SOLUTION BRIEF

Financial Services
Risk Management and Regulatory Compliance

Meeting the Challenges of Risk Management and Regulatory Compliance

Growing risk management and regulatory compliance pressures are driving up technology costs and complexity for financial services organizations, an issue compounded by investments in siloed point solutions to address each new regulation

One of the 2007 global financial crisis' most significant lessons was that banks' IT and data architectures were inadequate to support the broad management of financial risk.

Executive Summary

In *Principles for effective risk data aggregation and risk reporting* (BCBS-239), the Basel Committee on Banking Supervision concluded that one of the most significant lessons learned from the 2007 global financial crisis, was that banks' IT and data architectures were inadequate to support the broad management of financial risk. "Many lacked the ability to aggregate risk exposures and identify concentrations quickly and accurately at the bank group level, across business lines and between legal entities," the committee said. These failures had severe consequences for the banks themselves and to the stability of the financial system as a whole.

In response, regulators are mandating wide-ranging changes in regulatory reporting in order to better monitor and control systemic risk across the financial system. As a result, firms are facing increasing reporting and disclosure requirements from multiple pieces of regulation. Broadly speaking, given the post-2008 market dynamics and evolving regulatory environment, data integrity, real-time processing and scalability of data and analytics platforms have emerged as the top three challenges for financial service institutions trying to achieve risk management excellence and regulatory compliance.

This Solution Brief from SAP, Cloudera and Intel discusses how technology leaders in the financial services industry can simplify and streamline their current IT landscape, removing traditional siloed risk platforms, reducing operational risk elements and eliminating interdependencies.

Business Challenge: The spiraling costs of remaining compliant

Since the financial crisis there has been a huge investment from banks to address the technological inadequacies identified by the Basel Committee on Banking Supervision (BCBS). Dr. Howard Ruben, in his article Tracking the true technology cost of compliance, regulation and risk, quantifies this by first taking nine of the world's largest banks and conceptually merging them into the 'Bank of Banks'. Revenue for the Bank of Banks declined 4.1% from 2009 to 2013, whilst total technology expenses grew 10.5% over the same period; server instances grew 86.4% and storage grew 95.4%. According to Ruben, fully three-quarters of

the growth in technology expenses can be attributed to regulatory compliance.

Intel, Cloudera and SAP consider the top three technology challenges facing the financial services industry to be:

1. **Data Integrity:** Inaccuracies in data reporting can result in firms paying heavy fines and greater regulatory scrutiny. The potential for error will be greatly increased going forward given a drastic increase in the number of reportable instruments and the high level of detailed information required per transaction.
2. **Real-time:** Meanwhile firms must also exponentially expand the scope, flexibility and speed of their transaction reporting capabilities. This entails including a wider range of data fields in their transaction reports to competent authorities and on-demand analysis and reporting capabilities.
3. **Scalability:** Finally, a centralized, real-time picture of homogenized transaction, risk and finance data, with full analytic capabilities, is necessary to drive better and more efficient decisions through more timely risk management, while ensuring the flexibility to meet current and future regulatory, compliance and reporting requirements.

Three Major Regulatory Programs and their related IT Impacts

Principles for effective risk data aggregation and risk reporting (BCBS-239)

BCBS-239 is forcing institutions to review and sometimes renew their data management processes in order to strengthen and automate risk data aggregation capabilities, and push risk reporting towards near real-time.

Under this mandate, directly relevant to Risk IT and Operations, banks must be able to provide highly automated risk aggregation with minimal manual intervention, and ensure data is available by "business line, legal entity, asset type, industry, (and) region". And it must also be current and timely, with processes that support "on-demand" ad hoc requests.

From an IT perspective, BCBS-239 mandates:

- Granular data for all risk types
- Removal of manual processes, and automation of data collection
- Fast drill-down/aggregation mechanisms across all dimensions
- Integration of finance and risk data as 'single point of truth'
- Logical virtual data model to allow fast adjustments of requirements
- Automated, documented and transparent on-demand aggregation mechanism
- High performing environments (data collection, processing, analytics)

Markets in Financial Instruments Directive 2 (MiFiD II):

A cornerstone of EU financial services law, MiFiD II is designed to strengthen the transparency framework for the regulation of markets in financial instruments, including where trading in such markets takes place over the counter (OTC).

It will bring extensive new disclosure and reporting requirements of increased scope. Operators of Regulated Markets (RMs) and investment firms, including in their operation of Multilateral Trading Facility (MTFs) and Organized Trading Facility (OTFs), will need to make public, as close to real time as possible, post-trade information on a much wider range of financial instruments than before.

Investment firms will also need to include a wider range of data fields in their transaction reports to competent authorities, such as flags related to short sales, waivers and algorithmic trading. All this will require a re-design of existing systems.

But perhaps most challenging of all, under MiFiD II organizations are under new obligations to keep records relating to all services, activities and transactions, intended to result in transactions and client order services, even if the transactions or services are not concluded. This means the recording of telephone conversations, face-to-face meetings and electronic communications relating to actual or proposed transactions, as well as informing clients that conversations and communications will be recorded. These records must be provided to the client upon request and kept for five years. So merging and cohesively recording all communication mediums will enable organisations to meet the requirements of presenting a consolidated review of client interaction, potentially delivered through client portals.

This is big data on a very big scale: most specialists estimate that the amount of data that must be monitored, stored and reported could increase between 10 and 100 times as a result of MiFID II.

1. **Large and heterogeneous sets of "trade data" must be monitored and stored.** This will need to cover almost any asset, any format – including voice – from any source, regardless of existing data/business silos.
2. **Trade data must be processed and stored in a way that guarantees a complete and instantly available audit trail.** A core requirement for supervisory agencies is the ability to access trade-related data without delay for market surveillance and investigative purposes.

3. **Transactions must be monitored in near real-time** with a latency not greater than 5 seconds.

From this perspective, the most critical layer of complexity comes from the need for a near real-time monitoring of transactions, and rendering of the data without compromising on both scalability and data integrity.

Fundamental Review of the Trading Book (FRTB)

The Fundamental Review of the Trading Book (FRTB) is intended to harmonize the treatment of market risk across national jurisdictions and will generally result in higher global capital requirements, as estimated by the Basel Committee on Banking Supervision (BCBS).

To meet FRTB requirements, banks will need more data and stronger data analysis capabilities to meet new risk measurement and reporting requirements. The final standard imposes new internal and external reporting requirements, including monitoring market risk on an intraday basis and measuring market risk capital as of the end of the previous day.

For institutions that want to rely on their internal market risk models, they will now be required to use an Expected Shortfall (ES) measurement for capturing risk rather than the current Value at Risk (VaR) and Stressed VaR (SVaR) measures. Since the Expected Shortfall measure more effectively captures tail risk, this will contribute to higher capital requirements as well as result in expanded data requirements, computational capacity and operational complexities.

Banks that want to continue to use internal models face stricter regulatory scrutiny with the models being subject to regulatory approval at the trading desk level, for example, verification of model accuracy through P&L attribution testing and back-testing using daily model results. These new requirements will probably necessitate substantial data and technology infrastructure upgrading for most firms. And even when they have achieved regulatory approval for internal model usage, firms are still required to report risk capital under both the preferred Standard Approach as well as their internal model-based approach, and report their key modeling assumptions to regulators to facilitate a better understanding of the variations between the two.

The BCBS is requiring adoption of FRTB by each jurisdiction before January 2019 and compliance monitoring to begin by December 2019.

Key technology requirements for meeting these challenges

Given the expansion of data archiving and monitoring obligations impacting most market participants, the implementation of a truly scalable system in terms of storage, performance and cost is inevitable.

For global players of the capital markets, traditional data storage and processing technology just cannot cope with the upcoming regulatory landscape, as they are limited in scalability, granularity and by their exponential cost.

As such, key requirements for an effective platform include:

- **Performance:** The platform must deliver significant performance gains from data consumption to accelerated queries and analytic processing.
- **Scalability:** The platform must linearly scale to ensure consistent user performance as data volumes, the complexity of calculations and the number of users grow.
- **Agility:** The platform must provide the ability to do “on-demand” analysis from transaction level to ensure that banks can meet future analysis and reporting requirements.
- **Simplification:** The platform must be able to store all critical risk, finance and regulatory data within a single in-memory platform, eliminating the costly need for creating and maintaining aggregate tables, and data replication, while simultaneously reducing operational complexity to improve data lineage and trust.

Solution Architecture: Data and analytics platform from SAP, Cloudera and Intel

Based on these requirements for a centralized data and analytics platform, SAP*, Cloudera* and Intel propose a solution architecture based on combined technology from each.

- SAP HANA is an In-Memory Analytics Platform that provides a high performance “on-demand” analysis capability. It delivers against key regulatory requirements for data aggregation by providing a high performance, linearly scalable, agile and simplified platform.
- SAP HANA Vora correlates Cloudera Enterprise and SAP HANA data for instant insight, through the organisation of massive volumes of structured and unstructured data enabling analysis across disparate Hadoop* and

enterprise systems thereby supporting specific end-user requirements.

- **Business analysts** can perform root cause analysis using interactive queries across both business and Hadoop data to better understand business context.
- **Data scientists** can discover patterns by trying new modeling techniques with a combination of business and Hadoop data, all without duplicating data copies within data lakes.
- **Software developers** can deploy a query engine within applications that can span enterprise and Hadoop systems using familiar programming tools.

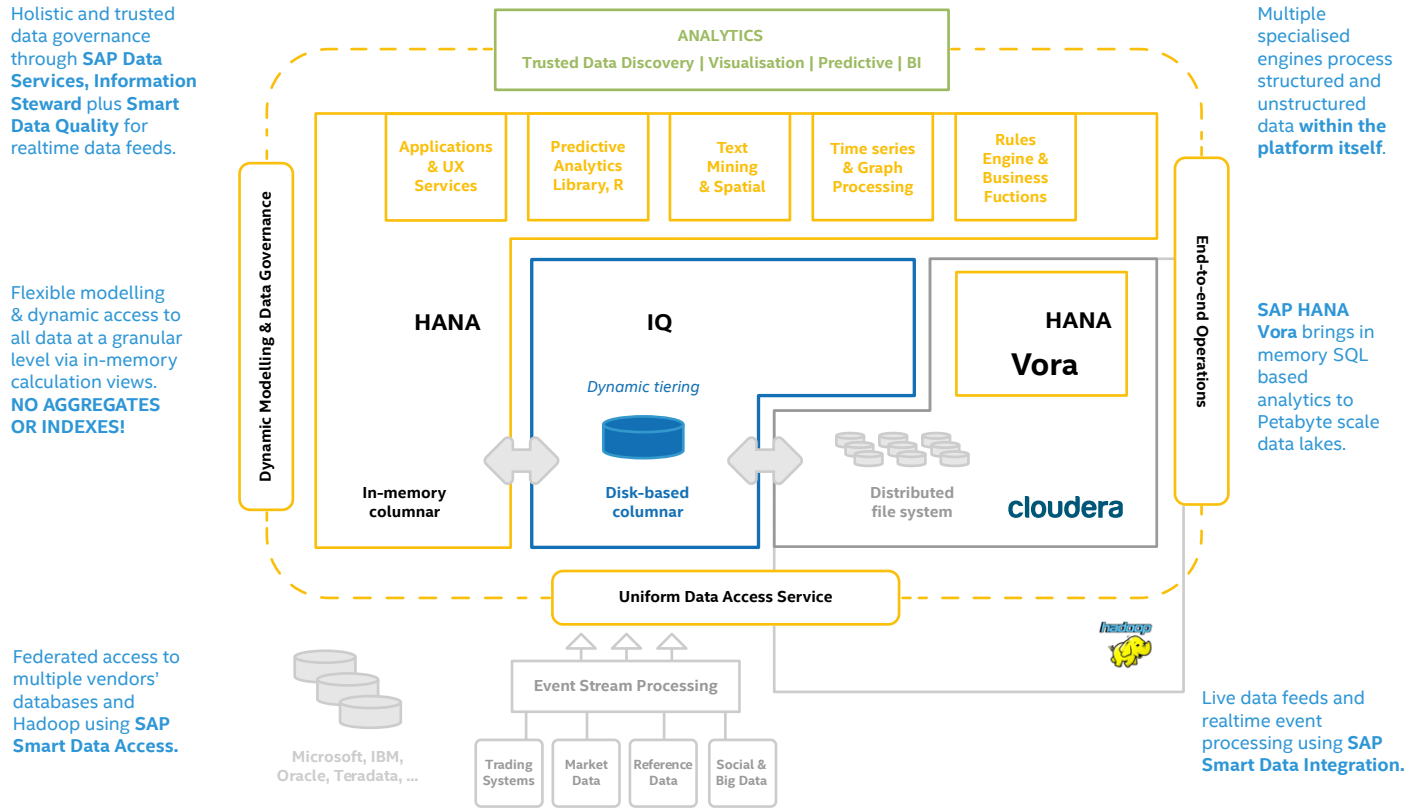
- Cloudera Enterprise allows banks to ingest and combine data from far more internal systems than had previously been feasible. Cloudera Enterprise provides a highly secure modern big data architecture that accommodates very large and diverse data sets.

Conclusion

The proposed architecture from SAP, Cloudera and Intel, significantly simplifies and streamlines the current IT landscape by removing traditional siloed platforms and thereby reduces operational risk elements by eliminating interdependencies between them.

At the same time all of the existing system infrastructure and proprietary computational components, which have been developed over the past decade, are fully utilized without the necessity for costly redevelopment or migration efforts.

Together, these advantages provide financial institutions with powerful tools to respond more affordably and holistically to the demands of the emerging programs driven by financial regulators.



Proposed solution for a centralized data and analytics platform from SAP*, Cloudera* and Intel

A Reliable, Scalable and High Performance Infrastructure

SAP and Cloudera solutions provide an integrated environment to solve a variety of complex business problems, so it is no surprise that they require strong computing performance, scalability and reliability. This is delivered by multiple hardware partners whose platforms use the Intel® Xeon® processor E5 family for distributed computing environment and Intel® Xeon® processor E7 family and Intel® Solid State Drives (Intel® SSD) with Non-volatile Memory Express (NVMe) for complex and real-time analytics operations.

Learn More

More information about the Intel Xeon® processor E5 family can be found here whilst information about Intel SSD may be found here.

BCBS239: www.bis.org/publ/bcbs239.pdf
Tracking the true technology cost of compliance, regulation and risk: http://www.wallstreetandtech.com/careers/tracking-the-true-technology-cost-of-compliance-regulation-and-risk/d/d-id/1297648?
MiFiD II: http://ec.europa.eu/finance/securities/isd/mifid2/index_en.htm
Intel Xeon processor E5: http://www.intel.com/content/www/us/en/benchmarks/server/xeon-e5-v4/xeon-e5-v4-world-record.html
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About SAP.

SAP SE (NYSE | XETRA) is the world's leader in application and analytics software and leading enterprise cloud company with approximately 310,000 customers in 190 countries. 74% of all worldwide business transactions touch an SAP system. In 2015 SAP introduced the next-generation business suite, SAP S/4HANA, which helps companies simplify their business processes. SAP S/4HANA is completely built on the high-performance in-memory platform SAP HANA. go.sap.com/index.html

About Cloudera

Cloudera delivers the modern data management and analytics platform built on Apache Hadoop and the latest open source technologies. The world's leading organizations trust Cloudera to help solve their most challenging business problems with Cloudera Enterprise, the fastest, easiest and most secure data platform available for the modern world. Our customers efficiently capture, store, process and analyze vast amounts of data, empowering them to use advanced analytics to drive business decisions quickly, flexibly and at lower cost than has been possible before. To ensure our customers are successful, we offer comprehensive support, training and professional services. Learn more at www.cloudera.com.

About Intel

Intel (NASDAQ: INTC) is a world leader in computing innovation. The company designs and builds the essential technologies that serve as the foundation for the world's computing devices. Additional information about Intel is available at www.intel.com.

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