

Operational Intelligence: The Next Generation of Business Intelligence

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Operational intelligence discovers actionable insights in live data, before the moment is lost.

HIGHLIGHTS

- Traditional techniques for business intelligence help analysts make strategic decisions.
- Business intelligence cannot provide immediate feedback within live systems.
- Operational intelligence has the potential to transform live systems in many applications and offer an important, new competitive edge for businesses.
- Enabled by in-memory computing technology, operational intelligence tracks the behavior of live systems to capture perishable business opportunities.

INTRODUCTION

For years, companies have relied on business intelligence tools to drive strategy and identify opportunities based on historical data. Big data technologies have amplified the power of business intelligence by enabling petabyte data sets to be analyzed in minutes or hours. However, in today's fast-paced, data-driven economy, traditional business intelligence still moves too slowly. With the emergence of the Internet of Things and the demand for greater customer personalization, companies increasingly need to quickly make sense of their data as it changes and take immediate action.

These companies are turning to operational intelligence — the ability to analyze live data and provide immediate feedback — to take business intelligence to the next level and create new opportunities. Operational intelligence uses the power of in-memory computing technology to track fast-changing data streams within live systems, enrich them with historical data, and analyze them in parallel. It then provides actionable feedback that identifies opportunities and steers



behavior. The benefits of operational intelligence are far-reaching and applicable to a wide range of industries, including manufacturing, cable, and retail.

After exploring some of the key differences between operational intelligence and business intelligence, this white paper looks at several applications that can benefit from operational intelligence and illustrates its compelling benefits. It then examines how exciting advances in in-memory computing provide the breakthrough technology needed to implement operational intelligence.

THE NEED FOR OPERATIONAL INTELLIGENCE

Business intelligence has proven its value in helping companies analyze large volumes of business data and guide strategic decision making. Traditionally hosted in the data warehouse, today's business intelligence solutions now employ big data techniques to speed

up analysis of huge, offline datasets. Because data reporting and the resulting strategic initiatives can take days to complete, business intelligence cannot respond to opportunities or challenges that emerge on a minute-by-minute basis. That need is now being filled by operational intelligence.

Unlike business intelligence, operational intelligence seeks to discover immediate, actionable insights within live systems and generate personalized, contextual insights that capture perishable business opportunities before the moment is lost. While business intelligence provides strategic guidance from the data warehouse, operational intelligence acts on the front lines, helping to add value and improve competitiveness on a second-by-second basis.

Operational intelligence tracks the behavior of live systems by integrating streaming data with an evolving model of the live system combined with historical information. It uses in-memory computing technology to

OPERATIONAL INTELLIGENCE

- Real-time
- Live data sets
- Gigabytes to terabytes
- In-memory storage
- Sub-seconds to seconds

Best uses:

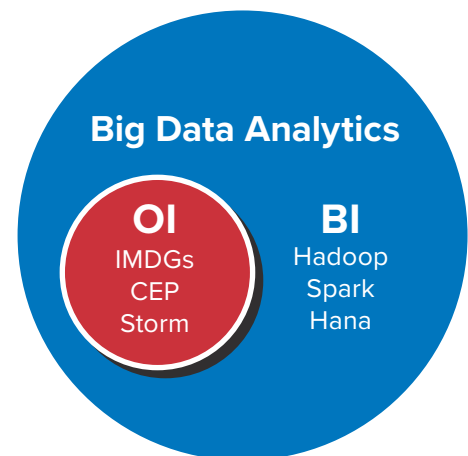
- Track live data
- Immediately identify trends and capture opportunities
- Provide immediate feedback

BUSINESS INTELLIGENCE

- Batch
- Static data sets
- Petabytes to exabytes
- Disk-based storage
- Minutes to hours

Best uses:

- Analyze warehoused data
- Mine for long term trends



IMDG: In-Memory Data Grid
CEP: Complex Event Processing



capture incoming events and run continuous, data-parallel analysis with extremely low latency. As a result, it can target short-lived business opportunities.

Operational intelligence is often confused with “real-time analytics,” which refers to fast, interactive analysis of static, offline data (typically, huge, historical datasets). Accelerating the analysis of large datasets helps improve the timeliness of business intelligence. However, real-time analytics is still designed for consumption by human analysts who make decisions over the course of minutes or longer. Unlike real-time analytics, operational intelligence provides immediate feedback to a live system without a human in the loop so that opportunities can be captured in the moment.

SOME APPLICATIONS OF OPERATIONAL INTELLIGENCE

Operational intelligence creates exciting opportunities for influencing the behavior of live systems in diverse industries. Here are a few examples.



E-commerce Recommendations and Metrics Tracking

Operational intelligence can dramatically enhance the customer experience on e-commerce websites by enabling context-aware recommendations for shoppers. Personalized recommendations have proven to be highly effective for cross-sell and upsell opportunities. However, conventional approaches have been limited to using offline, data science techniques, such as market segmentation, to create static, pre-computed recommendations which do not take into account an individual shopper’s current browsing activity. Using operational intelligence, e-commerce sites instantly can combine each customer’s specific shopping history, brand preferences, and pre-computed recommendations with current browsing activity to generate highly relevant, context-aware recommendations. The result is a more effective

shopping experience for the customer and a higher conversion rate for the e-commerce site.

Operational intelligence also enables e-commerce site managers to track real-time metrics, such as which promotions have the highest conversion rates and how many shoppers currently on the site are loyal return visitors. By measuring the success of marketing campaigns and promotional offers in real time, these managers can make immediate changes to their merchandising strategies and campaigns, lock-in incremental revenue, and gain a leg-up on their competition.



Brick-and-Mortar Retailers

Over the past several years, e-commerce’s unique combination of convenience and personalization

has enabled it to cut into the market share of traditional, brick-and-mortar retailers. Based on their knowledge of consumer shopping habits and browsing history, e-commerce retailers like Amazon and eBay are able to make personalized offers and display ads, giving them a huge advantage over the traditional, in-store shopping experience. Online sales are expected to reach \$523 billion by 2020 in the U.S. alone (source: [Internet Retailer](#)).

However, advances in operational intelligence should help turn the tide for brick-and-mortar retailers. By combining operational intelligence with mobile technologies such as i-beacons, in-store retailers now have the tools they need to compete with e-commerce and create a compelling shopping experience. For example, opt-in customers can share their in-store locations with the retailer, who can combine this information with demographics, brand preferences, shopping history, and current offers to assist sales associates in making context-aware recommendations that match the customer’s immediate needs.

Moreover, brick-and-mortar stores now are adopting the use of radio frequency identification (RFID) tags to



identify every item of merchandise in a store and using the information as part of their operational intelligence. Similar to bar codes, RFID tags identify inventory with high efficiency, enabling stores to track which items customers are examining. This allows sales associates to keep the correct sizes on the retail floor and suggest complementary products. It also reduces the stock that needs to be kept on hand and lowers inventory costs.



Financial Services

Financial Services have long been on the cutting edge of data management technologies. Operational intelligence's ability to react with sub-second latency enables fund managers to react more quickly to changing market dynamics and capture opportunities that otherwise would be missed. In-memory computing technology running on commodity servers allows operational intelligence to provide an important complement to the more exotic techniques and special purpose hardware used by sub-microsecond algorithmic trading.

For example, consider a hedge fund which maintains thousands of hedging portfolios in various industry verticals, such as automotive, health care, real estate, and high-tech, and must maintain a balance between long and short positions within each portfolio. In comparison to traditional, database-centric techniques which require several minutes to evaluate market price changes and post trades, in-memory computing provides the operational intelligence to complete these actions in under a second. This minimizes risk and allows the hedge fund to respond much more quickly to market fluctuations.

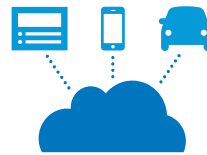


Manufacturing

By enabling manufacturers to track telemetry from machines on the factory floor and react to important patterns and trends in real time, operational intelligence can ensure uninterrupted operations and lower costs. Operational intelligence can continuously compare

streams of live data with historical models, monitor performance, identify early indicators of problems, and prevent costly failure scenarios.

In the last few years, factories and plants around the world have added the technology needed to implement operational intelligence. Consider an automotive manufacturer that uses hundreds of "smart" machines which incorporate tools and sensors connected with the company's network and databases. This provides the telemetry needed to immediately identify issues and bottlenecks in the assembly line and take action with minimum delay. Operational intelligence can use this telemetry to anticipate and often avoid machine failures. This helps minimize the costs of repair and downtime, as well as a range of associated inefficiencies that can reverberate throughout the business.



Internet of Things (IoT)

Networks of smart machines on a manufacturing floor represent just one example of "the Internet of Things" (IoT). Many IoT applications are quickly gaining widespread use as devices become increasingly intelligent and interconnected. Whether they are thermostats in an office building, wireless towers managed by a telco, a fleet of rental cars, or an array of solar power generators, these devices generate streams of telemetry that need to be tracked and analyzed in real time. Operational intelligence enables large numbers of devices to be simultaneously analyzed so that alerts and feedback can be generated with consistently low latency and maximum effectiveness.



Cable Television

Although the explosion of Netflix, HBO GO, and other "over the top" entertainment channels has given cable viewers more content options than ever before, this abundance of choices makes decision-making daunting for many viewers. Using operational



intelligence, cable providers can track their customers' program selections, combine this information with historical data and preferences, and make intelligent recommendations in the moment —while the viewer is active. This allows providers to up-sell with appropriate context-aware offers. For example, cable providers can alert viewers to similar, upcoming movies and shows that fit their personal preferences. They also can more easily identify and address issues with cable boxes before a disruption occurs.

Operational intelligence also enables cable providers to track network behavior, such as bandwidth consumption, and make immediate adjustments that re balance the networking load according to quality of service requirements for each customer. For example, regional events, such as a soccer match or concert, can create hot spots in the cable network. Cable providers are evaluating the use of operational intelligence to handle these transient situations in real time.



Healthcare

Operational intelligence can provide important benefits in real-time patient monitoring. Large populations of patients wear medical devices, such as pacemakers, which stream telemetry that can be analyzed to detect anomalies and alert medical personnel. With operational intelligence, this telemetry can be tracked, combined with specific knowledge of each patient's treatment plan, and immediately analyzed to detect alertable conditions. This enhances patient outcomes and guards against unexpected medical events.

ENABLING OPERATIONAL INTELLIGENCE WITH IN-MEMORY COMPUTING

Recent advancements in in-memory computing technology have provided the important breakthrough needed for operational intelligence. In-memory computing eliminates the real-time bottlenecks inherent in the techniques used for business intelligence, and it

enables feedback to be generated within milliseconds or seconds. For example, it avoids the overheads of disk-based data storage and batch scheduling so that live data can be tracked and analyzed with much lower latency. Unlike pure streaming and event-processing systems, in-memory computing uses memory-based data storage to build and maintain a comprehensive picture of data sources enriched with historical information. This allows operational intelligence to provide deeper introspection on the behavior of a live system and more effective feedback. Moreover, in-memory computing incorporates high-availability techniques that ensure uninterrupted processing vital to live, mission-critical environments.

All of the applications for operational intelligence examined above share the common requirement to track and analyze large numbers of data sources with consistently low latency. In-memory computing combines the power of multiple servers into a single computational cluster that scales on demand. This ensures fast processing time even under very large workloads. It also provides a flexible software platform that can host application-specific operational intelligence algorithms in a wide variety of applications.

Please see the whitepaper, "*In-Memory Computing: A Key Enabler of Operational Intelligence*" for an in-depth look at the technical concepts behind in-memory computing.

IN SUMMARY

Live systems require the next generation of business intelligence — operational intelligence — to capture perishable opportunities before the moment is lost. By instantly tracking and analyzing data and then generating feedback to steer behavior, operational intelligence extracts value from these systems that otherwise would be missed. While business intelligence provides strategic guidance, operational intelligence enables live systems to react to second-by-second changes, providing context-aware recommendations and alerts. Whether



suggesting a new product, rebalancing a hedge fund, or looking for an impending machine failure, operational intelligence adds exciting new value that can generate significant ROI.

In-memory computing technology enables operational intelligence by providing a scalable and highly available platform for simultaneously tracking and analyzing events from many data sources and then providing feedback within milliseconds or seconds. This technology provides an ideal platform for hosting the

business logic required to generate real-time insights. In-memory computing extends traditional business intelligence beyond the data warehouse to realize the full potential of operational intelligence for today's real-time applications.

ABOUT THE AUTHORS



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ABOUT SCALEOUT SOFTWARE

ScaleOut Software develops and licenses leading-edge software that delivers scalable, highly-available in-memory computing technology to a wide range of industries. ScaleOut Software's in-memory computing platform enables operational intelligence by storing, updating, and analyzing fast-changing data, so that businesses can capture perishable opportunities, before the moment is lost.

ScaleOut Software was named a "Cool Vendor" in Gartner's ["Cool Vendors in In-Memory Computing Technologies, 2015,"](#) and was profiled in Forrester's ["The Forrester Wave™: In-Memory Data Grids, Q3 2015."](#)



Cool Vendors in In-Memory Computing Technologies, 2015, Massimo Pezzini, Roxanne Edjjali, Nick Heudecker 13 April 2015 | Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings or other designation. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.