BIG IRON MEETS BIG DATA

Create new business value by merging transactions and new data with big data analytics

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About the author

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New opportunities from a goldmine of data

Mainframe transaction systems have supported your core business for years. You've built them around your core competencies, creating a competitive advantage by differentiating how you conduct business from your peers. You may not realize it but your big iron now contains a goldmine of historical, contextual and high-value business data.

Now big data has arrived fast and furiously—volumes and volumes of new data from a complex variety of sources that is created and updated at instantaneous speeds. Imagine what insights you could glean if you could gain insights into your valuable transaction data and also combine it with all this new data in motion and make sense of it all, in real-time.

Big data analytics is the key to deriving the maximum value from fast big data and transactions. Those who embrace this new capability can gain new insights and make better decisions by processing and enriching an immense volume of structured and unstructured data.

How much has your organization embraced big data? Have you looked beyond the walls of your enterprise for new data sources that could transform how you operate your business? What will be the impact on your business's future if you delay taking advantage of the opportunities created from the big data evolution?

Big data is one of the major forces affecting the IT industry today. Don't ignore it. Start exploring how you can increase the business value of your high-value transaction data with new data sources and big data analytics. Learn how Software AG can help you close the gap between your big iron and big data to meet business demands faster, make real-time decisions and create more valuable products and services.

"Big data is high-volume, -velocity and -variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision-making."

— **Gartner IT Glossary**
www.gartner.com/it-glossary/big-data

The big data evolution

Only a few years ago, we considered data big when a database reached the size of gigabytes or terabytes. Now we talk about petabytes, exabytes and zettabytes while also recognizing that database size no longer provides a proper context for describing big data.

Commonly referred to as the 3Vs (Velocity, Variety and Volume), the characteristics of data assets and the innovative technologies that have emerged to harness, process and analyze that data into something meaningful and valuable is now commonly referred to as big data.

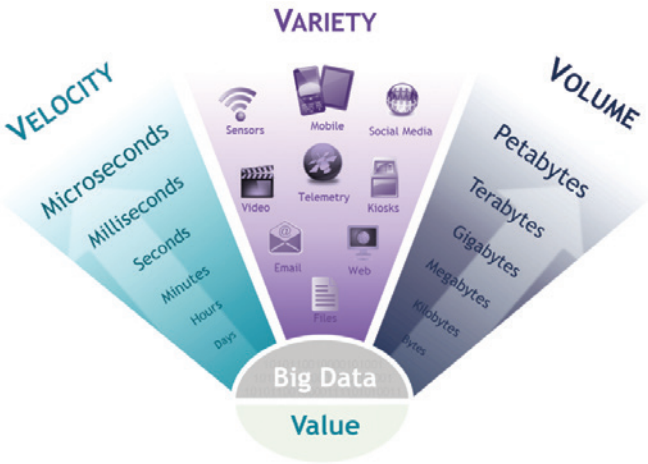

Figure 1: Big opportunities exist to drive big value from big data.

"Big data streaming analytics is software that can filter, aggregate, enrich, and analyze a high throughput of data from multiple disparate live data sources and in any data format to identify simple and complex patterns to visualize business in real-time, detect urgent situations, and automate immediate actions."

— **The Forrester Wave™** | Big Data Streaming Analytics Platforms, Q3 2014, Forrester Research, Inc., July 17, 2014

The **volume** of data growth has been extraordinary. In 2003, five exabytes of data creation took 1,000 years. In 2011, it only took two years. Right now, five exabytes of data creation takes only 10 minutes.

We can thank the **variety** of data sources now available for all this information. From the ubiquity of mobile—with 6 billion subscribers—to the explosion of social media—1.5 billion users with 96 percent of companies planning to increase social media investments—data now comes in a multitude of data formats, including text, document, image, video and more.

Digital businesses are also embracing the Internet of Things (IoT)—everyday objects and devices connected to the Internet—to usher in automation in nearly all fields. Sensors and embedded devices now collect real-time information like monitoring the speed of a train or elevator to tracking movement goods or habits of individuals. It is estimated that IoT will add nearly 2 trillion dollars in economic value by 2020. All this variety and detail contribute to the huge **volume** of data available today.

Big data storage platforms have emerged to seize on the opportunity to store this immense volume of structured and unstructured data more cheaply by distributing data across clusters of low-cost servers. Apache Hadoop® is an open-source software project that is the primary big data technology platform commercialized by vendors. Also NoSQL (non-relational, distributed, open-source and horizontally scalable) databases are emerging to persistently store massive volumes of data.

While these big data storage platforms handle large volumes and variety of data, they cannot address the velocity of big data. The **velocity** at which data is created, moves and changes is driven by the confluence of advances in technology, ubiquity of devices such as mobile, and the habits of consumers. Being able to make decisions quickly on a stream of perishable information is where big data analytics comes into play.

Big data analytics is Software AG's strength. It's how we ensure "Big Iron meets Big Data" to create real value for your business.

The opportunities of big data analytics

Big data analytics opens new opportunities to greatly increase the value of big iron's transactional data. Most Adabas-Natural systems on mainframe or Linux®, UNIX® and Window® (LUW) already contain high-value data and conduct mission-critical transaction processes. By leveraging big data analytics, you can monitor fast-moving operational data from multiple sources, detect patterns and take action to immediately optimize performance, protect sensitive information and prevent fraud. Blending this valuable transactional data with new data sources and big data analytics, you can increase the business value of your core data exponentially and provide actionable intelligence from data that is always changing.

The value in big iron

Consider the value of the data in your transaction systems. Beyond storing the basics, such as customer name and address, you likely have stored a long history—more than five years—of customer transactions, product information, log data and processes.

Logistics companies may have years of details about shipping vessel or vehicle capacity, routes, loading and unloading locations, suppliers, merchants and warehouse locations. Banks may track customer payments, loans, accounts, credit cards or stock transactions with records of people who have bought and sold. Manufacturing companies likely keep historical data on machines, material lots, workers and production parameters, such as temperature.

From that history, you can determine patterns and benchmarks—contextual data—that is very valuable when you correlate that data with new data sources and real-time data analytics. A utility company, for example, will likely know every customer's usage patterns based on his history of utility use and billing. It will also know from experience when a data pattern looks like fraud or theft; from that, benchmarks can be created to prevent future occurrences of fraud.

In addition to the valuable business data stored in transactional databases, log files are another source of useful database event information. Log files contain important information about how, when and by whom data is accessed or changed. Big data analytics collects and analyzes log files, providing added-value services in the area of data security and audits to derive intelligent actions and alerts in real-time.

You may have a lot of data in your transaction systems but remember that the real value in your existing data is how you experience it. Are you getting everything you can from that valuable data?

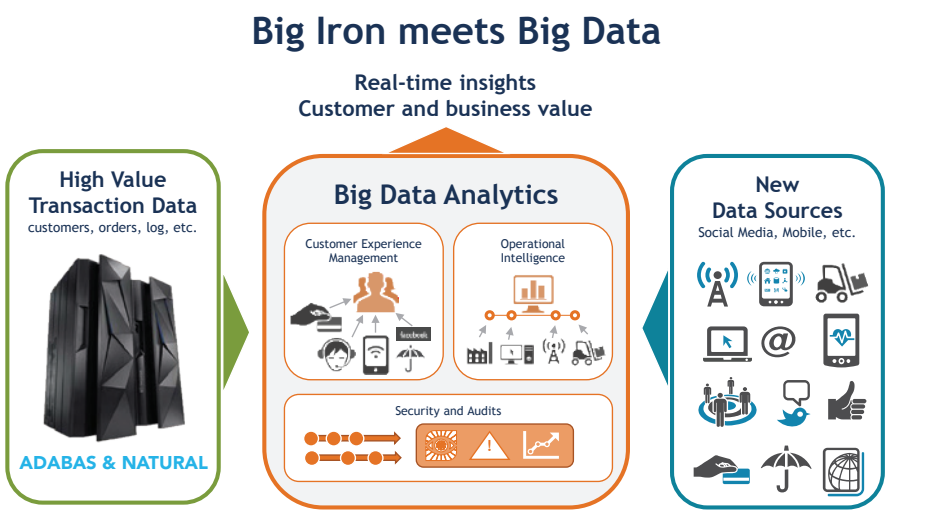

Figure 2: Increase the business value of your data by merging transaction data with new big data sources and analytics when Big Iron meets Big Data.

Customer experience management
Imagine being able to create personalized offers for your customers "on the fly." Do you know where a consumer of your product or services spends his vacation? What are his shopping habits? If you interact with him on social media such as Facebook or Twitter®, you could draw a conclusion about what appeals to him most. Now combine that with insights from analyzing this individual's past transactions, service requests or call center interactions—stored on your ERP and CRM systems—to create a tailored offering. Now deliver that offering right to his mobile phone as he walks into your retail store. This approach to managing the customer experience—gaining you a 360-degree customer view —will help you deliver products, services or offers tailored specifically for an individual customer in seconds.

Operational intelligence
Imagine having better operational intelligence to make decisions and immediately act on analytic insights. If you are a utility company, wouldn't it be valuable to have the latest weather conditions and forecasts geographically defined to proactively plan for capacity needs or staging repair crews? Once your logistics operations kick in, whether it is repair trucks on the way or shipping products, imagine how tapping into local Twitter feeds about traffic conditions could help you re-route and stay on schedule.

Visibility into your business processes can help you optimize your supply chain like never before. Automatically connect critical upstream and downstream processes, seamlessly pulling data from disparate silos and showing how each distinct part affects your overall business. You can measure real-time events against target key performance indicators providing actionable information that lets you perform root-cause analyses throughout the supply chain. With your new insights, you can implement new rules and workflows to optimize your supply chain, saving your organization time and money.

Security and audit
What if you could stop fraud before it happens? Monitor all of your data streams through automation—real-time incoming alerts from smart meters, database events and log data, inconsistencies between consumption and billing, changes in consumption patterns compared to historical levels and processes associated with investigating questionable service and security levels. Then, by integrating these multiple streams in a way that allows real-time comparison and benchmarking, you provide your employees the tools to identify fraud sooner, protecting your infrastructure as well as your revenue.

Big iron meets big data
This is what merging historical transaction data with new data and applying big data analytics looks like. Insights you can gain from a variety of sources outside of your company about the habits, needs and wants of your customers, partners and business combined with real-time access to contextual data—historical usage rates, benchmarks for known fraudulent patterns—and you will have a competitive advantage.

Big data analytics can help you manage the customer experience, increase operational/supply chain efficiency, and provide greater security and audit detail. The value of big data comes from leveraging information from outside of your company. From the IoT to social media, there is so much information available to complement your core transaction information, especially when it comes to your customers and operations.

Make your vision reality

It's time to think differently about how you approach the opportunities and risks of doing business today. The velocity at which data flows from a vast variety of data sources contains valuable insights that must be detected and acted upon immediately.

With Software AG's big data analytics solution, shown in Figure 3, you can correlate, aggregate, filter and query large volumes of fast-moving data from multiple sources to make intelligent decisions with real-time visualization. Through streaming analytics, you can enrich real-time events, detect patterns and derive context to improve decision-making. Combine all that with an in-memory data management architecture that provides scalability and high availability with extremely low latency, you have the tools you need to take advantage of all that big iron and big data have to offer.

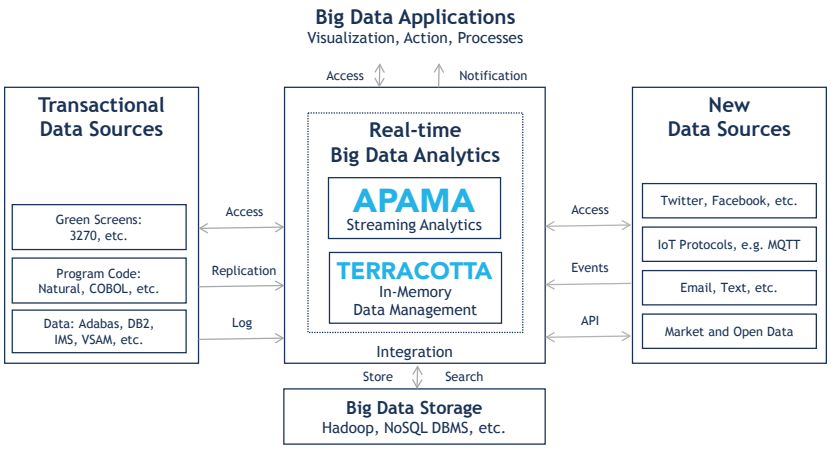

Figure 3: Big data analytics from Software AG bridges the gap between big iron and big data.

Streaming analytics
Software AG's Apama Streaming Analytics Platform helps you to analyze and respond to high-volume transactions and customer interactions as they happen. By correlating, aggregating and detecting patterns across fast-moving data from multiple sources, Apama enables you to put real-time data in context and analyze current events. It gives you intelligence on data in motion.

Unlike traditional approaches to event processing, streaming analytics does not store data or indexes, thus giving it a simpler and more efficient architecture that is suited to event processing of big data in motion. Apama's use of LLVM to compile highly optimized machine code means it can execute complex operations faster than C or Java® to ensure microsecond response times remain consistent even as data volumes grow.

Using a hybrid buy-and-build approach with rich out-of-the-box capabilities and open development tooling, Apama lets you focus on building differentiated solutions without having to start from scratch. Apama is being used for smart order routing, auto-hedging, pricing, cash flow risk management, customer experience management, fraud detection, foreign exchange ecommerce, market surveillance & monitoring, multi-tier supplier control, omni-channel fulfillment, order performance optimization, real-time personalization and supply chain visibility.

In-memory data management
In-memory data management, provided by Software AG's Terracotta In-Memory Data Management Platform, provides you with ultra-fast, predictable access to hundreds of terabytes of data from your core applications, Hadoop, social, real-time, enterprise, Web, mobile and other sources. Because the data your users need isn't buried deep in a database but stored in-memory, it is instantly retrievable by multiple users from multiple apps. This feature alone can help big iron users speed up Web and mobile applications and improve application responsiveness.

Terracotta changes what applications can do by providing access to data where it's needed, when it's needed and how it's needed. It uniquely does this by providing:

- More than five petabytes of data managed in memory
- Unlimited scale out with Enterprise Ehcache (now integrated in Terracotta BigMemory)
- Low 250-millisecond latency with Universal Messaging

Enterprise Ehcache, based on the de facto caching standard for Java, snaps into enterprise applications for an instant, 10x speed increase and on-demand, unlimited scale out. The ability scale out with just two lines of configuration—not a full application rewrite—makes scalability available to mainstream developers and ensures Terracotta provides a low TCO.

Apama

- Earned the prestigious Sell-Side Technology award for the second year running
- More than 150 deployments worldwide
- First-year ROI more than 200 percent

Terracotta

- Leading in-memory data management platform
- Deployed by 80% of the Global 1000
- More than 2.5 million enterprise deployments in 190+ countries
- Used by 2.1 million developers
- 2012 DataWeek Award for Top Innovator in the "Big Data Technology" category

Because RAM can be distributed across any size server array with Terracotta BigMemory, it's not unthinkable to store massive datasets of upwards of five petabytes for instant access.

Since time is money, Terracotta ensures that latency—as low as 250 milliseconds—is predictable with universal messaging. Ensuring low-latency messaging across a wide array of delivery channels, including all mainstream enterprise, Web and mobile platforms can make the difference between whether you meet your SLAs or not. No matter how big your big data source gets, you will always have predictable low latency with Software AG's in-memory data management platform.

Data visualization
Software AG's self-service, real-time data visualization and exploration tool combines data from different live information sources to create dashboards that can be displayed on any device. With it, you can combine your transaction data with new data from any source—data warehouses, big data platforms, news feeds, social media, Business Intelligence (BI) systems, streaming data and even Microsoft® Excel® spreadsheets—to create real-time mashups on a dashboard to get a new perspective and make better decisions. Data visualization in real-time lets you stay on top of constantly changing business data.

Proactive alerts and intelligent action
You can also be proactive by setting up automatic alerts—based upon what has happened or what is about to happen—delivered through a console, email, SMS or integration with other applications. This enables you to respond rapidly to real-time insights with automated intelligent actions.

Mainframe integration

Your transactional data is an integral part of the big data evolution. Without the mission-critical information from your ERP, CRM and other OLTP systems, big data analytics would be incomplete. Your high-value transactional data stored on the mainframe can participate in fast, big data for immediate processing and analytics. The products are available today to make participation in a big data environment a reality. Connecting with the best big data and big data analytic platforms (e.g., Hadoop, Terracotta, Presto, Apama) is straightforward.

Now that you can envision the opportunities that big data offer, let's explore how easy it is make your core application information and functions available to big data analytic platforms. Typically, as shown in Figure 3, mission-critical core applications can communicate via one of four access areas:

- Screen
- Code (business logic)
- Data
- Log
- Screen access

Communicating directly with terminal screens (e.g., 3270), user interface access, is a good approach when the information or transactions needed by the big data analytics platform already exist in a core application display. Using webMethods mainframe integration technologies (e.g., ApplinX), you can expose the core application-screen functions and data as services. This non-invasive approach to bringing core applications to big data analytics has no impact on the core application itself as it requires no code understanding and no changes or additions to the code.

Software AG's approach to mainframe integration is uniquely:

- Non-invasive
- Keeps OLTP stable
- Requires no overhead in production

Code access
When you need to deliver complex business logic functions to your big data platform, accessing the code (business logic) is your most optimal approach. With webMethods mainframe integration technologies (e.g., EntireX), developers can quickly and easily generate services (e.g., Microsoft®.NET, Java®, REST or SOAP) from a number of different programming environments (e.g., Natural, COBOL, C, PL/1, RPG, IBM® Assembler) and make them available for use.

webMethods uniquely combines message-queuing capabilities with built-in support for synchronous request/reply and conversational communication. This true bi-directional service wrapping capability allows big data applications to access and update information in the core application and database. This level of access is ideal for managing interactions for tightly coupled, time-critical user applications.

Data access
Data access is ideal for pushing or pulling data in real-time to big data analytic apps and dashboards. If you wish to push data from your core application databases to a dashboard, look at replication as an option. Replication proactively transforms and delivers select Adabas data based on pre-defined "subscriptions" to big data platforms in real-time.

webMethods opens up many mainframe database environments (e.g., Adabas, DB2®, VSAM, IMS™) to share information with big data platforms by using standard SQL to pull and/or update non-relational and relational databases. Using this technology, a single SQL request made from a big data analytics tool can simultaneously access (or pull) data across any number of databases.

Log data
To ensure security and create audit trails, log data is collected and monitored in real-time. webMethods or other transport mechanism pulls the log data from the source and places log data records and events for streaming analytics purposes into Apama. These streams of events are evaluated (correlated) against a unique, multi-dimensional filtering mechanism that quickly sifts through multiple event data streams, detects sought after patterns and identifies appropriate responses—within milliseconds or less. You can visualize data in real-time with dashboards and be alerted proactively to unusual behaviors or events. Statistical data is cached to preserve many audit trails.

Conclusion

Imagine the possibilities of merging your high-value transaction systems with new big data platforms. You could provide your lines of business with a self-service means to aggregate information into personalized dashboards that can be securely shared across the organization, as shown in Figure 4. This would allow users to:

- Make better, more efficient decisions
- Provide more value to your customers with personalized offers and differentiated services
- Create a unified picture of what is happening in your organization and the world around you
- Leverage your core transactions system data without disrupting processing
- Increase productivity by enhancing the user experience and supporting organizational collaboration
- Detect security breaches on sensitive data and identify fraud proactively
- Provide audit trails relating events from multiple sources
- Gain more transparency into geographically dispersed database operations
- Connect historical and current data for intelligent actions based on what's happened, what is happening and what's about to happen

Figure 4: Provide new analytical solutions for your business.

We're not talking about replacing current applications, just about adding new data and new analytics to increase the business value of your data. The big data evolution does not negate the continued need and value of your transaction systems—it adds value to what you already have.

If you think having a data warehouse meets your needs, you are mistaken. Data warehouses process data from your transactional systems and other systems, but remember it can only take what exists inside the enterprise. On the other hand, don't believe that just moving your transaction data to a big data storage platform, such as Hadoop, is the answer. Big data platforms can only provide you batch processes. Keep your data where it is. Collect new data in a big data storage platform if you wish, but look to big data analytics to operationalize your data from multiple sources.

With Software AG's big data analytics and mainframe integration technologies, you now have the ability to make business decisions on real-time data from multiple sources including your transactional data in Adabas-Natural applications. Through interactive, self-service dashboards you can view real-time insights into critical aspects of the business using your mobile device, your laptop or any other platform you choose. And more importantly, you can automate intelligent actions to take place when certain criteria or thresholds occur. Embrace big data today—as one of the four forces—mobile, social, big data and cloud—that are reshaping expectations and possibilities, you cannot ignore the opportunities of the big data evolution.

Isn't it time for your big iron to meet big data?

ABOUT SOFTWARE AG

Software AG offers the world's first Digital Business Platform. Recognized as a leader by the industry's top analyst firms, Software AG helps you combine existing systems on premises and in the cloud into a single platform to optimize your business and delight your customers. With Software AG, you can rapidly build and deploy digital business applications to exploit real-time market opportunities. Get maximum value from big data, make better decisions with streaming analytics, achieve more with the Internet of Things, and respond faster to shifting regulations and threats with intelligent governance, risk and compliance. The world's top brands trust Software AG to help them rapidly innovate, differentiate and win in the digital world. Learn more at www.SoftwareAG.com.

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