops, mediated by the grid broker that must ensure that all calculation tasks are routed to the engines, that all task components are executed, and no data or assignments are lost along the way.

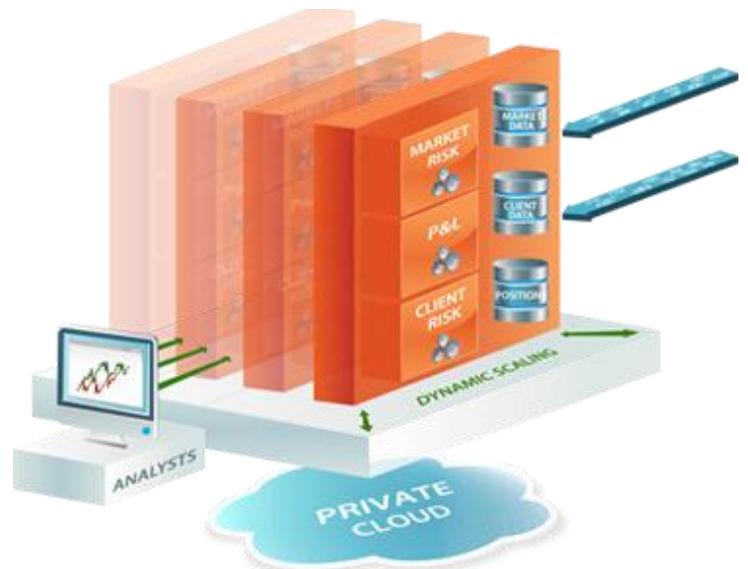
Such complex systems require separate management of hardware, tasks for the compute grid, database and the network. Running the system as separate layers, each residing on a different platform, makes scaling complex, if not impossible: Each layer has its own clustering model and H/A scheme, making it difficult to coordinate among them. With constant processing of massive real-time market data, centralized database architecture slowing the system preventing the system to scale on demand.



Real-Time Market Data Analytics with GigaSpaces XAP

With GigaSpaces XAP the validation, normalization, consolidation and data distribution process are fused with their data and integrated onto a single platform. Co-located data, messaging, and processing mean that all the data is immediately available, no matter how complex, with no network hops, vastly speeding up processing, for better risk management. End-to-end elasticity enables all system components to scale as resource requirements increase.

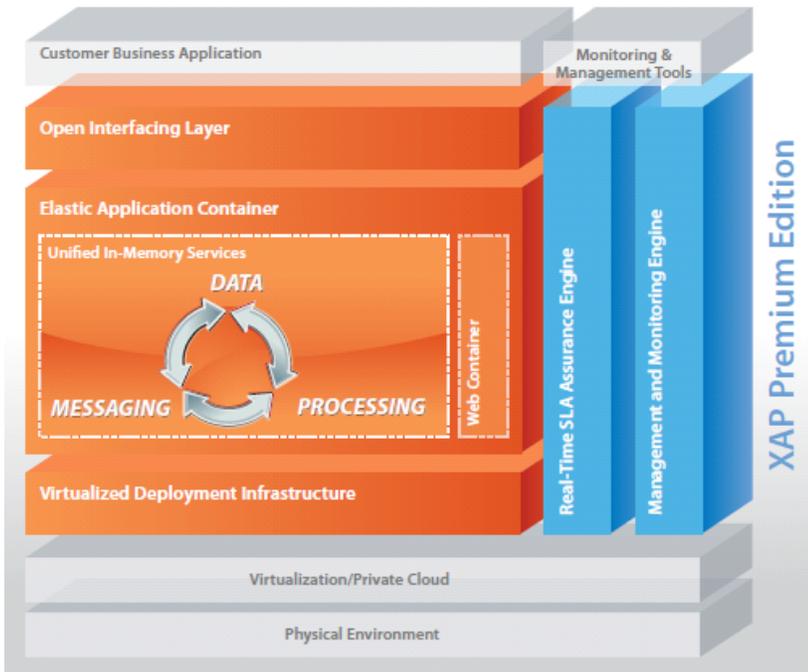
All these benefits delivered while providing full data consistency, high-availability and data integrity. You may leverage GigaSpaces with physical hardware, or to further optimize TCO, GigaSpaces can fully integrate with any private cloud management mechanism, enabling dynamic provisioning of the underlying infrastructure, using a single point of management.



GigaSpaces XAP product architecture

Comprehensive, mature application platform that provides the simplest path to production:

- All the building blocks for extreme application scalability in the processing stack.
- Operational readiness that enables faster time-to-market, zero-downtime, and maximum resource utilization.
- Complementary suite of robust, enterprise-grade management and monitoring tools.



Open Interfacing Layer

Supports any language, any platform, any API.

Elastic Application Container

End-to-end-scalable execution environment with elastic deployment to meet extreme throughput requirements.

Unified In-Memory Services

Data access, messaging, parallel processing services, to speed up your app.

Web Container

Host your java web modules on GigaSpaces XAP for end-to-end management and scaling of your application.

Virtualized Deployment Infrastructure

Any environment, anytime, anywhere – traditional data center, public/private cloud, or hybrid.

Real-Time SLA Assurance Engine

Optimize IT resource utilization.

Management & Monitoring Engine

Production-grade control and visibility.

About GigaSpaces

GigaSpaces Technologies is the pioneer of a new generation of application virtualization platforms and a leading provider of end-to-end scaling solutions for distributed, mission-critical application environments, and cloud enabling technologies.

GigaSpaces complementary solutions are [XAP Elastic Application Platform](#) and [Cloudify - Easy Deployment of Mission Critical Applications to the Cloud](#).

GigaSpaces XAP is the only platform on the market that offers truly silo-free architecture, along with operational agility and openness, delivering enhanced efficiency, extreme performance and always-on availability. The GigaSpaces solutions are designed from the ground up to run on any cloud environment – private, public, or hybrid – and offer a pain-free, evolutionary path to meet tomorrow’s IT challenges.

Hundreds of organizations worldwide are leveraging GigaSpaces’ technology to enhance IT efficiency and performance, among which are Fortune Global 500 companies, including top financial service enterprises, e-commerce companies, online gaming providers and telecom carriers.

