Why the IBM mainframe is an effective choice for banks

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Executive summary

Retail banks around the world are faced with a growing set of challenges. Competition is intense, managing risk is more challenging than ever and responding quickly to change is a necessity. This paper reflects IBM's general view of various forces affecting the banking industry and their relationship with IT investment. It was produced and developed by members of IBM's Global Banking community, and includes research conducted by the IBM Institute for Business Value and from a variety of non-IBM resources.

These challenges are helping to shape the business strategies of retail banks. Despite continued merger and acquisition activity and changing market conditions, banks are now focused on achieving organic growth as their primary objective.[1]

To achieve organic growth, banks are expected to focus heavily on customer retention and increased wallet share. Customer service, rather than products or price, may be a differentiator for most banks to survive.

Banking executives may be limited in their ability to adapt to market conditions. Banking executives are potentially facing the following challenges:

- *Difficulty supporting new business initiatives*
- *Unable to get new products to market as quickly as they would like to*
- *Inability to support current or projected customer accounts without considerable investment*
- *Inability to support the functionality of an acquired bank*
- *Struggling to react quickly to customer transaction requests, which may result in response time delays that negatively impact customer service*
- *Inability to handle current and/or future regulatory and compliance mandates*
- *Struggling with back-office integration and maintenance costs that may be prohibitively high when new applications like CRM are added*

As a result of these challenges, banks may be considering Core Banking application transformation in order to support organic growth. It is anticipated that transformation will occur most rapidly in Asia[2], where banks will struggle to operate effectively as the volume of transaction processing increases with economic growth. Transformation also is expected to occur rapidly in the Europe-Middle East-Africa (EMEA) region, as banks cope with regulatory compliance and risk management. Many banks in the Americas are now beginning the planning process for transformation.[3]

The mainframe can be a key component of Core Banking System transformation. The benefits banks may achieve through transforming an environment to a Service Oriented Architecture (SOA) center on increased agility and the ability to respond to changing market conditions. Banks also have the goal of bringing new products to market more quickly, centralizing multiple Core Banking Systems into one system, adhering to regulatory and compliance mandates and reducing response time delays that negatively impact customer service. These are all benefits that may be able to be achieved through migration to a Service Oriented Architecture on the mainframe platform. By mainframe, we are referring to the IBM® zSeries® and System z9 platforms.

In the banking industry, the mainframe can be a platform of choice. In fact, the number of MIPS (million instructions per second) installed increased dramatically between 2001 and 2004 according to Gartner (see Figure 5).

The mainframe can be viewed as the platform of choice because it brings many advantages, including:

- *High availability*
- *Strong business continuity*
- *Deep levels of security*
- *High system utilization rates*
- *Strong performance*

Banks are deploying mainframes in new and exciting ways

Virtualization. A mainframe can support hundreds of servers in a virtual environment. This can help improve manageability and may enable more efficient use of system resources by allowing servers to be prioritized and allocated to the workloads that need them most at any specific moment in time.

Open Standards. Mainframes are able to support J2EE, Linux®, grid standards, SOA, Web services and other forms of open standards.

Collaboration. Increasingly, banks seek to collaborate with partners and even other banks. For example, while some banks leverage check image exchange networks like Viewpointe Archive Services, others are transmitting digital images directly between banks for settlement. Open standards, deep levels of security and real-time capabilities that mainframe can provide can help simplify integration and may also facilitate collaboration.

IBM can help your bank adapt quickly to changes in market conditions by transforming your Core Banking application environment. Starting with continued use of the mainframe, through middleware and applications, and including our services and financing offerings—IBM offers a comprehensive solution for banks.

Retail banks are faced with a growing set of challenges

A number of significant challenges are currently impacting the banking industry today.

1	2	3
Competition Is Intense	**Managing Risk Is Challenging**	**Responding Quickly To Change**
✓ Commoditization ✓ Consolidation ✓ Non-Traditional Competitors ✓ Flattening Yield Curve	✓ Regulatory Compliance ✓ Security Breaches And Fraud ✓ Deregulation and Privatization	✓ New Product Offerings ✓ Reaching The "Unbanked"

Figure 1. Banking industry challenges

Competition is intense

Commoditization—Banking is a commoditized and highly competitive business. Because of this, banks are struggling to differentiate in order to retain existing customers and attract new customers.

Consolidation—The number of banks continues to shrink in North America and Europe. The largest banks are becoming larger. However, mid-size, regional banks are asking how to differentiate themselves more effectively, which is creating the need for strategic reassessment of their business.

Non-Traditional Competitors—New, non-traditional competitors are gaining traction in retail banking. These include non-banks (Merrill Lynch, Fidelity, Vanguard) and indirect banks (ING Direct). Industries like insurance are experiencing higher margins by moving into banking and are stealing customers from traditional banks.[4]

Flattening Yield Curve—The yield curve is quickly flattening and is expected to drive the need for banks to reduce costs in order to remain profitable.[5]

Managing risk is more challenging than ever

Regulatory compliance and risk management—Regulations in the banking industry are evolving and are becoming more complex and demanding. Banks are attempting to create greater transparency in a proactive, rather than reactive, manner.

Security breaches and fraud—The American Banker recently reported that for the first time in several years, Internet banking usage has remained flat largely as a result of security concerns.[6]

Deregulation and privatization—Deregulation and privatization is occurring in many areas in Asia such as China, in part due to participation in the World Trade Organization (www.chinawto.com/wto/). The result for banks in this region may be increased competition from local, regional and international competitors.

Responding quickly to change is a necessity

Surge of demand for new product offerings—In the U.S., aging Baby Boomers and continued strong consumer spending are helping to drive new product offerings like Reverse Mortgages and Offset Accounts. Wharton recently reported that surveys show high risk products like interest-only loans now account for nearly 50% of all mortgages, up from 10% in 2004.[7] Banks are struggling to come to market quickly with these new products in order to meet demand.[8]

Reaching the "Unbanked"—In an effort to acquire new customers, banks are attempting to reach consumers that do not have a relationship with a bank. While this can be a substantial market opportunity, it is challenging for banks to execute profitably.

These challenges are shaping the business strategies of retail banks

A priority: organic growth. Despite continued merger and acquisition activity and changing market conditions, banks are now focused on achieving organic growth as their primary objective. Susan Landry, Research Vice President at Gartner, says, "CEOs are focused on generating sustainable growth, and they are planning on the growth to be generated by improving quality and customer satisfaction among existing customers."[9]

Banks will focus more heavily than ever before on customer retention and increased wallet share. Customer service, rather than products or price, is expected to be the differentiator for most banks to survive.[10]

Banking executives are limited in their ability to adapt to market conditions

Most banks' core banking processes have become more complex over the past thirty years. Similarly, applications that were initially implemented over 20-30 years ago have become highly complex as banks have added or enhanced functionality and capabilities over the years. Because of this complexity, banks

may be at risk of being able to achieve their primary business objective: organic growth. This is no longer just a CIO or CTO issue. It is expected that increasingly, the board of directors in the banking industry will be addressing Core Banking applications as a critical business issue.

Banks are attempting to address six main challenges:

Speed to adapt to change—Banks may be unable to adapt to changing business conditions as quickly as they need to, which in turn can cause inefficient business processes. There is heavy demand for new products, but bringing new products to market is difficult and can take longer than most banks want. This is a big issue given heavy market demand for new products.

Growth—In emerging markets, banks may struggle to manage growth with manual processes. In more mature markets, some banks may be unable to process the number and volume of current or projected customer accounts without considerable investment. Other banks are struggling to support the functionality of banks they have acquired.

Efficiency and service levels—The ability to receive 24x7 service from a choice of channels can result in customer expectations that continue to grow. In addition, banks may struggle to react quickly to customer transaction requests. Response time delays can occur which might negatively impact customer service.

Keeping pace with regulatory change—Many banks may struggle to keep pace with current and/or future compliance and regulatory issues. This is especially an issue in Europe as Basel II and other regulatory changes can make it increasingly challenging to achieve compliance.

Managing costs—The complexity of Core Banking applications can result in back-office integration and maintenance costs that can be prohibitively high when new applications like Customer Relationship Management are added. In addition, prohibitively high investment is often required to provide business continuity.

Risk management—Many banks are acting to help reduce their overall back office risk exposure. There is an increasing demand to comply with all regulations and internal controls. At the same time many progressive banks are expected to develop plans to build an evolutionary architectural framework that induces controls.

Many banks are considering Core Banking System Transformation to support organic growth

As a result of the challenges mentioned above, many banks are considering Core Banking System Transformation.

Core Banking transformation will occur at different velocities across geographies, and we expect this trend to be the case with banks in Asia, Europe and North America.

Asia—In Asia, economies in the region continue to experience rapid growth. Banks may struggle to operate effectively as the volume of transaction processing grows. It is anticipated that deregulation and the anticipation of more intense competition may result in a stronger orientation towards customer service and product innovation.

A second wave of Core Banking application transformation is also now underway. Some banks in Asia have watched their peers replace Core Banking Systems. This is essentially a "me too" strategy. Gartner expects these trends to result in Core Banking transformation over the next two years (see Figure 2).
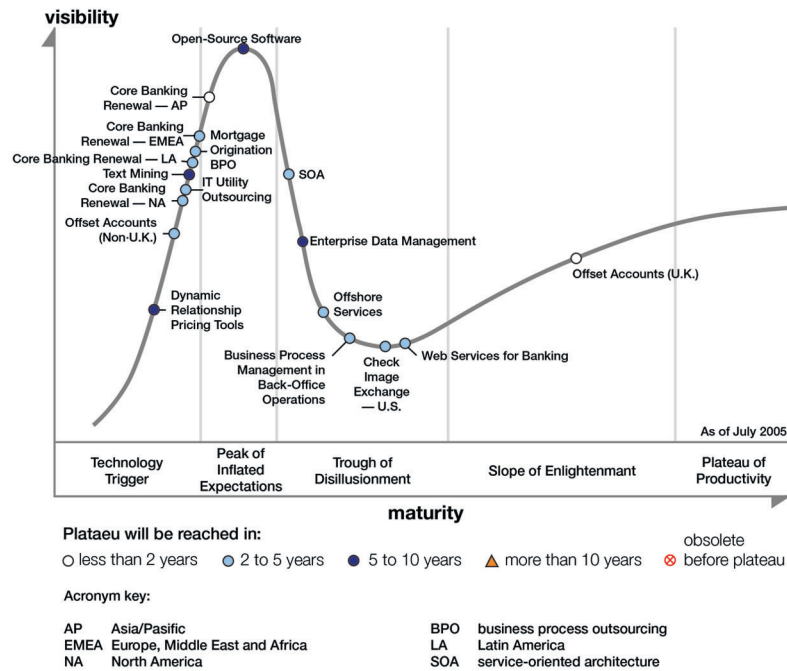

Figure 2. Gartner Hype Cycle For Back Office Banking Technologies, 2005

Source: Gartner Research[11]

Europe, Middle East and Africa (EMEA)—Banks in Europe are struggling to cope with regulatory compliance and risk management.[12] Basel II and other regulations are resulting in severe strain on banks to be compliant. In addition, the European Union is impacting Core Banking application transformation. Banks attempting to provide services to a member country must adhere to applicable EU standards and handle language and currency differences as well. This may lead to Core Banking transformation.

Other banks are taking a somewhat different approach to Core Banking transformation by initially addressing strategic infrastructure decisions. These banks are attempting to help reduce the risk of "rip and replace" by addressing architecture and infrastructure first, and then core banking application transformation.

As a result of these and other factors, it is expected that significant levels of transformation will occur in EMEA within the next two to five years.

Americas—Banks are recognizing that delays in transforming Core Banking applications may lead to a loss of competitive advantage. IBM's point of view is that bankers benefit by adopting a progressive renovation (vs. "big bang") approach. Progressive renovation is the ability to build a flexible, modular and low risk transformation roadmap that has the capability to survive the next ten years and support business changes during the transformation. Some U.S. banks are taking this progressive renovation approach to transform their Core Banking applications.[12]

Canadian and Latin American banks continue to extend their existing Core Banking applications. Many are concerned with risk management and view Core Banking transformation as a risk that may not yet bring enough rewards. Many banks in the U.S. are in the process of developing a transformation blue print with the capability to enable organic growth.[12]

Industry best practices provide guidance for the right timing of transformation

Core Banking application transformation and its implications to infrastructure is now a board of directors issue. Executives are looking for best practices and guidance regarding the right timing. How does a bank know when it should consider Core Banking application transformation?

Best practices show that Core Banking application replacement may be the best alternative if a bank is experiencing challenges. Adoption of best practices potentially provide the ability to:

- *Support new initiatives*
- *Bring new products to market*
- *Adapt to changing business conditions*
- *Support functionality of an acquired bank*
- *Reduce security breaches and identity theft*
- *Reduce system delays that can negatively impact customer service*
- *Support the number of current/future accounts*
- *Support current/future transaction volumes*
- *Avoid prohibitively high integration and support costs when new applications such as service channels are installed*
- *Discern the long-term viability of the current vendor*
- *Discern the commitment of the current vendor to aging applications*
- *Discern the commitment of the current vendor to specific geographical regions*

The benefits banks expect to achieve through transforming an environment to a Service Oriented Architecture (SOA) center on increased agility and the ability to respond to changing market conditions. Banks also expect to bring new products to market more quickly, centralize multiple Core Banking Systems into one system, adhere to regulatory and compliance mandates and reduce response time delays that negatively impact customer service. These are all benefits that may be achieved through migration to SOA.

Despite these benefits, the decision to transform Core Banking applications is a difficult one. Some banks continue to postpone transformation because of the risk involved in terms of cost, time and moving customers seamlessly to a new system. One way of mitigating this risk, however, can be by taking a modular, phased approach to transformation.

Mainframes can be a critical component of Core Banking transformation

Mainframe replacement in the banking industry is a myth (see Figure 3).

Figure 3. Top five mainframe myths in the banking industry

Mainframe myths	Market reality
Mainframes are expensive to buy and operate	Two concepts are important to discuss in the context of this myth: Total Cost of Acquisition (TCA) and Total Cost of Ownership (TCO). TCA refers to the upfront costs of acquiring hardware, license fees and maintenance. TCO refers to the long-term operational cost: hardware and software acquisition, management and support, end-user expenses, opportunity cost of downtime, training and other productivity expenses.[13] Banks may be able to achieve both TCA and TCO benefits in a mainframe environment. *TCA*—For those banks that already have a mainframe, the additional TCA for the mainframe can be lower because the incremental cost to add additional MIPS is marginal as opposed to acquiring a completely new system. Additionally, typically the cost of resources to manage a distributed computing environment is linear but can be lower in a mainframe environment.[14] As an example users may get discounted capacity when they upgrade their systems with Integrated Facility for Linux (IFL—dedicated processors for running Linux) and zSeries Application Assist Processors (zAAPs—WebSphere workloads). *TCO*—When a comprehensive definition of TCO is examined, one that includes indirect costs such as end-user operations and cost of downtime, cost of security breaches and ensuing reputation damage, the mainframe can provide an advantage. This may be achieved through the leadership of the mainframe in areas such as availability, scalability, security and business continuity.[15] The bottom line is that the mainframe, particularly for banks that already have a mainframe installed, can provide superior cost performance with both a TCA and TCO analysis. This TCO and TCA analysis are demonstrated in the examples contained at the end of this publication.
Inability to find talent as those with mainframe skills retire	Heavy integration and business process management requirements are mainly addressed at the middleware layer. This results in higher demand for Java/C++ programmers than Cobol programmers in the banking industry. However, mainframe programmers are still needed. But as pointed out in Information Week, September 2005, by Ian Archbell of Micro Focus, the demand for Cobol programmers is often overstated.[16] Yet, in response to the retirement plans of many current Cobol programmers, IBM has set a goal of training 20,000 workers by 2010.[17] Over 150 colleges and universities currently have programs to help support this goal.[18]
Mainframes are inflexible and unable to change quickly	Mainframes are flexible due to domain partitioning and workload management and optimization capabilities. Contrasted to distributed servers, the mainframe is designed to maximize its capabilities in a multi-workload environment because the zSeries and System z9 have been designed with a focus on operational performance. Therefore, the zSeries and System z9 have a balance between high performance and RAS. Mainframes also enjoy flexibility benefits because UNIX APIs, J2EE, grid standards and Linux can now be run on mainframes.

ISV enthusiasm for mainframe applications is dwindling	ISV enthusiasm is a challenge in some industries, but banking is not one of them. Leading Core Banking System ISVs have invested many millions of dollars in applications that run on the mainframe. In addition, many open standards-based applications can be run on mainframes as a server. As an example, this makes it possible to run Core Banking applications developed in J2EE environments on the mainframe.
There is nothing new in the world of mainframes	Sometimes new is not such a good thing. While there are incremental technologies constantly making mainframes better, one of the greatest advantages of the mainframe is its stability and ability to help protect your existing investment in applications. But it is true, the mainframe is being used in new and exciting ways. Innovations like virtualization, GRID computing and collaboration are just a few of the ways mainframes are being used in new and exciting ways in the banking industry. Business Process Management (BPM) has also extended the use of the mainframe from back-office operations to Linux-based front-office and branch operations on the mainframe (see the case study on a Large European Bank).

The fact is that mainframes can be a critical component of Core Banking transformation. Mainframes have capabilities that can help banks improve efficiency, resiliency, time-to-market and the ability to grow.

Many mid-size and large banks continue to view the mainframe as the platform of choice

> *" La Caixa continues to rely on IBM's zSeries platform, as it has done for over twenty years, in order to retain its leadership position in the domestic and international finance sectors," says Lluís Deulofeu, Deputy Managing Director of La Caixa. "…Our bank can honor its commitment to stay at the forefront of technological development and innovation in order to provide the best possible service to our customers."*

The Mainframe processor capacity is increasing among banks.

A recent cross industry study conducted at a Gartner Data Center Conference showed that mainframe-intensive organizations are increasing, not decreasing, in terms of the number of MIPS installed. **Over 80% plan to maintain or expand their mainframe environment over the next three years (see Figure 4)**. This is particularly true for the mid-size and large banks (those with over 500,000 accounts).

IBM has experienced year over year growth in the number of shipments of its zSeries mainframes from 2001 to 2004 (see Figure 5). Total deliveries of zSeries as measured in MIPS increased 33 percent in 2004 versus 2003. Deliveries of zSeries measured in MIPS increased more than 28 percent in 2003 as compared to 2002. Trend analysis, combined with our observations in the market place, indicates that this trend will continue.

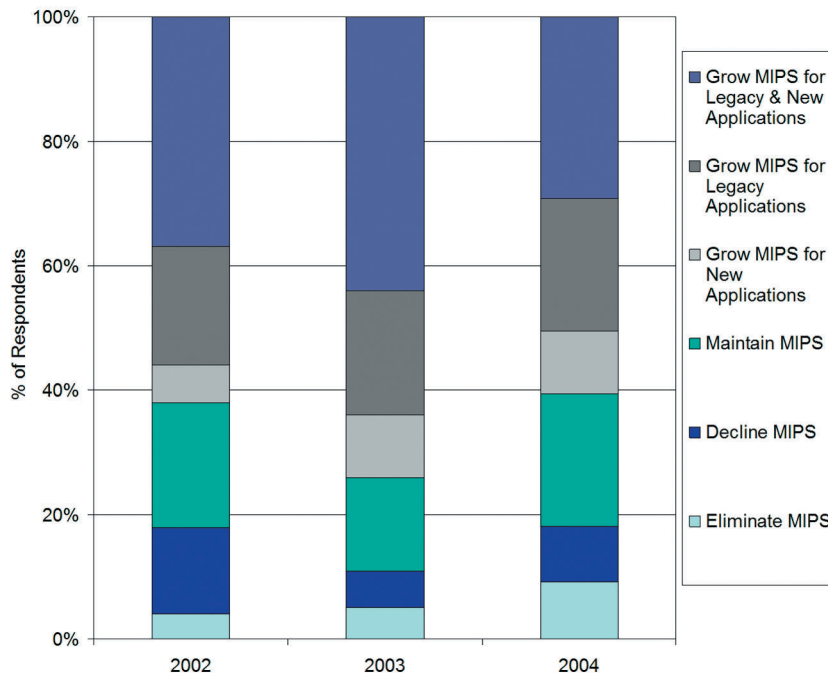These data points provide indications that for many organizations, the mainframe is the right choice.

Figure 4. Outlook for mainframe environment in next three years
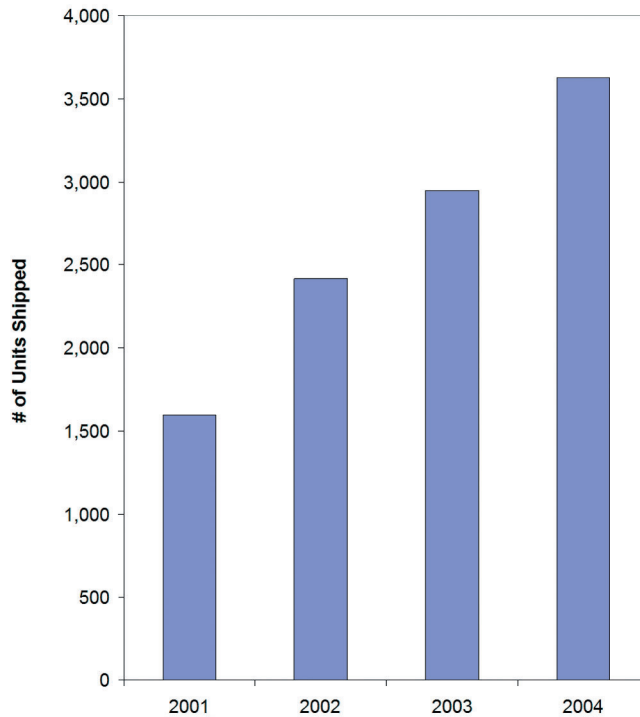
Source: Gartner Research[19]

Figure 5. IBM mainframe shipments—zSeries

Source: Gartner Research[20]

Best practices (listed below) indicate conditions under which a mainframe environment is being considered in the banking industry:

- *When the business requires reduction of downtime*
- *Fast and simple scalability is critical to business operations*
- *Security breaches and identity theft are of major concern and must be managed effectively and allow for continued customer trust, particularly with regard to self-service channels like Internet banking*
- *Control cost / TCO (TCO is measured by the definition recommended by Gartner: hardware and software acquisition, management and support, end-user expenses, opportunity cost of downtime, training and other productivity expenses).[21]*
- *The self-service channel is important and must be able to handle utilization spikes*
- *Capability to achieve utilization rates of up to 100% without performance degradation are desirable*

We expect current and future transaction volume to grow rapidly. The IBM Mainframe's on demand capacity and provisioning capabilities can help dynamically and non-disruptively (when properly configured) add capacity.

Many banks list some or all of the above requirements in their overall business requirements for core systems, which is reflected by the growth of mainframe MIPS in the banking industry.

Mainframes can bring many advantages

From a business perspective, mainframes provide many advantages. Mainframes can help enable the IT foundation for accelerated business growth, customer information safety, efficiency, resilience and time-to-market.

Mainframes are capable of achieving these possible business benefits because they can help provide simplicity and flexibility, deep levels of security, high levels of availability and TCA/TCO advantages.[22] (See case studies.)

Greater simplicity and flexibility–

In a mainframe environment, when properly configured, adding processor capacity and storage can occur quickly, without necessarily disrupting the business, when you need it, and typically without having to increase staffing levels.[23] Capacity backup can be added on demand in an emergency. Mainframes can also provide capacity on demand capability in the event of unexpected utilization spikes.

Deeper levels of security–

Mainframes provide a security-rich environment. This is particularly important for banks given the prevalence of security breaches and identity theft. Credit card fraud was the most prevalent form of financial fraud the past year (ending May 2005), with more than 3.9 million consumer victims, according to a recent Gartner survey.[24]

With IBM zSeries and System z9 mainframes, security and encryption are at the hardware level, which may represent less of an opportunity for security breaches compared to relying on security exclusively at an application level. The mainframe provides highly secure data transfer at very high speeds, and because of this, it can act as a hub and therefore is an attractive option to manage security across the enterprise.

Mainframes can also provide deep levels of security because security can be managed for one mainframe instead of hundreds of distributed servers, which can help reduce the complexity of security management and potential points of vulnerability. This may help to reduce security management costs and reduce risk of security breaches.

> *" As a result of consolidation, we only have to maintain a handful of servers instead of nearly 600—making the task much less complex and expensive."*
>
> — Ken Kucera, Chief Information Officer, FNBO Solutions/Offerings

Mainframes are now even being used for security management. Mainframes can be a central monitoring and management point for user identification and authentication, access control, network security and security administration.

IBM also recently announced the Encryption Facility for z/OS v1.1. When available, and when properly configured, the Encryption Facility can enable high volume encryption and management of archived data for remote site archival. This includes the ability to encrypt data to either tape or disk in order to share information with suppliers and customers. This may contribute to a customer's audit, privacy and compliance of personable identifiable information.

Security is on every banker's mind—and the IBM mainframe delivers the capabilities to deal with transaction and data security issues.

Superior product and operations management capabilities—

A Gartner survey compared the product and operations management capabilities of the IBM zSeries with non-mainframe servers. Results show the IBM zSeries is superior in every aspect. (See Figure 6)

Mainframes, augmented with Geographically Dispersed Parallel Sysplex (GDPS) for automated recovery fail over are, according to Gartner, more reliable and available than an environment that includes thousands of distributed servers. This is especially important in the banking industry, where Core Banking System availability is mission critical.

Capacity on demand can enable banks to respond quickly to changing business conditions. Domain partitioning as well as workload management and optimization can help to further enable the flexibility of banks. Distributed servers have been optimizing their designs for a small set of benchmark applications

that run one at a time in one partition with one OS instance. This approach typically favors more processor execution space at the expense of RAS and cache. The zSeries, as well as System z9, have been designed with a focus on operational performance. Thus, the zSeries has a balance between high performance and RAS.

High levels of systems performance and flexible provisioning of capacity can enable banks to manage peaks and fluctuations in transaction volumes that are commonly associated with Retail Banking, particularly with self-service channels. The System z9 in combination with its management tools may help enable banks to keep costs under control at a time when many banks may begin to struggle to achieve profitability goals.

Figure 6. IBM zSeries product and operations management performance

	IBM zSeries	Non mainframe servers
PRODUCT	**50.0**	**39.3**
Processor technology	10.0	8.2
System performance	10.0	8.6
Unplanned downtime (single)	10.0	8.2
Unplanned downtime (clustered)	10.0	7.8
Disaster tolerance/recovery	10.0	6.6
OPERATIONS MANAGEMENT	**57.0**	**40.1**
Planned downtime	10.0	7.7
Partitioning	10.0	7.0
Capacity On Demand	8.0	5.2
OS manageability	9.0	7.1
Server management tools	10.0	6.9
Workload management	10.0	6.2
GO TO MARKET	**49.0**	**52.8**
Platform viability	9.0	7.2
ISV enthusiasm	4.0	6.4
Application portfolio	5.0	6.9
Availability of skills	5.0	6.1
Target markets	7.0	6.8
Market coverage & fulfillment	6.0	6.7
Industry awareness	9.0	7.0
New business potential	4.0	5.7

COMPANY	68.0	65.7
Ease of doing business	7.0	7.0
Support	9.0	7.8
Sales & marketing	8.0	6.7
Server business unit viability	10.0	8.3
Thought leadership	8.0	7.1
Negotiation opportunity	3.0	6.9
Ability to change	6.0	6.8
Delivers on promises	8.0	7.4
Professional services	9.0	7.7
Raw data total	224.0	197.9

Source: Gartner Research[26]

Total Cost of Acquisition (TCA) and Total Cost of Ownership (TCO) advantages−

Two issues are important to discuss in the context of this cost: Total Cost of Acquisition (TCA) and Total Cost of Ownership (TCO).

TCA refers to the upfront costs of acquiring hardware, license fees and maintenance. TCO refers to an operational, long-term perspective: hardware and software acquisition, management and support, end-user expenses, opportunity cost of downtime, security breaches, potential reputation damage as a result of security breaches or down time, training and other productivity expenses.[27]

Banks may be to achieve a more favorable TCA and TCO with a mainframe environment

TCA−Critics of the mainframe like to point out that the upfront cost of a mainframe is higher than distributed servers. While this is true for smaller installations, it fails to recognize that most banks already have a mainframe environment.

Incremental costs may be lower with the mainframe. Banks with an existing mainframe environment may be able to gain incremental TCA benefits because the cost to add incremental MIPS declines significantly as compared to acquiring an entire, stand-alone system. The cost of adding resources to manage the environment is linear in a distributed computing environment but negligible in the mainframe environment.[28] Mainframe users may also get more affordable capacity when they upgrade their

mainframes with Integrated Facility for Linux (IFL—dedicated processors for running Linux) and zSeries Application Assist Processors (zAAPs—WebSphere workloads). These are all key aspects of TCA. These specialty processors are currently priced at lower price points than traditional processor capacity.

TCO—Organizations sometimes limit a TCO to include only hardware and software costs. This approach fails to include critical TCO metrics that Gartner recommends, such as management and support, the opportunity cost of downtime and other productivity expenses.[29] Although a TCO that compares only software and hardware costs initially sometimes appears favorable to distributed servers, *TCO for mainframes (as defined by Gartner) can be lower for banks.*

This is also because availability, business continuity, security, utilization and performance are all critical elements of the technology operations of a bank. Because mainframes provide high levels of utilization and automated workload, per processor software costs may become lower, software management costs may become lower, and the overall administration costs may become lower The same is the case for power and cooling, and there is less demand for expensive floor space.

Given its strengths in security, availability, business continuity, utilization and performance, mainframes may provide an opportunity to cost effectively meet the infrastructure demands of a bank as it pursues growth.

Service Oriented Architecture (SOA)—Banks want to accomplish Core Banking application transformation without losing the qualities of services, reliability and security that they have developed today with their Core systems.

IBM has provided a robust, flexible SOA environment on the mainframe that includes the Websphere for z/OS running on an IBM System z9 109 making it a foundation for creating new Web services in a mainframe environment.

Recognizing that banks want to take advantage of the wealth of assets they have already available in Core systems such as CICS and IMS, IBM has added the capability (CICS 3.1 and IMS V.9) that allows existing business logic contained within those systems to be exposed as Web services as part of a Service Oriented Architecture (SOA).

Because of this, banks can continue to use the Core logic that is running today's applications as part of a transformed application. These Web services can then be incorporated into a mainframe SOA System z9 application that may be able to continue to realize the qualities of service in a superior way.

This approach may also allow IBM Mainframe users to run these new workloads alongside their existing applications, utilizing the existing infrastructure and skills to manage this mixed workload. It may also allow for an evolutionary approach which can enable application transformation to occur at a pace that has the capability to mirror the business needs.
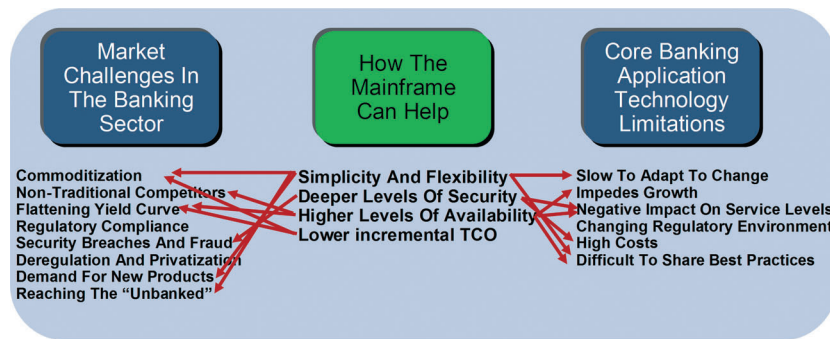

Figure 7. How the mainframe can help address market challenges and Core Banking application limitations

Banks are deploying mainframes in new and exciting ways

Virtualization—A mainframe can also support hundreds of distributed servers in a virtual environment. This can help improve manageability and enable efficient use of system resources by allowing servers to be prioritized and allocated to the workloads that need them most at any specific moment in time.

With this type of virtual environment, generally there may be less need to overprovision for excess capacity to be able to absorb individual workload spikes compared to a distributed server network, and total capacity needed is typically less than in a distributed server network. Mainframes are designed to be capable of utilization rates of up to 100%. Typically, distributed servers achieve a utilization rate of approximately 10-20% (see, First National Bank of Omaha case study). By leveraging the benefits of virtualization in a mainframe environment, a bank may be able to reduce its investments needed and achieve a lower overall TCA/TCO.

Openness—Mainframes are able to support J2EE, Linux, grid standards, SOA, Web services and other forms of open and industry standards. Because of this, it is no longer accurate to equate open systems with UNIX.

Running Linux on a mainframe is gaining market momentum (see Figure 8). Virtualization may enable significant server consolidation and help reduced cost—hundreds of Linux servers can run on a single server. In addition, running Linux on a mainframe may bring some of the benefits of the traditional mainframe environment: availability, scalability, disaster recovery and capacity on demand.
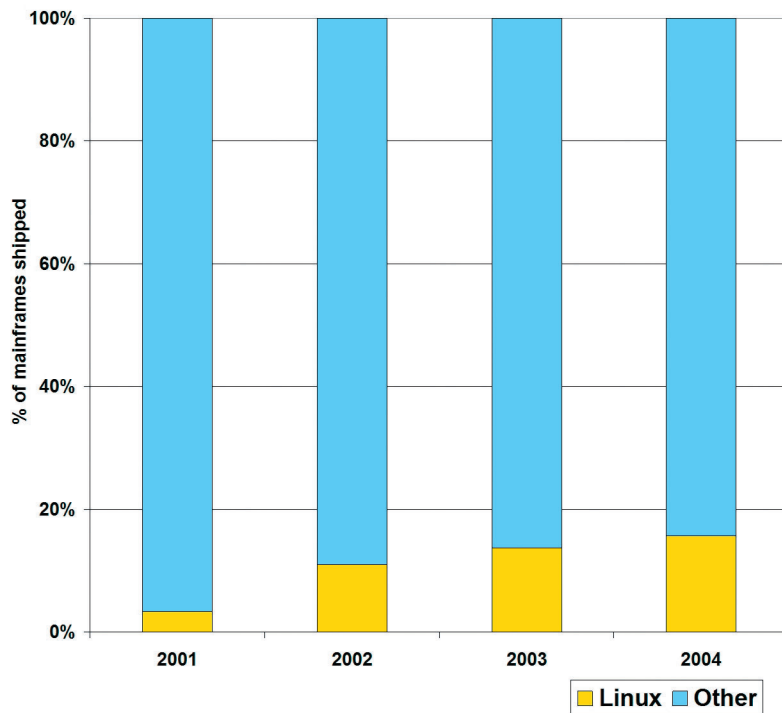

Figure 8. Linux acceptance on IBM System zSeries mainframes

Source: Gartner Research[30]

Collaboration—Increasingly, banks must collaborate with partners and even other banks. For example, while some banks leverage check image exchange networks like Viewpointe Archive Services, others are transmitting digital images directly between banks for settlement. Open systems and dynamic, deep levels of security and real-time capabilities that mainframes can provide may help simplify integration and therefore help facilitate collaboration.

IBM is a leader

IBM can help your bank adapt to changes in market conditions by transforming your Banking business and the Bank's IT infrastructure. Starting with continued use of the mainframe, through middleware and applications, and including our services and financing offerings—IBM offers a comprehensive solution and for banks around the world.

Large European bank: Enhancing customer experience through horizontal integration

A large European bank, one of the largest banking organizations in the world, focuses on trading, funds, assets and insurance banking. This bank has more than 6,300 employees, 600 branches and a long tradition of retail and corporate banking. It manages approximately €18 billion in assets to meet the banking needs of customers throughout the country and in the international banking markets.

European banks face increasingly intense competition that may force them to find ways to control costs and improve customer satisfaction. In fact, due to the maturity of the market, banks find that customer loyalty is a key factor in remaining competitive and maximizing profit. As one of the larger banks in Europe, this bank was no stranger to these challenges. Like its competitors, it established new delivery channels such as Web and telephone banking to meet the evolving expectations of its customers. The new channels, however, were deployed without any integration with the existing branch operations, which made it impossible to create a seamless customer experience across channels.

Contributing to the problems was a complex, fragmented IT infrastructure based on distributed servers housing disparate applications—everything from customer relationship management (CRM) to credit evaluation applications. The systems were increasingly costly to maintain and lacked the flexibility to support the deployment of new services. Inflexibility in the siloed systems also led to low utilization rates. In addition, this bank found it increasingly difficult to maintain security and system availability for the growing number of isolated servers.

To meet its customers' changing expectations and to streamline internal processes, this bank needed to integrate its delivery channels and present a unified view of services and accounts to both employees and customers. The transformation would require this bank to standardize the underlying technology, simplifying integration efforts and the deployment of new services.

This large European bank implemented and infrastructure including IBM WebSphere software, IBM Rational development tools, IBM Lotus® software and IBM Tivoli® software running on IBM @server zSeries 990 servers with z/VM and SUSE LINUX V8 operating systems. This bank also standardized its branch clients on the Linux operating system, eliminating the need to distribute software.

The bank consolidated its outdated OS/2 platforms onto two IBM @server zSeries 990 servers. Using the z/VM operating system enables the bank to reallocate central processing units (CPUs) and memory to support shifting workloads and add virtual servers when deploying new applications. This bank uses the parallel sysplex configuration for the zSeries servers, with three CPUs that process 6,000 MIPS. Since the open-source architecture is based on J2EE, the solution can use core application elements to provide faster and more efficient application deployment.

By establishing a single cross-channel view of its customers, this bank enhanced its ability to strengthen customer relationships through the branches, thus improving customer loyalty and boosting its competitiveness. And the bank can maximize its revenue potential by more effectively cross-selling and up-selling products to existing customers. Plus, with open, reusable architecture components, this bank can roll out new services and take advantage of new business opportunities quickly and efficiently. This capability to respond quickly to changing market demands is enhanced by the use of flexible virtual servers on the zSeries platform.

In addition, this bank expects to reduce total cost of ownership (TCO) - a result of consolidating servers onto two zSeries mainframes and installing Linux clients in the branches. Using the money saved on software licensing and support, it was able to refresh all of its desktop hardware systems in its branch offices. As a result of the legacy server consolidation, the bank maximizes the performance of its existing information technology (IT) investments. In addition, by standardizing on J2EE, the bank will be able to leverage more Web services to capitalize on strategic partnerships with other financial services providers.

For further details on this bank, contact David Zimmerman (davidzim@us.ibm.com) or Morten Nygaard (nygaard@us.ibm.com) of IBM.

BMO Financial Group: Leveraging its IT infrastructure to generate revenue and lower costs

With total assets of Can$265 and 34,000 employees, Bank of Montreal (BMO) Financial Group is the oldest financial services provider in Canada and one of Canada's largest financial firms.

As is common across the financial services industry, BMO had disparate applications and processes that put a drain on productivity. Twenty thousand client devices running Microsoft® Windows® provide the interface for customer service representatives (CSRs) in the bank's branches, call centers and back offices. Yet the mainframe is also a crucial part of BMO Financial Group's technology infrastructure. Most of the bank's systems run on mainframe technology, enabling BMO Financial Group to take advantage of the robustness, reliability, availability, performance and disaster recovery capabilities inherent in mainframe systems—capabilities that make it possible for the bank to provide the services its customers demand.

When BMO Financial Group decided to pursue a solution that would connect its many IT resources through a single interface, it didn't want to sacrifice existing investments in back-end infrastructure assets—or the skills necessary to run them. The bank had no plans to replace these systems, so the new solution would have to integrate seamlessly with them.

BMO Financial Group worked with IBM to develop BMO Connect, an open-standards-based Web services integration solution, to help ensure that the bank's mission-critical applications and processes would be readily accessible to users company wide, based on their roles.

The new Web services solution is built on IBM WebSphere Application Server software running on IBM System z9 machines. The reliability of WebSphere Application Server software on System z9 servers provides the high performance, availability and disaster recovery protection that BMO Financial Group requires for its mission-critical applications. And the solution delivers seamless integration between aging applications and mainframe systems, and user-facing applications—while improving response times and hiding the complexity of the systems.

Using WebSphere Application Server software on System z9 machines has enabled BMO Financial Group to improve the productivity and efficiency of its sales and service personnel because CSRs now have a better perspective into business and sales processes. This improved visibility reduces operating costs, increases referral rates and drives sales by providing cross-selling and up-selling opportunities that would have otherwise been hard to detect.

The inventory of referrals continues to grow—a business challenge BMO Financial Group is happy to tackle.

> " *The new solution allows our channels—be it the Internet, the call center or a branch office—to work collaboratively on behalf of our customers. We're ecstatic about that.*"
>
> – Randy Oswald, Senior Vice President of Technology Solutions, Bank of Montreal

First National Bank of Omaha: Cutting costs and gaining flexibility through IT infrastructure simplification and consolidation

FNBO is the 11th-largest credit card processor in the U.S., and it is growing rapidly. Its expanding customer base fuels a steady increase in overall transaction volumes, which are punctuated by dramatic spikes during holiday seasons. Managing the dynamic volume effectively is critical to the bank's ability to attract and retain customers.

Years of growth, however, left FNBO with a large, complex IT infrastructure that was difficult to monitor, manage and scale. Each core business application typically ran on isolated servers with dedicated storage, network connections and firewall. With a large mainframe and a distributed environment comprising almost 600 servers, maintenance requirements skyrocketed. Peak transaction volumes for certain critical applications forced the bank to continue adding processing capacity while siloed computing resources left utilization rates at an average of 12 percent for processors. The inefficiencies added up to a high total cost of ownership and an inability to respond swiftly to business growth.

FNBO could no longer afford to continue adding staff and computing resources to keep up with growth and seasonal transaction spikes. The bank needed to transform IT from an impediment into an enabler of business objectives. It needed an adaptable, scalable infrastructure that would offer a clear roadmap for future growth with an emphasis on long-term efficiency and low costs.

FNBO turned to IBM and IBM Business Partner MSI Systems Integrators to help simplify, consolidate and virtualize its IT infrastructure, thus enhancing the bank's ability to grow smoothly and cost-effectively. The bank began by upgrading its existing IBM @server zSeries 900 server to a zSeries 990 model, adding a 32-way processor. The upgrade brings the server to a total of three Integrated Facility for Linux (IFL) engines, with a fourth engine available for sudden volume increases. IBM Capacity On Demand capabilities enable FNBO to handle transaction peaks without purchasing computing assets that would go unused for most of the year. Also harboring 26 uncommitted processors, the mainframe helps to ensure scalability for ongoing expansion. FNBO has already begun to migrate 60 applications based on IBM WebSphere Application Server—Express V5.1 technology from 30 servers in the distributed

environment to the Linux on zSeries platform. The bank will consolidate approximately 550 distributed Intel-based applications from just as many servers onto 5 IBM @server BladeCenter systems, each housing 65 blade servers.

The IBM solution enables FNBO to manage its IT infrastructure more efficiently, with better utilization and enhanced flexibility. The company no longer has to purchase enough capacity up-front to handle peak transaction rates. Instead, it can scale up and down, paying for only what it needs. In this way, FNBO can continuously expand its customer base without worrying about escalating maintenance requirements or high costs due to poor utilization.

FNBO's new approach to IT resulted in a physical server consolidation ratio of 18:1. The dramatic reduction in equipment allows the bank to manage the environment with a staff that is one-third its previous size. Plus, FNBO yielded immediate cost savings of US$450,000 by eliminating the need for 30 servers, and it recognized further cost benefits by using the open-source Linux operating system. The solution reduced mainframe operating system licensing costs by 80 percent; overall annual costs are down from US$800,000 to US$125,000 per processor. The improvements also increased the availability and performance of core banking and e-business applications.

IBK: Utilizing the high security and resiliency of zSeries to expand business growth and meet customers' demand for new banking services

Industrial Bank of Korea (IBK) is one of Korea's largest banks with a total of 78 trillion KRW in assets, 3.7 trillion KRW in capital owning 400 branches both domestic and overseas. IBK holds the public policy role of promoting growth among Korea's small and medium-sized enterprises as well as guaranteeing reliability, profitability with firm assets.

IBK aims to become one of the 50 Global Top Financial Groups by 2010. To do this, it must leverage its Next Generation Banking System (NGBS) to enhance customer convenience. IBK is implementing NGBS to gain competitive advantage through improved e-service and greater profitability.

IBK chose z990 to support enhancements in its core banking systems and to provide high availability and flexibility for its NGBS platform. In addition, the IBM z990 manages such processes as integration of customer information, daily accounting system, a web terminal system which improves the user interface and life-long account numbering system.

Operating three IBM z990 systems in a Parallel Sysplex mode allowed for ultra-high tolerance capability and for near continuous operations without any disturbance to daily functions. The processing capacity also can be scaled easily by connecting more mainframe systems. The workload management and data sharing of the Parallel Sysplex technology deliver continuous computing to IBK. In the event of high peaks, IBK can balance the workload by sharing processing across the systems.

With its new solution, IBK launched 168 new products specifically targeted at key customer segments in a six-month period resulting in US$120M of revenue growth.

La Caixa: Extending and enhancing infrastructure to support business applications

Caja de Ahorros y Pensiones de Barcelona, widely known as "La Caixa", is the largest savings bank and third-largest bank in Spain. It runs a network of over 4840 branches and employs more than 24,000 people. The bank has more than nine million customers and operates almost seven thousand cash dispensing machines.

In an effort to stay at the forefront of technology innovation and to support its medium term goal to move towards Java standards, "La Caixa" has undertaken a project to improve the bank's present system. The project will include revamping and enlarging both the core IBM zSeries platform and the supporting software technologies (such as z/OS, DB2, Websphere) allowing performance optimization, both in the current applications environment and the future Java environment. The project will optimize "La Caixa's" IT resources and thus enhance efficiency, improving application flexibility and availability. "La Caixa" already boasts capacity of 1050 transactions per second.

"This not only demonstrates "La Caixa's" continued endorsement of the IBM zSeries platform as the most reliable, scalable and secure system on the market for all the bank's business application environments," says Juan Pi, IBM Executive Vice President for the financial services industry, "but it also provides further evidence of the trend right across the European banking industry to move to Java as the strategic development platform of choice."

The agreement with IBM also involves the installation of IBM UNIX servers (IBM @server pSeries) for other work settings at "La Caixa", and the supply of data storage systems and personal computers for the bank's branch offices.

For Further Information:

- **ibm.com**/banking
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