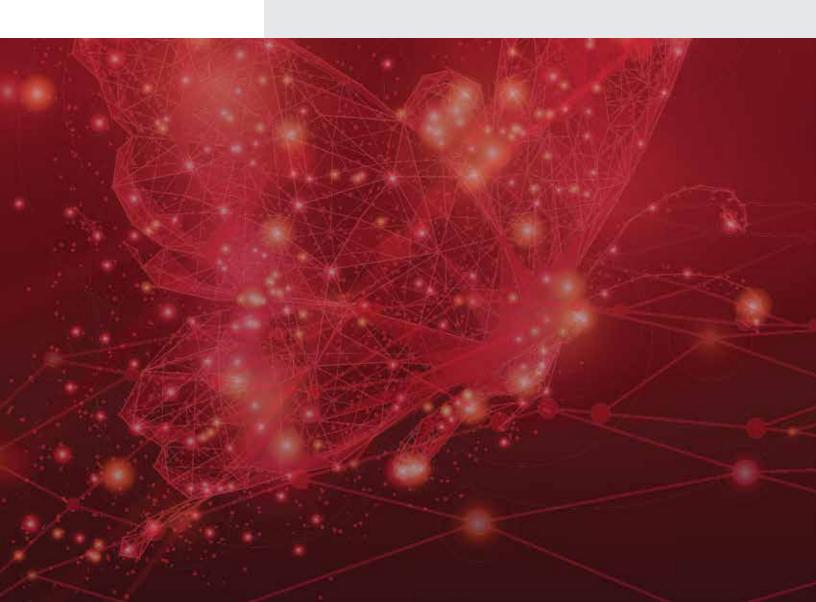# Transforming Asset and Wealth Management with In-Memory Computing

A GridGain Systems In-Memory Computing White Paper

TRANSFORMING ASSET AND WEALTH MANAGEMENT WITH IN-MEMORY COMPUTING

The asset and wealth management sector of the financial services industry is undergoing rapid changes. Competition among investment-services providers is growing, with a wider range of providers courting a younger, more tech-savvy client base. These young investors bring with them new expectations and new challenges. To court them successfully, providers must offer the services they demand, including a 24/7 online investment environment with access to a wider range of investment vehicles than the traditional equity and bond funds.

Technology is key for maintaining a competitive edge in this situation. Investors will no longer wait for slow software or browser refreshes, so fast performance against big datasets and streaming data is crucial. Providers also need a scalable solution that interoperates with other systems, so they can offer the full range of digital channels and investment vehicles. Sophisticated analytics capabilities are essential as well, both for meeting increased regulatory requirements and for predicting advantageous investment scenarios.

To achieve this level of performance, scalability, and analytical sophistication, many financial-services providers are turning to in-memory computing solutions. This white paper will discuss the increased expectations of investors, the new challenges providers are facing, and how providers can gain the edge they need with solutions such as the GridGain in-memory computing platform.

WHAT TODAY'S INVESTORS WANT

In the past, investors typically made their investments through large, institutional investment firms with advisors who would help them choose appropriate investment vehicles—generally funds oriented toward equities or bonds. Today's investors are different. Overall, they are younger and more technology-driven, and these demographic trends are creating a new set of expectations for investment providers.

Today's investors want investment services that offer the following characteristics:

- Multiple sources of personalized investment advice: Rather than relying completely on an advisor to guide them, today's investors want to take a more active approach to finding an investment strategy tailored to their needs. They're consulting peers, comparative recommendations, and reports of investment performance, looking for transparent explanations and a sense of personal involvement.

- 24/7 access to investments: Today's investors want 24/7 online access to their investment environment, including from mobile platforms, with timely alerts of changes in their holdings and their value. They want to be able to make rapid decisions based on personal preferences from anywhere at any time.

- Individualized, wider-ranging investment strategies: Rather than limiting their investments to funds, today's investors are interested in a wider range of asset classes and investment vehicles, including socially conscious investments, startups with innovative ideas, and opportunities in other countries. They are less interested in traditional risk-management models and performance benchmarks than in choosing a strategy aligned with their personal goals and trying to come up with an acceptable risk level for that strategy.

These expectations—along with the willingness of these young investors to move their money from firm to firm if their expectations aren't being met—have encouraged a fast pace of change among providers of investment services.

CHANGES FACED BY INVESTMENT PROVIDERS

As the client base skews toward younger, more tech-savvy investors with higher expectations, the world of investment-services providers is also evolving, seeing the following types of changes and increased pressures:

- More nontraditional providers: New investment services providers—not just banks and financial institutions—are getting involved in this area, offering new technology platforms and a wider range of investment opportunities, such as crowd-funding and startups.

- Increased competition: Large investment houses are competing against smaller, more technology-focused firms, as providers see increasing investor movement among investments and firms.

- New distribution channels: Providers are using newer channels (online, mobile, social media) to reach and influence people choosing between financial services firms.

- Customer-centric, 24/7 business model: In today's environment, providers need to put customers first and make sure all available digital channels are meeting customer demands, providing round-the-clock access.

- Increased cost pressures: With more competition to reach potential investors and greater transparency about fees, there is pressure on providers to reduce their charges to clients. In addition to reducing fees, some providers are using common platforms to consolidating functions (investment management, risk management, and so on) and increase efficiency.

- Increased market-volatility pressures: In today's post-financial-crisis world, market volatility is 20 to 25 percent greater than it was previously. Providers need to make sure they are offering investment strategies that adequately address this volatility and mitigate its risk.

Increased regulatory pressures. Providers today must meet increased reporting requirements and implement new risk-management. Providers must do capital planning and stress testing to keep their balance sheets healthy. They must also provide high-quality data and reporting related to trades and transactions, as well as establish robust anti-fraud and cyber-security programs. In addition, they must comply with strengthened requirements in the areas of consumer protection, liquidity, foreign banking, crime prevention, and data governance.

In this environment of increased competition, customer expectations, and regulation, as well as other pressures, providers are finding that technology is the key to maintaining a successful edge.

MEETING NEW CHALLENGES WITH CUTTING-EDGE TECHNOLOGY

As investment providers seek ways to cope with the increased expectations and pressures of today's environment, they are focusing on how technology can help with the following three challenges:

- Providing a real-time, 24/7 individualized environment with a full range of investment services
- Facilitating customer access through multiple channels and platforms, including mobile devices and social media
- Ensuring that all provided advice and investment actions meet rigorous regulatory requirements

Let's take an in-depth look at the technologies and techniques that providers are using to meet these challenges.

Technologies for Providing a Real-Time, 24/7 Individualized Investment Environment

To satisfy customers who want 24/7 access to individualized investment advice, trading, and management of their portfolios, providers are using the following technologies:

- Content automation: Automating communications between the customer and the financial advisor as much as possible
- Robo-advisors: Using robo-advisors as needed to select individualized investments for customers based on the information they provide

- Virtual reality: Using virtual reality experiences to help customers visualize potential performance of various investment strategies
- Big-data management and analytics: Analyzing large quantities of data to provide analysis for customers
- Advanced analytics: Employing analysis mechanisms that allow customers to source inventories of various assets and decide what they need in their portfolios
- Scenario analysis: Modeling market movements in particular directions to make sure investors are prepared for potential changes
- Machine learning: Analyzing historical actions and performance to predict current behavior, using techniques such as behavior analysis, neural networks, heuristics, and "what-if" analysis
- Complex Event Processing (CEP): Creating algorithms and models that can automatically place orders for customers based on pre-configured ordering parameters and a real-time analysis of current market conditions
- Blockchain capabilities: Using blockchain digital-ledger technology for messaging, instructions, and payment options to reduce transaction costs and processing time (For a more in-depth look at blockchain capabilities and requirements, see "Enable Bitcoin and Blockchain Technology with In-Memory Computing".

Providers seeking to combine these technologies successfully in a 24/7 customer environment need a high-performance, low-latency data solution with streaming capabilities that can handle big-data management and analytics, including interoperability with preferred analytics tools.

Technologies and Techniques for Facilitating Multi-Channel, Multi-Platform Access

In addition to creating an investment environment that is available 24/7, providers face the challenge of enabling customers to access their investment services seamlessly from any communications channel or platform.

To meet these challenges, providers are using the following technologies and techniques:

- Multi-channel integration: Making the available capabilities (including advice, account setup, quote requests, real-time notifications of portfolio changes, and so on) similar across all digital communication channels and platforms, including social media and mobile devices
- Session-state tracking: Tracking the user session state across multiple platforms, to enable a consistent experience

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- Cloud solutions: Putting data and software in the cloud to enable convenient access from any physical or virtual environment

- Open source and open architecture solutions: Using tools that are open source or open architecture to facilitate interoperability among platforms

Asset and wealth management providers require a high-performance, scalable data solution to meet always-on multi-platform customer expectations.

Fortunately, there is a technology that is available with these features and is well-suited to this type of high-speed, big-data use case: in-memory computing, as implemented in the GridGain In-Memory Data Computing Platform. Let's look at why in-memory computing makes sense for providers of investment services.

IN-MEMORY COMPUTING: BENEFITS AND USE CASES

To offer high-quality, real-time investment advice and trading capabilities 24/7, investment-services providers need to be able to process and analyze enormous volumes of data at tremendous speed. Inmemory computing is faster than any other storage-based computing method because it keeps data in RAM for extremely fast access, with no disk-related slowdowns.

For applications that require heavy analytics and real-time (or near real-time) transaction processing of hundreds or even millions of transactions per second, the market is now moving from disk-based to inmemory computing. The reasons for this trend involve both performance and Return On Investment (ROI).

1000x Faster

The move from disk to memory is a key factor in improving performance. However, simply moving to memory is not sufficient to guarantee the extremely high memory-processing speeds needed at the enterprise level. Enterprise-level speed requires cluster computing, with multiple machines performing analyses at the same time, and parallel distribution of data. These capabilities are important for providing high availability, disaster recovery, and concurrency across systems—and they are all provided in the GridGain in-memory computing platform. Clients who have implemented the GridGain In-Memory Data Computing Platform have found that they can process transactions about 1000 times faster.

10x ROI Improvement

The cost of memory has dropped roughly 30% per year since the 1960s, so memory has become much more affordable in recent years. While it may still be slightly more expensive than disk, the performance is so much better that it improves ROI significantly. Clients who have implemented the GridGain in-memory computing platform have seen a tenfold or more improvement in their ROI.

Customer Case Study: Sberbank

One of the most noteworthy GridGain Systems financial services customers is Sberbank, the largest bank in Russia and the third largest in Europe. Sberbank was faced with a similar problem to the one currently facing companies who are transitioning from person-to-person, cash-and credit card-based payments to 24/7 digital, online payment environments. The bank was switching from a more traditional, brick-and-mortar setup—one in which people would come into their offices and manually process a limited number of financial transactions each day, during a limited time period—to a new world with online and mobile customers transacting with them 24/7.

The company forecasted future throughput requirements and determined that it needed to move to a next-generation data-processing platform to handle the expected transaction volume. Sberbank analyzed more than ten potential solutions from vendors in the in-memory computing space and found that the GridGain in-memory computing platform was the most comprehensive solution. The bank concluded that GridGain would provide the next-generation platform with a significant improvement in performance and scalability.

The GridGain in-memory computing platform provided several other important capabilities that Sberbank's next-generation platform would require such as machine-learning and analytics, flexible pricing, artificial intelligence, ease of deployment, hardware independence of cluster components, and a rigorous level of transactional consistency. Of particular importance was the ability to conduct integrity checking and rollback on financial transactions. Sberbank could not find that level of consistency with other in-memory computing solutions.

In a January 2016 article in RBC, Herman Gref, the CEO of Sberbank, said that the bank selected the GridGain Systems technology to build "a platform that will enable the bank to introduce new products within hours, not weeks." He went on to state that the GridGain in-memory computing platform enables Sberbank to provide "unlimited performance and very high reliability" while being "much cheaper" than

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the technology used previously. Sberbank is using GridGain's in-memory computing platform to implement capabilities that could not be provided by the other vendors evaluated—a group that included Oracle®, IBM® and others.

GRIDGAIN SYSTEMS: A LEADER IN IN-MEMORY COMPUTING

With many companies grappling with the challenges of processing and analyzing increasing volumes of data for real-time, individualized customer interactions, demand for the GridGain in-memory computing platform is growing dramatically. This comprehensive platform contains a complete feature set that surpasses the capabilities of in-memory database point solutions, making it well suited to financial use cases like payments involving data streaming, machine learning, risk analysis, real-time analytics, complex event processing, and other capabilities needed in the new world of digital and mobile payments.

As a complete in-memory computing platform, GridGain helps users consolidate onto a single high performance and highly scalable big-data solution for transactions and analytics, resulting in lowered TCO. Advanced SQL functionality and API-based support for common programming languages enable rapid deployment. These features, along with the rapidly decreasing cost of memory, boost ROI for inmemory computing initiatives, enabling financial services companies to build less expensive systems that perform thousands of times better. Sberbank, Barclay's, and Citi realized such benefits with the GridGain in-memory computing platform.

A Unified High-Performance Architecture

The GridGain in-memory computing platform consists of multiple grids connected by a clustered in-memory file system. The In-Memory Data Grid, In-Memory Compute Grid, In-Memory SQL Grid and In-Memory Service Grid are interconnected. Computations occur as close as possible to the data used in the computation. Additional features such as high throughput, low latency, load balancing, caching, in-memory indexing, streaming, Hadoop acceleration and other performance improvements are crucial to success in real-time modeling, processing, and analytics.

Scalability

The GridGain in-memory computing platform excels in terms of scalability, allowing companies to add cluster nodes and memory in real-time with automatic data rebalancing. As a hardware-agnostic solution, clients can choose their preferred hardware for scaling up.

Full SQL Support

GridGain is ANSI SQL-99 compliant and the In-Memory SQL Grid supports DML users can leverage their existing SQL code using the GridGain JDBC and ODBC APIs. For users with existing code bases which are not based on SQL, they can leverage their existing code through supported APIs for Java, .NET, C++, and more.

High Availability

The GridGain in-memory computing platform provides essential high availability features such as data-center replication, automatic failover, fault tolerance, and quick recovery on an enterprise-level scale.

Transaction Processing

The GridGain in-memory computing platform supports ACID-compliant transactions in a number of user-configurable modes.

Security Features

The GridGain in-memory computing platform supports authentication, authorization, multiple encryption levels, tracing, and auditing.

Open Source Framework

GridGain is based on Apache® Ignite™, a popular open source project with many contributors that has been tested globally. GridGain Systems was the original creator of the code contributed to the Apache Software Foundation that became Apache Ignite and fully supports the technology behind Apache Ignite. The GridGain Enterprise Edition extends the features in Apache Ignite to provide enterprise-level capabilities and services, such as additional security, data center replication, auditing mechanisms, a GUI for management and monitoring, network segmentation, and a recoverable local store.

Production Support

GridGain Systems Support is available for GridGain Community Edition, GridGain Enterprise Edition and GridGain Ultimate Edition users. The Enterprise and Ultimate editions include rolling updates, faster availability of all releases and patches, and 24/7 enterprise-level support.

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TODAY'S BEST INVESTMENT FOR ASSET AND WEALTH MANAGERS

As the field of asset and wealth management widens to include both traditional and non-traditional investment-services pro-viders, more and more providers are competing to attract today's young, tech savvy investors. In this environment, providing state-of-the-art 24/7 services at real-time speeds is a must, and providers must up their game with greater transactional speed and analytic power to beat the competition.

Fortunately, in-memory computing solutions provide the level of performance that asset and wealth management companies need. GridGain's in-memory computing platform provides asset and wealth management services with the performance, scale, and flexible interoperability that they require to distinguish themselves in a competitive market. Data Grid improves the speed and scale required to provide ACID-compliant transactions in an always-on individualized investment environment. Sophisticated streaming data capabilities allow for the integration of market and news feeds with portfolio information. Com-pute Grid provides parallel processing capabilities to run analytics and other business processes in real time. SQL Grid allows companies to connect the GridGain In-Memory Data Computing Platform to other systems for the analytics and reporting required for regulatory compliance.

Combining an open source framework with enterprise-level features, the GridGain in-memory computing platform offers a high-performance, scalable, comprehensive, secure, and affordable solution—an elegant and efficient way to give investment providers, and the investors they serve, the high-performance edge they need.

Contact GridGain Systems

To learn more about how GridGain can help your business, please email our sales team at sales@gridgain.com, call us at +1 (650) 241-2281 (US) or +44 (0)208 610 0666 (Europe), or complete our contact form at www.gridgain.com/contact and we will contact you.

About GridGain Systems

GridGain Systems is revolutionizing real-time data access and processing with the GridGain in-memory computing platform built on Apache® Ignite™. GridGain and Apache Ignite are used by tens of thousands of global enterprises in financial services, fintech, software, e-commerce, retail, online business services, healthcare, telecom and other major sectors, with a client list that includes ING, Raymond James, American Express, Societe Generale, Finastra, IHS Markit, ServiceNow, Marketo, RingCentral, American Airlines, Agilent, and UnitedHealthcare. GridGain delivers unprecedented speed and massive scalability to both legacy and greenfield applications. Deployed on a distributed cluster of commodity servers, GridGain software can reside between the application and data layers (RDBMS, NoSQL and Apache® Hadoop®), requiring no rip-and-replace of the existing databases, or it can be deployed as an in-memory transactional SQL database. GridGain is the most comprehensive in-memory computing platform for high-volume ACID transactions, real-time analytics, web-scale applications, continuous learning and hybrid transactional/analytical processing (HTAP). For more information on GridGain products and services, visit www.gridgain.com.