



Enterprise Data Fabric: A Critical Foundation for Risk Management

EXECUTIVE SUMMARY

Enterprise Risk Management (ERM) is an increasingly important initiative for financial service providers (FSP) as these organizations battle to minimize exposure to potential economic loss. Although managing risk in niche practices such as capital markets is an established part of operating strategy, only recently have companies begun to take an enterprise-wide view of the interrelated factors of operational, credit, and market risk. ERM usually involves multi-pronged initiatives focusing on strategy, process, and technology to ensure a balanced approach. This paper looks at the challenges in data management that an FSP needs to overcome to successfully embark on an ERM endeavor. These challenges also provide an ideal frame of reference to discuss data infrastructure solutions and architectures that provide a backbone for risk management.

THE GROWING COMPLEXITY OF RISK MANAGEMENT

Recent developments have significantly impacted the notion of risk in the financial services community. Market events such as decimalization and the consequent reduction in spreads, increased adoption of automated (or algorithmic) trading, global market volatility and the prospect of terrorist attacks have introduced enormous pressures on the day-to-day operations of FSPs and greatly increased their exposure to risk. Share trading volumes have remained at high levels even in the face of a prolonged bear market, but at lower unit prices, requiring more trading volatility to achieve desired profit margins. As a consequence, investors and financial institutions are challenged to more closely control costs, speed operations, consider more factors in every decision, and make use of information from a variety of sources to instantaneously assess exposure to risk and to identify lower risk, higher margin opportunities.

Data usage has also grown with the advent of newer risk-related financial engineering tools that process large amounts of information in order to provide greater accuracy and quality. These programs may deal with extremely complex transactions such as managing hedge funds, tracking derivatives trading across asset categories, and watching program trading patterns and results.

Regulatory controls have also been a strong force in driving financial service providers towards newer technologies and solutions that incorporate compliance in their risk management approaches. External legislation such as the Sarbanes-Oxley Act of 2002 and stringent internal trading/risk controls mandate a higher priority for risk assessment and timely reporting of risk, both of which require reliable and instantaneous access to risk-related information.

In order to efficiently manage the market dynamics, compliance requirements, and new product/ service portfolios, companies need to understand a wide variety of interrelated factors and interdependencies and take a more holistic view of their vulnerabilities and opportunities. Risk management today is no longer an end of day batch settlement activity, but a critical ongoing

process that affects the core operations of an FSP. Facilitating an accurate real-time view of risk involves a comprehensive enterprise-wide risk assessment approach, which in turn drives the need for a nimble infrastructure for sharing and distributing information across different systems.

WHY IS DATA INFRASTRUCTURE CRITICAL?

Companies coping with the above issues in developing a comprehensive risk management platform need to plan for several fundamental initiatives and strategic approaches to their enterprise architecture:

- Make risk-related information instantaneously available to risk computation applications and consumers of risk information.
- Support initiatives like grid computing for large-scale risk analytics.
- Aggregate information from several different sources to integrate factors affecting credit, market, and operational risk.
- Move from operational silos to more fluid information sharing and flow between applications and departments.
- Deploy a system that can handle large data volumes and computations to support sophisticated financial engineering tools.

"ERM IS A DATA AND PROCESS INITIATIVE; GOOD DATA ON A TIMELY BASIS: KEY TO GOOD DECISION-MAKING"

- Douglas McKibben, Research Director, Gartner Inc.

Good data on a timely basis sounds like a simple request, but actually encompasses a large number of factors, requiring the proper computing platform to support it. If risk management is to be approached on an enterprise scale, data management becomes a critical foundation for all related processes. A well-planned infrastructure ensures that data is aggregated, distributed, and made available even in the face of network problems. Initiatives such as intelligent capital allocation, continuous risk mitigation, and timely risk reporting rely upon a centralized system that works with data in a variety of formats on multiple hardware and software platforms and in different business applications. Such an infrastructure also facilitates instant correlation of risk levels across the organization based on external events. For instance, a sudden change in equity markets would signal a review of market risk factors. But this market risk could affect collateral values for borrowers using market holdings to secure loans. The institution's credit risk needs to be reviewed because of the market change. If the market shift were to also increase trading volumes, there would be a corresponding change in operational risk for the institution's brokerage and trading platforms. Without a data fabric that allows instantaneous information availability and sharing based on current events, a holistic risk and impact analysis as discussed above is impossible.

Figure 1 illustrates a functional¹ view of a risk management architecture. The three main components of this system are the risk information sources (which can be spread across physically or logically separate platforms), risk information processors (risk management applications/pre-processors), and consumers of the risk computations (trading applications, reporting tools, etc.). As shown in the figure, there are several issues that can plague this architecture if it lacks a proper infrastructure to support its functions. Scalability and performance issues can affect the client layer as well as the risk applications layer when new clients are added or additional risk management applications are deployed. Risk computation applications are vulnerable to problems with data availability that can cause performance bottlenecks. Data access and latency can be a cause for concern in extracting data from different sources and may become even more prominent in a distributed network, where network latency and data source unavailability can further impede operations. All these issues affect the risk computation lead times and can increase operational risk due to delayed completion of risk calculations during clearing and settlement.

A 2001 Ernst and Young report identified lack of early warning systems linking financial and risk data and untimely assessment of risk as two of the main barriers to effective risk management in financial institutions. These barriers can be seen as manifestations of the data availability, performance, and latency issues discussed earlier. Hence, a robust data infrastructure solution is absolutely essential to surmount these challenges.

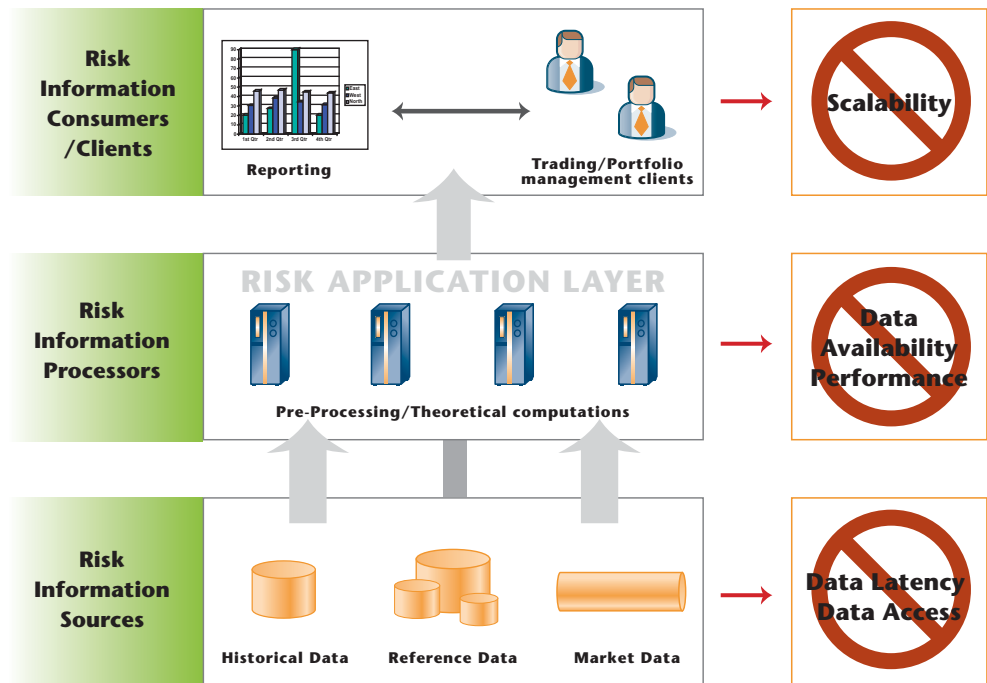
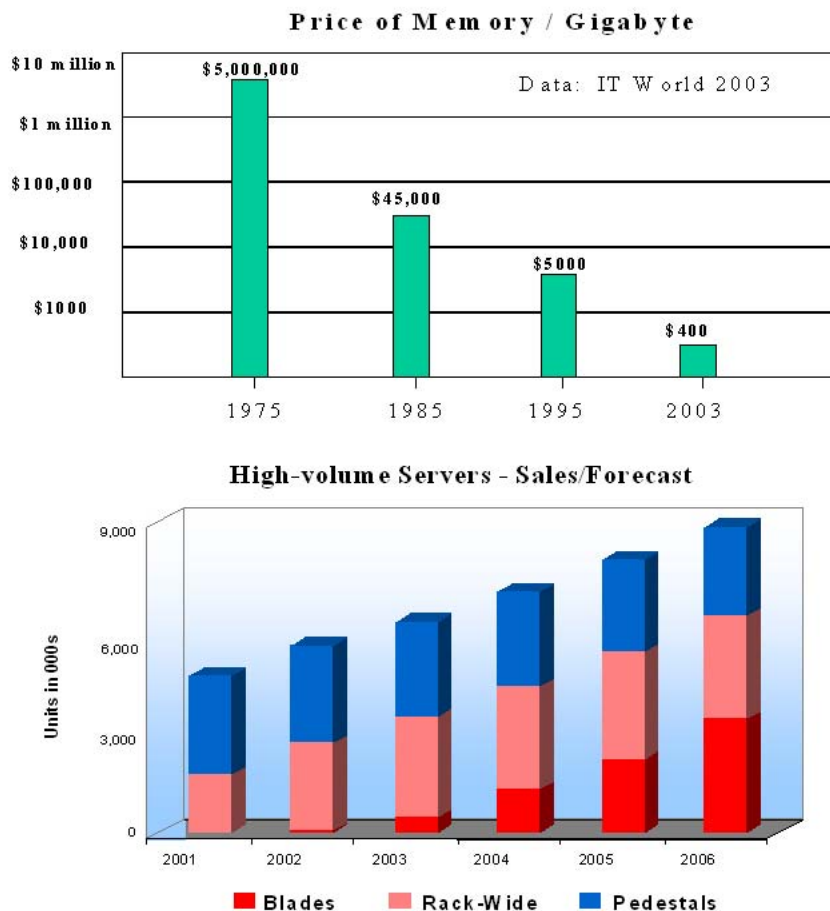


Figure 1: Functional Risk Management Architecture

¹ A functional architecture identifies the main components of a system from a behavior standpoint. Not to be confused with a technical architecture, which deals with how these components are connected, how they interact with other systems, etc.



Source: IMEX Research ©2003

Figure 2: Market Trends for Computer Memory and High-Volume Servers

In addition to the business drivers that emphasize the need for a flexible and high-performance data infrastructure, current trends in hardware technology are also driving new approaches to data management. A technical examination of modern data management techniques is available in a white paper from GemStone Systems entitled "GemFire Enterprise Data Fabric: for Risk Management." At an overview level, contributing factors include steep declines in the price of computer memory and the growth in distributed hardware architectures that handle higher processing volumes on multiple servers (Figure 2). Because the enterprise can reconfigure individual components of the network as needed to reduce costs, incorporate new data sources, and handle increased load, a data fabric must be adaptable and performance oriented to exploit lower-cost hardware resources and distribute information to applications no matter where they are found in the network.

An increasingly adopted approach to providing such a data fabric in complex financial service computing systems is to use in-memory data management systems. In-memory data management capitalizes on the availability of low-cost memory to access and distribute data faster and with greater reliability than traditional centralized disk databases can. In-memory architectures can scale to handle very large data loads and numbers of applications requesting the data. They provide data in the format needed for each application, no matter what format the underlying source data is in. The ability to quickly access, distribute, and share data between data sources and applications allows the complex and interdependent risk management that financial service providers require.

THE VALUE IN ADOPTING A DATA FABRIC FOR RISK MANAGEMENT

This paper has shown that risk management at an enterprise level requires immediate access to large amounts of data, shared between many different departments and applications. Regulatory compliance, reporting, real-time approvals, and portfolio management are all affected by the availability and usefulness of data from a wide variety of sources. A well-planned data architecture must be adaptable and cost-effective in a distributed computing network where machines, data sources, and applications may be added or physically moved at any time. In-memory data management software has been applied by many financial service providers to meet these requirements. Tangible benefits to the organization include:

- Moving from end of day batch risk computations to real-time accurate risk analysis feeding into subsequent trades
- Reducing the lead times involved in clearing and settlement activities
- Feeding accurate data on demand to risk engines and data intensive algorithms, enabling better decisions that account for risk
- Assessing risk metrics (e.g. margin call risk, position and exposure, P&L, etc.) in real-time to control client trading practices and pricing
- Enabling correlation between credit, market and operational risk by analyzing risk data from multiple sources and performing predictive risk analysis across various business segments

Additional technical benefits of an in-memory data management system arise for the organization and should be studied by information technology architects and managers. Advantages can be seen in scalability, availability, flexibility, and overall performance gains.

More information on this subject is available directly from technology vendors serving the financial services community with data management software systems.



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