Initial Steps on the Journey through Big Data for Financial Services Institutions
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Executive Overview

The increasing amount of information that is being captured by organizations has given rise to a new megatrend called Big Data. An added complexity in this trend is the co-existence of both structured and unstructured data which presents both, new business opportunities as well as competitive threats for Financial Services Institutions (FSIs). FSIs must adapt by analyzing the sources of big data by analyzing more data, addressing uncertainty in data requirements, responding to an increasing volume of unanticipated questions, and producing more analytical insights in real time. A business can achieve comprehensive analytical coverage and long-term success when all key facets of Big Data management converge onto a single, unified platform.

Big Data comes with both challenges and opportunities for the FSIs. Co-existence of structured and unstructured data is a massive concern. FSIs need to store dissimilar data resulting from a combination of both structured and unstructured data sources and yet maintain a tight relationship between the two to extract maximum value/insights. Vastly reduced storage costs have provided FSIs an opportunity to store more history than in years past and enabled FSIs to integrate data from some of the emerging/new platforms like web and social media that generate tremendous amounts of data.

A second challenge is the near linear growth in demand for computing power. Explosive growth of data, especially dissimilar data, is putting unprecedented pressure on computing resources to maintain optimum performance and produce timely and actionable insights.

However, there are also a whole slew of new opportunities resulting from Big Data and with the advancement in computing techniques, FSIs no longer need to transform unstructured data to structured data for analysis. Tools such as Hadoop and Hive have vastly decreased computing time even across very large amounts of data. Data manipulation does not need to be consolidated to optimize performance. As a result, many analytic advantages are now available for the FSI to exploit:
• **Unstructured Data analysis**: Using distributed data grids coupled with MapReduce style processing enables the FSIs to avoid transforming unstructured data to a structured format for easy analysis.

• **Dynamic information discovery vs. static analytic outputs**: Analytic requirements don’t need to be pre-defined. Big Data techniques enable data discovery or ad-hoc data analysis with better performance through-puts.

• **Real-time vs. batch**: Computing advantages and the availability of all critical data and, in theory, infinite history data enable real-time computing that offers tremendous potential in Fraud/Compliance areas.

FSIs can prepare for Big Data by taking four steps:

• Survey the analytics landscape

• Target specific problems to solve

• Study relevant use cases

• Expand capabilities with the best technology solutions

To help you maximize the Big Data opportunity, Oracle’s suite of financial services analytical applications that help FSIs acquire transactional and unstructured information, organize and analyze data, and deliver contextual information at the point of interaction. Oracle is well positioned to meet the needs of banks and other financial institutions as the advantages of the Big Data opportunity continue to grow and evolve.
Introduction

In a world that is connected everywhere and all the time, the amount of information that flows through organizations has exploded. It pours in from transactions, sensors and a rich mix of day-to-day communications as companies track what we do, what we say and how we feel, all in an effort to understand customers and their needs better and enrich the overall experience. The trend is Big Data, and it has serious implications for how Financial Services Institutions (FSIs) will do business in the future.

These new mountains of information present new business opportunities and serious competitive threats. Still smarting from the Financial Crisis, FSIs are finding that Big Data compounds the added scrutiny from regulators, shareholders and customers. FSIs must report on their financial performance, profitability and stability, providing a fully reconciled view of the institution that breaks down information silos between various internal organizations. At the same time, FSIs need to dig far deeper. They must track, measure and monitor almost every digital activity to uncover opportunity, surface risk and stay level with competitors.

This white paper outlines key steps you can take to start the Big Data journey. We recommend essential technology elements of a unified platform for driving analytical transformation and identify use cases for driving improvement in your business.
Why Should I Care about Big Data?

Technology has changed significantly in the last five years. The trend of digitization of information traditionally maintained as documents (examples being emails, contracts, logfiles, policies, claims), finding structure in data traditionally viewed as digital “blobs” (examples being call logs, digital audio and video, weblogs, social media generated data), along with the unprecedented rise of social networks has given rise to new information sources spewing out vast quantities of data continuously. This is the phenomenon of Big Data. Given that Financial Services is one of the most data driven industries, the opportunities afforded by this phenomenon are tremendous. Whether it is responding to regulatory pressures nimbly (cheaper/faster/better), or creating a propensity/spatial/temporal based targeted marketing campaign, there is a new set of technologies that can now be brought to bear on these opportunities.
Key Applications of Big Data in FSIs:

Analysis of Unstructured Data

Customer service logs, sales pipeline entries, and operational risk incident records contain a treasure trove of information. Until recently, aggregating enterprise level insight from these records has largely been a human exercise; analysts looking for insight painstakingly reviewed thousands of records. It was an error-prone process.

One of the sub-themes in Big Data has been the ability to analyze unstructured data (text, video, audio) at scale. Using dynamic search and indexing engines, distributed processing, natural language processing algorithms and machine learning techniques, organizations now have the ability to extract information at an alarming pace.

Companies can quickly understand and react to recurring issues across a sales pipeline or emerging customer service problems, and they can identify the root cause of related operational risk events.

Expanded Data Store

Today, almost every action by your users and systems can be tracked. Every time a customer clicks on a link, checks in to a location, starts and uses a mobile app, or walks into a branch, there is a record of the event. Until a few years ago, the costs of storing and analyzing such information was prohibitive.

One of the central themes of Big Data has been the ability to leverage low-cost hardware and the distributed processing capabilities of Hadoop. Given these advantages, massive libraries of event data can be assembled to create highly accurate profiles of customer segments and individual users. Predictive models are used to enhance the relevancy and efficiency of each customer contact and communication. These statistical models can now leverage the additional history data that is available within the data store to more accurately predict customer behavior.

Enhanced Risk/Fraud Analytics

For some time, FSIs have been able to automatically recognize fraudulent transactions and generate event-based trades in the capital markets. The world of big data allows FSIs to generate real-time reactions to a much broader range of events. News, tweets, location-based data and customer service requests all provide significant opportunities for differentiation. We now have the ability to predict fraud events and present offers on a real-time basis, which allows FSIs to gain an advantage over the competition and remain compliant with regulators.

Enriched Customer View

Customers are interacting with the brands they have a relationship in more ways than in years past. Customers who like a particular brand now follow them on their favorite social media network and are eager to interact with the brand they like. Even customers who are either indifferent or unhappy with a specific brand continue to interact with it by broadcasting their opinions to their sphere of influence. This information may extend beyond their immediate network through re-tweets or shares etc. FSIs rely on predictive models to enrich the customer experience through increased relevancy in their
communications. Customers openly share their likes and dislikes; their plans for a future vacation or plans for remodeling a kitchen, as an example. FSIs now have an opportunity to map this information with “known” information already available to them to grow their engagement with the consumers. While achieving a deeper level of customer understanding is far more rewarding, it is also more complicated than it has ever been. How can we reconcile conclusions from social media sites with actual internal transactions? How do we resolve conflicts?

Understanding, attributing and resolving customer data is certainly the holy grail of all analytics. What could be a better business model than servicing your customer’s needs before they have expressed a preference? Businesses such as LinkedIn are doing just this through data applications such as “People whom you may know.” Certain FSIs are already able to make equally robust offers to their customers. However, FSIs are still learning to integrate these various information sources to turn around relevant, actionable offers. Complex Event Processing and Stream Analytics technologies within the Big Data trend offer the ability to satisfy the promise of real-time customer interaction.

Real-time Offers and Relationship Pricing

FSIs strive to maintain loyalty by developing products that meet their customer’s financial needs; increased relevancy in their communications and offers embracing the concept of relationship pricing. To enable this, the boundary between operational tasks and decision-making tasks, which may have been clear in the past, is increasingly blurred today.

Real-time decision making (for e.g., presenting contextual offers to a customer during a transactional interaction or location-based) requires simultaneous access of data in both operational and analytical data stores. Pricing each transaction or purchase dynamically recognizing the existing relationship and the related performance is critical to optimize customer profitability.

Preparing for Big Data

Financial institutions can prepare for the Big Data opportunity by surveying the analytics landscape, targeting a specific problem to solve, studying relevant use cases and expanding capabilities with the best technology solution.

Survey the Analytics Landscape

Get familiar with emerging trends in analytics, strategies for analytical transformation, and the variety of solutions that are available to help financial services institutions deal with Big Data. In addition, you should analyze the applications your organization is already running; is there opportunity for these applications to work with Big Data tools? Analyze your department’s applications and the applications of other departments – how do they need to work together? What can be leveraged and what needs to be acquired? Evaluate vendors – ensure they have industry experience. With big data being so broad, you want a vendor who can speak to your organization’s needs.

Target a Specific Problem to Solve
Big Data is a big undertaking. Increase your chances of success by isolating a particular area to tackle first. For example, in Capital Markets, you might focus on detection of rogue trading based on transaction and accounting records. Commercial and retail banks might want to improve their loan risk analytics and profiling capabilities. In insurance organizations, anticipating customer needs can increase retention by cross-selling additional products, providing “customized” offerings and a superior customer experience. For example, a savvy insurer taking advantage of social media monitoring tools can recognize when a personal auto policy owner begins posting on social media sites about purchasing a new home. With this insight, the insurer can offer a personalized homeowner and personal auto bundled policy proactively.

Study Relevant Use Cases

Pioneering financial institutions already are experimenting with new analytical strategies, and it always helps to learn from the experience of others. Consider the case of a large multinational bank that has acquired another financial institution. During a financial crisis, the government takes a stake in the merged entity, and the bank needs to present regulators with a unified picture of its risk and finances, while reducing the reporting process from 20 days to 5 days.

The bank moves to a unified analytical platform built on common infrastructure, data models, technologies and components. This platform breaks down silos among its risk, finance, accounting and compliance functions and runs a large volume of financial processes in a fraction of the time that was previously required. At the same time, improved data architecture brings consistency between the financial close and management reporting processes, so that the bank can automate the reconciliation of outputs to the general ledger. (See more use cases on page 7.)

Expand Capabilities with the Best Technology Solution

In the era of Big Data, financial institutions must expand their analytical capabilities in four key ways:

- Analyze more data
- Address uncertainty in data requirements
- Respond to an increasing volume of unanticipated questions
- Produce more analytical insights in real time

The way to do this is to adopt a unified analytical platform and expand the toolkit of applications that allow you to acquire, organize and analyze vast amounts of structured, semi-structured and unstructured data. (See Figure 2.)
In the ideal solution, shared building blocks common to each application—such as data model, infrastructure and business intelligence layer—ensure consistency, traceability and availability across the enterprise, while at the same time providing for customer-specific configuration and expansion. (See Figure 3.) A unified platform should support analytical “intersections” to address emerging or overlapping analytical needs without extensive “re-wiring” and rebuilding of the supporting data infrastructure.

Together, the platform and applications that run on it, must meet critical requirements for:

- Robust processing
- Unstructured analysis
- Expanded event analysis
- Expanded customer view
- Real-time response

Comprehensive and best-of-breed analytical coverage of all key disciplines on a single, unified platform is essential to long-term success.
Investing ahead of the Curve

Oracle has invested ahead of the curve to help financial services institutions maximize the Big Data opportunity. Powered by a comprehensive set of technologies and engineered machines, Oracle’s suite of financial services analytical applications helps you to acquire transactional and unstructured information, organize and analyze data, and deliver contextual information at the point of interaction. (See Figure 5.)
platform. Data is consistent, traceable and available anywhere in the enterprise, and the platform is flexible enough to adapt or expand as the needs of the business change.

![Diagram](image)

Figure 5. Oracle Financial Services Analytical Applications.

**Solutions for Use Cases**

Oracle Financial Services Analytical Applications address critical needs in the areas of fraud, customer analytics, liquidity risk, regulatory capital and profitability.

**Fraud**

Checking the names of clients against those on a sanctions blacklist is a time-consuming process that delivers many false positives. Similarly, identifying fraudulent transactions among millions of legitimate ones is a daunting task with mobile banking and electronic transfers. Oracle addresses these problems within its Financial Crime & Compliance applications.

**Benefits**

- Ability to amass data from a variety of different sources, including the customer’s nationality and address, the names of family members, and whether they have travelled to or received money from countries on sanctions lists
- Real Time access to a complete view of the customer including fraudulent activity

**Customer Analytics**
A retail bank based in the United States needs a place to store information available for each prospect including structured data such as demographics and unstructured data such as information extracted from Tweets and Facebook status updates. Predictive models need to scan through this mix of information, augmented with scores such as Klout, to arrive at propensity scores. Oracle has applications to enhance customer insight.

**Benefits**

- Target online ads using location information and propensity scores to refresh ad information constantly.
- Leverage social media engines to share various bank offers with encoding that identifies the original sender.

**Liquidity Risk**

A global bank holding firm based in New York needs to provide an intra-day assessment of enterprise liquidity and trading book risk. Accurate assessment means generating millions of risk factor pat simulations and valuations. Existing applications can only provide approximations.

By deploying Oracle Financial Services Analytical Applications for Risk Management, the firm gains a better understanding and management of risk through accurate assessment, improves margins through optimized allocation of funds and enables compliance with regulatory requirements on intra-day monitoring.

**Benefits**

- Address regulatory requests in minutes instead of hours.
- Understand the impact of global events as they happen.
- Fine-tune contingency funding strategies as events unfold.

**Operational Risk**

A global capital markets firm has $1.5 trillion in assets under management and has outgrown its technology infrastructure and inefficient processes. Management is concerned that trading practices in the dealing room across the equities, bonds and foreign exchange desks could result in unexpected losses. They see the potential for insider trading and other possible rogue trader scenarios and they fear the reputational damage that could result from this kind of scandal.

The customer implements OFS Behavior Detection for Trade Surveillance, OFS Operational Risk and Compliance (Rules, Risks, Controls, and KRI monitoring), Oracle Business Intelligence and Analytic Apps, and Oracle Exadata/Database. Management can rest easy, knowing that trading activity is scrutinized by computer systems. The firm depends less on human managers in the dealing room, and tighter controls reduce the risk of trading abuses.

**Benefits**

- Confidence that trading activity is scrutinized by computer systems
- Dependence upon ‘human’ managers in the dealing room reduced
• Tighter controls substantially reduces the risks of trading abuse

Pricing Analytics

A Tier 1 U.S. property and casualty insurer located in Ohio has $14.7 billion in direct written premiums and wants to use its online sales and service channel clickstream data to reduce lost sales and increase customer satisfaction. The insurer aims to harness social media to recognize life events and anticipate sales. It also needs to jump on the telematics bandwagon to offer personalized personal and commercial auto insurance policy pricing.

Benefits

• Online quoting and customer service channels optimized to maximize new customer quoting and existing customer service
• Agents are notified when customers post about home and auto purchases; up-sales and cross-sales have increased
• Customized auto pricing introduced, accounting for granular driving characteristics such as location, speed, braking, and time-of-day driving patterns

Profitability

A Tier 1 bank based in Australia wants to address inconsistent pricing methodologies across lines of business. There is a lack of information on the complete customer relationship, customer profitability and other relevant information at the point of decision making, and the bank cannot change pricing behavior to improve margins.

Oracle provided the ability to deliver consistent pricing and capital allocation methodologies, on demand and across lines of business, providing front line managers with a view of Risk Adjusted Return. The bank gained real-time access to a complete view of the customer, including relationship profitability. It also has the ability to measure and view incremental profitability including new deal pricing in real time, resulting in greater profitable.

Benefits

• Capture a daily view of profitability and risk-adjusted performance.
• More proactively manage your business.
• Quickly assess the profitability of new products and programs.
• Run your institution based on what you know today instead of what you knew last month.

The Oracle Financial Services Analytical Applications portfolio helps you accelerate innovation while increasing performance and reliability. At the same time, you'll increase end-to-end security, shorten deployment times and experience easier management and upgrades. A low cost of ownership and reduced change management risk provide further benefits as you embark on a strategy to take advantage of the Big Data opportunity.
Why Oracle

Oracle delivers complete, open and integrated solutions to the financial services industry. With more than 11,000 people dedicated to the industry and one of the largest footprints of applications and technology in the vendor landscape, Oracle is well positioned to meet the Big Data needs of banks and other financial institutions. Our hardware and software solutions are engineered to work together—from storage and servers to virtual machine and operating system to database, middleware and applications—and we are changing the rules of the game with a comprehensive solution.

To learn more about Oracle’s approach to Big Data technology, download “Financial Services Data Management: Big Data Technology in Financial Services.”