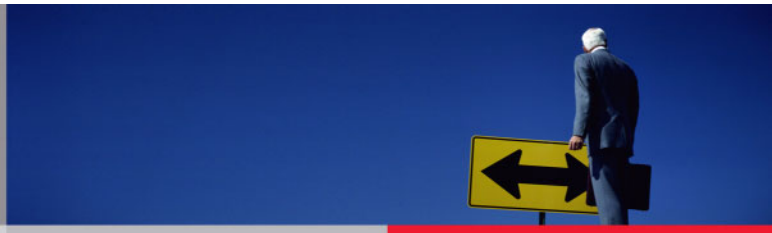
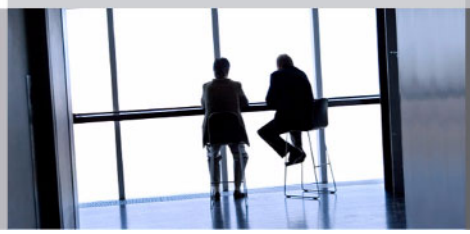
Taking Advantage of SAP for Banking Solutions in an IBM zEnterprise Multiplatform Environment





Redguides
for Business Leaders

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- Transform your business with SAP for Banking on an IBM zEnterprise System
- Learn about the advantages of SAP software in the banking industry
- Gain insight into the benefits of running SAP on an IBM zEnterprise System

Redbooks

Executive overview

In the banking industry, IT service provisioning is of key importance. Banking CIOs, who are responsible for a bank's core operational and reporting systems, are now facing many challenges, including these core concerns:

- Reducing the business risk that is involved with operating IT systems and improving infrastructure resilience
- Enabling business growth by quickly meeting increasing demands from customers
- Meeting rapidly changing regulatory compliance requirements

CIOs can meet these challenges with the powerful combination of SAP for Banking solutions and the IBM® zEnterprise® System. This partnership solution helps your IT department to attain several key objectives:

- Achieve resilience and reduction in business risk through the adoption of SAP integrated banking software running on the IBM zEnterprise System, so that you can provide continuous system operation and five 9s availability. Supported by a global pool of skilled SAP and IBM service representatives, this combination can provide peace of mind regarding business-critical banking services.
- Provide agile responses to customer demand with the seamless scalability of the zEnterprise System. This helps grow new markets through an increased customer focus.
- Introduce innovations, aided by the rapid product development facilities of SAP for Banking software. You can bring products to market in weeks, as opposed to months or even years on existing systems.
- Respond to and be fully compliant with regulatory requirements through the adoption of the SAP integrated banking industry solutions. IT teams can use the processing capabilities of the zEnterprise platform to rapidly access and process the big data streams that they are required to analyze and report on to avoid operational risks.

This IBM Redguide™ publication explores these capabilities. It provides insight for CIOs, executives, managers and other decision-makers, including IT architects, consultants, and systems professionals on how the technology of the IBM zEnterprise platform running SAP for Banking solution solves these major challenges in a cost-effective manner.

Business challenges for banking CIOs

Core banking systems represent decades of experience from professionals who learned their lessons by trial and error. These systems are unparalleled in their performance, scalability, proof-of-stability, and resilience when compared to any industry. However, business is more challenging than ever, which is why many banks are modernizing their systems. These are among the key challenges that CIOs face in today's banking industry:

- Reduce the business risk that is involved with operating IT systems and improve infrastructure resilience
- Improve competitive agility to grow market share
- Meet rapidly changing regulatory compliance requirements

Reduce business risk and increase resilience

Many banks are running their core banking systems on platforms that were designed several decades ago. At that time, the business model was based on branch banking with a limited number of customer channels. These systems are often built and maintained in-house. Some are based on technology that is no longer current, such as the assembly programming language.

Although these systems are well-understood by the bank's staff and provide good service for the business model that they were designed for, they are becoming more challenging to support and expensive to run. In-house solutions are expensive to recode, in contrast with packaged solutions that the vendor keeps current. Often, only a few individuals truly understand how in-house systems work. Documentation of the solution might be poor, and this provides a significant risk to the bank. The lack of flexibility of these applications also makes them difficult, if not impossible, to adapt to the rapidly changing banking business environment and increasingly demanding customer requirements. New applications take many months to develop and deploy, which can result in many years between launches.

When core services are unavailable to customers for several days or even interrupted for a few hours, the result is typically serious and costly losses. Therefore, the resilience of a core banking platform is crucial to the success and even the survival of the bank.

Data security is also critical to the resilience of the core banking platform and, therefore, the business. Data must be protected from unauthorized access and from loss or damage. The consequences of unauthorized access to customer data or of the loss of data have potentially catastrophic consequences for a bank.

Improve competitive agility to grow market share

If a core banking platform does not allow for innovation to develop new products and build new market share, the business is at risk of no longer being competitive. Customers leave, because they are lured to rivals by new and more attractive products.

A core banking platform must be able to support innovation and facilitate rapid development and deployment of new products so that the bank retains existing customers and attracted new ones. In addition, if a platform cannot support the 24x7 banking environment that customers demand today, those who are unable to access their banking services whenever and wherever they happen to be are more likely to switch to banks that can provide that level of access and convenience.

Comply with changing regulations

One of the main motivators of updates in recent years has been regulation.

Several rounds of regulatory policies have required banks to undergo changes. These include compliance with Sarbanes-Oxley (SOX); International Financial Reporting Standards (IFRS); Basel I, II, and III; Anti-Money Laundering (AML); strong end-to-end audit trails; and others.

In recent years, many more regulations have been country-specific, because central and reserve bankers are increasingly concerned about the stability of the Western financial system. They introduce more requirements for banks to comply with, and these get updated at such a rapid pace that banks cannot always meet the new requirements with their existing systems.

Sometimes, these are merely requirements for new ways of presenting data that exists within the current systems. But in many other cases, the data that is required for reporting is not yet collected by the operational systems. If banks do not meet those requirements, they incur financial penalties. Other new regulations motivate banks to transform and modernize their systems to protect against regulatory penalties for loss of service.

More risks exist if a company does not fulfill legal or statutory requirements. In addition to the loss of corporate reputation, costly penalties are to be expected for stopping business operations.

Banking regulations are also putting more demands on how quickly a bank must be able to recover in a disaster. Because banks are increasingly multinational, they must be aware that organizations, such as the European Union, have even more stringent requirements.

All of these require banks to protect themselves against the rising cost of change.

How SAP for Banking on a zEnterprise System handles the business challenges

The IBM zEnterprise System that runs SAP for Banking solutions address the challenges that today's banking CIOs face in these key ways:

- Reduces the business risk that is involved with operating IT systems and improves infrastructure resilience
- Grows market share by improving competitive agility and customer service
- Meets rapidly changing regulatory compliance requirements

Reduces risk and increases resilience

The combination of SAP for Banking solutions running on the IBM zEnterprise platform is a proven and popular answer.

SAP for Banking solutions are comprehensive

SAP for Banking solutions are packaged, pre-tested applications for all important aspects of a bank's business. The portfolio covers the entire range of banking processes for retail and wholesale banks. This starts with customer relationship management, followed by transactional banking and analytical banking, and includes the business support processes.

All solutions are based on service-oriented architecture (SOA). In this framework, a collection of modules that provide services communicate with each other. Especially in transactional banking, SAP puts an emphasis on delivering new and existing solutions that are designed according to SOA principles. These solutions pose demanding requirements on the underlying infrastructure, which is fundamentally based on the interplay of servers, operating systems, databases, and disk storage systems.

Because SAP for Banking solutions are designed according to the SOA paradigm, the software can be easily integrated with non-SAP applications. For banks, this is very important, because the SAP solution usually needs to be integrated into an existing system.[1]

IBM System z is a proven financial services platform

SAP software developers know the benefits and reputation of IBM System z® mainframes, which is why they write prepackaged banking applications for it that can be expanded as your organization evolves. A brief review of the history of System z helps make this clearer.

System z is among the mainframe descendants of IBM System/360 and System/370 systems that date back to 1964. The latest models are the zEnterprise mainframes: zEC12 and zBC12[2]. They maintain full compatibility with earlier versions. System z is one of the most stable and proven technologies that exist today, because applications that were written 40 years ago can still run on the platform, unchanged. Many of the financial services industry applications that power most of the production floors run on System z.

The z in System z comes from its design, which aims for zero downtime. Other platforms are just starting to aspire to such high-availability targets, but zEnterprise systems are all built with spare components for hot failover, so they ensure truly continuous operation, 24x7, 365 days a year. This principle is built into every component of the system.

High availability of the platform is supported by software components, including the IBM z/OS® operating system and IBM DB2® database. This differentiates System z from other systems.

As for hardware components, System z cores can detect errors, shut down a processor that fails and shift the processing seamlessly to a spare processor. Then, a service technician can replace the component without interrupting the running applications. The same applies to memory, I/O, power, and cooling. It even extends to IBM Geographically Dispersed Parallel Sysplex™ (GDPS®), which consists of coupled mainframes that can work up to 100 km apart. Some systems hold world records of 20 – 50 years mean time between failures (MTBF). GDPS users have experienced a recovery point objective (RPO) with no data loss and a recovery time objective (RTO) measured in minutes.

This is why IBM clients use System z servers for business-critical applications, where downtime costs (calculated with the probability of such downtime) are significantly higher than the cost of the special hardware, facilities, and service that are required to run such a system. There are now alternative data center architectures that can reach such high availability levels. Still, for such customers (mostly government and financial services), System z provides lower total cost of ownership (TCO) than solutions based on other platforms.

[1] This section was taken from *SAP for Banking on System z Reference Architecture, published by SAP.*

[2] For additional information, see “zEnterprise, the system of systems” on page 21.

The combination reduces risk and improves resilience

SAP banking services on the IBM zEnterprise platform make your business more resilient, which makes it more competitive.

zEnterprise security features

The SAP for Banking solution uses the zEnterprise proven ability to provide a highly secure and resilient base. With five 9s, it is continuously available, with no single points of failure throughout the architecture. High availability of the hardware is supported by software components, including z/OS and DB2. Combined with near real-time replication of data to a disaster recovery site over secure channels, this provides peace of mind. Even in the worst-case scenario of the loss of a data center, the core banking platform can be made available almost immediately at the disaster recovery site.

The security capabilities of the zEnterprise platform also provide resilience against the consequences of the loss of data through hacking or damage. The platform has its own secure internal network that connects virtualized servers that host the banking system. SAP banking services use the zEnterprise facilities to provide a highly secure banking environment with a security rating of EAL5+, data encryption, secure role-based access, and extensive auditing capabilities. The EAL5+ rating assures you that you can run production with nonproduction work without compromising integrity. The result is that zEnterprise provides one of the most secure computing platforms in the world, with no known hacking of applications.

Protection of data against loss or damage is provided through the extensive nondisruptive backup and data mirroring technology of the zEnterprise platform. Data can be recovered in seconds, if required. There is further peace of mind in the knowledge that this real-time banking solution is used globally.

Advantages of combining the SAP and IBM products

SAP AG is a global software vendor with an extensive support organization and a global resource pool of skilled support staff. This availability of technical support removes the risk of having a core banking platform that is developed in-house, with a limited and often diminishing knowledge base of support. IBM also continuously trains people through the IBM mainframe universities to increase the global pool that is available to support clients.

SAP and IBM have been involved in joint development and collaboration for nearly two decades to enable the IBM mainframe and SAP applications to take advantage of their respective strengths. The zEnterprise platform removes the challenges and risks that you might have with an existing platform. It is modern and future-enabled, the result of billions of dollars of continuous investment and development. The platform can also scale massively and seamlessly without interruption of service. This scalability increases your ability to capture new markets with flexible and rapid product development.

Improves competitive agility and customer service

SAP for Banking on zEnterprise improves competitive agility and customer service.

Banks need to be innovative and agile. They need to bring new products to target markets quickly to increase market share and to maintain competitiveness. The core banking systems must support the rapid development and deployment of products across various channels. Your customers expect to be able to access their banking services at any time of the day through various mobile devices and online and through branch teller machines.

A new bank product can be deployed in SAP quickly. Often, it can be online in days rather than the months (or years) that an in-house application can take.

Running SAP for Banking services on the zEnterprise platform can address the challenges that you might face with your existing core banking platform. It offers an integrated multi-channel solution with power and flexibility. This helps you increase market share and retain existing customers.

The combination of SAP for Banking services and the IBM zEnterprise platform enables you to rapidly develop and deploy new products through various channels, based on a real-time core banking engine. The zEnterprise platform provides a highly resilient, highly available platform that supports the 24x7 banking applications and service that today's customers demand. This is proven technology, with more than 40 years in some of the most demanding, highly available business situations. It has an unrivalled record of reliability and resilience. The platform can scale massively and seamlessly to handle the high volume of transactions that new markets generate at all times of the day and night, across new channels, while also supporting extensive account management background activities. We provide specific examples of System z availability and scalability in "Real-world results and proof points" on page 23.

Meets changing regulatory compliance obligations

SAP for Banking services on zEnterprise helps meet the ever-increasing regulatory compliance demands.

SAP's integrated banking software suite helps you stay current with the regulatory compliance obligation across many different financial jurisdictions. The power of SAP analytical software that is backed by the flexible on-demand processing power of the zEnterprise platform can extract, analyze, and report on the big data that is contained in the bank's operational systems.

SAP keeps up with the latest regulatory reporting and compliance requirements and provides features to meet those new requirements. Additionally, there is a worldwide pool of skilled SAP support teams to supplement a shrinking pool of in-house teams.

Summary of key values and benefits

IBM System z excels in minimizing risk. System z integrated functions enable banks to process a vast number of complex accounts and business partner information on time, within planned resource limits, and at a predictable cost. Exceptional peak workload at quarter-end or year-end is managed by total automation of system control and workload optimization.

These are some of the key benefits of adopting SAP software on zEnterprise hardware:

- You can design your solution by using all classes of processors. That lowers the cost.
- The renowned reliability of the System z reduces risk.
- The enterprise architecture allows for growth and high performance.
- Components such as the Unified Resource Manager make the system simple to use.
- Integrated workload management capabilities can be set to adapt the system to changing workloads.

These capabilities result in a solution that fits your current needs and your future requirements in several essential ways:

- **Business resilience**

  Near-zero downtime (continuous availability), even during maintenance of hardware, the operating system, and database components. This reduces cost and risk. With System z, the server availability is enabled by Parallel Sysplex clustering. The goals are five 9s availability and reducing the risk of system failures to a minimum. GDPS, in particular, offers capabilities that are unique in the industry to react to risks such as natural disasters.

- **Efficiency**

  Reduced infrastructure complexity through consolidation, automation, and virtualization. This results in savings on energy, labor, software, and more. It also offers end-to-end management of the SAP application landscape, a fast private network, and adopting cloud technology for higher use of your investment and standardization of administration.

- **Competitive agility**

  Flexibility and near-linear large scalability. This is based on the unique capabilities of Parallel Sysplex technology to scale up and scale out for business growth and increased workloads.

- **Integration**

  DB2 optimized for SAP. This provides the capability to handle all volumes of data on the same system architecture. It includes tight integration and simple management of SAP data and applications within an IBM cloud solution for SAP on zEnterprise.

- **Security**

  Comprehensive protection of business-critical data from all types of IT security threats. This extends to applications on zEnterprise architecture for SAP applications. It complies with major federal government and legal requirements for banks. Examples in Germany include BaFin and Federal Office for Information Security (BSI) requirements. In the US, they include the

Food and Drug Administration (FDA) Orange Book, Sarbanes-Oxley (SOX) Act, and other governmental regulations.

- **Affordability**

  Improved price performance and the new Solution Edition pricing for SAP offer significant savings and a highly competitive investment option.

Myths and realities

In this section, we examine common misconceptions.

Myth 1: Both zEnterprise and SAP for Banking solutions are rigid, binding, non-flexible technologies. Development ends up being expensive and slow, which risks core banking transformation projects.

Reality: The use of SAP core banking applications on the zEnterprise platform involves non-binding, evolutionary technology. It has enough industry momentum and strength to ensure reasonable costs of professionals for ongoing maintenance. Moreover, using SAP as a package solution significantly reduces these other risks that are involved with core banking transformation:

- The SAP for Banking solutions are flexible enough to accommodate most business requirements for financial products by using only configurations that are performed by functional domain experts, not by traditional code development after costly design-build-test cycles. This ensures agility and short time-to-market, unleashing business innovation and competitiveness.
- Package enhancements are developed by using standard SAP tools that are common for all SAP Business Suite applications. The technical skills and capabilities that are required to extend, enhance, and maintain an SAP core banking application are the same. These capabilities can be found among IT staff in most banks that run SAP as an enterprise resource planning (ERP) suite.
- SAP industry solutions, specifically banking services from SAP, support service-oriented architecture. They can be easily integrated with your existing systems if those systems are designed for SOA.
- SAP and IBM have developed proven methods and practices to implement the packages. This enables rapid implementation by using agile approaches. Say goodbye to “waterfall” methods and the necessity to review 1000 pages of documents before writing one single line of code.
- The fact that implementation starts with a working product eliminates much of the risk that is inherent in the first few iterations of any core banking transformation project. Building and maintaining home-grown software frameworks and infrastructures tends to become the new (often inflexible) legacy for the organization. What was supposed to be a development accelerator becomes a key factor in non-reducible costs.

Myth 2: There are alternative platforms to run SAP that provide the same levels of performance and availability as zEnterprise at a lower total cost of ownership.

Reality: Some alternative data center architectures exist today that might allow reaching high availability levels. However, high availability is not the same as continuous availability. If you are looking for availability, demand a clear definition of how a vendor’s infrastructure is maintained and upgraded.

Often, application maintenance costs are not due to the platform but to other factors. They are not relevant when you use a standard package, such as SAP, which relies on widely used technologies, such as SAP NetWeaver and Advanced Business Application Programming (ABAP) programming, both of which are practiced by many professionals.

The IBM zEnterprise System, the latest line of IBM mainframes, goes one step further, closing the gap between System z traditional and alternative architecture. It offers both mainframe and open server technologies in one integrated system, with a single management view of resources that can reduce the total cost of ownership.

zEnterprise, which uses IBM zEnterprise BladeCenter® Extension (zBX), extends mainframe capabilities of management, security, governance, serviceability, and dynamic resource allocation to other systems that are running on other platforms, such as IBM AIX® on IBM POWER7® and Microsoft Windows or Linux on x86. This is a breakthrough in mainframe architecture.

Therefore, by selecting zEnterprise as the future data center architecture, you can implement the most advantageous features of each platform in a single system. By using less-expensive processors and distributed operating systems with central management and tight integration between the System z host and the lower-cost distributed technology servers, you reduce your TCO.

Myth 3: SAP runs better on open platforms than on IBM mainframes.

Reality: That alternative is less costly only if you ignore the benefits of stability and performance. Both of those reduce the TCO of choosing a System z platform.

SAP and IBM alliance teams have worked together for years to build a series of unique and important features into the SAP NetWeaver server for mainframes and into the banking services from SAP components. Therefore, System z has a unique advantage when it runs SAP NetWeaver and SAP for Banking systems.

The architecture of SAP for Banking solutions on IBM zEnterprise Systems

This chapter provides details of the solution components and the benefits of each. It includes an overview of the SAP for Banking solutions, followed by a description of the benefits of the IBM zEnterprise platform.

SAP for Banking solutions

SAP for Banking offers an integrated product suite to meet the demanding requirements of retail and wholesale banks. It provides solutions for the following areas:

- Customer relationship management
- High-volume transactional and loans banking
- High-volume payment processing
- Analytics for financial instrument accounting and profitability analysis
- Risk and compliance management
- Accounting
- Enterprise resource planning (ERP)

Figure 1 shows the solution components.

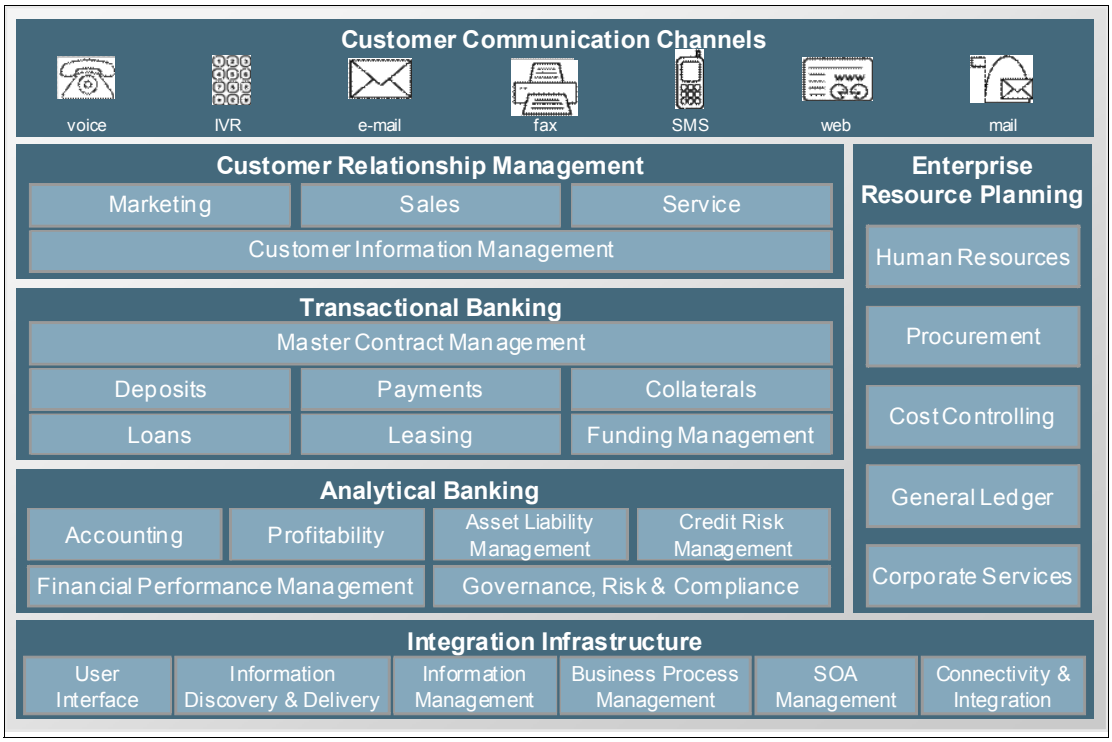

Figure 1 Components of SAP for Banking solutions

SAP for Banking is built on an open service-oriented architecture (SOA) and the SAP NetWeaver technology platform. It is flexible, agile, and makes integration into your existing banking IT environment easier.

The core is SAP Banking Services software, which is an SOA-enabled platform for retail and wholesale banking. This package includes high-volume transactional banking, loans, collateral management, banking analytics, and risk management components. It processes large volumes of transactions and scales to meet the most demanding banking scenarios.

The flexibility of SAP Banking Services can increase market agility and improve the ability of a bank to focus on new and changing customer groups. For example, new account products can be configured and tested in hours without developing new program code. You can then bring these new products to market rapidly, through existing customer channels or new mobile banking channels, through the open SOA.

The SAP software manages the complete account lifecycle of checking and loan accounts. Powerful integrated banking analytics and risk management analysis support the banking operation. Integration with back-office enterprise resource planning (ERP) systems, either SAP or non-SAP, completes the solution shown in Figure 1.

This powerful SAP Banking Services suite, combined with the unique capabilities of the IBM zEnterprise platform, meets the most demanding needs of the fast-moving banking industry.

SAP technical stack: NetWeaver

The synergy between the zEnterprise platform and the SAP NetWeaver stack (which underlies the SAP core banking package) creates a powerful combination that is highly available, stable, scalable, and high-performing, yet portable, maintainable, and flexible.

The SAP NetWeaver stack has features that make it practical for enterprise application development and maintenance. These features surpass any other in-house development and are among the best packages in the market:

- Extensive documentation of the package to help your teams use of all of its capabilities and benefits. This includes its business processes, data entities, configurable capabilities, and implementation guides.
- Service-oriented architecture (SOA) for flexibility and growth. This includes a large set of well-documented interfaces, file and message formats, and enterprise services that are publicly available as sets of Web Services Description Language (WSDL) files and related documentation, messages examples, and sequence and interaction diagrams.
- Built-in documentation of the software package code for ease of use. This includes mechanisms for maintaining software documentation and help resources.
- Standard cross-component mechanisms. These are built in across the suites for handling multiple languages, time zones, country, currency, product systems, rules and regulation systems, and other variations.
- Multi-tenancy built into the platform as a typical cloud service feature. It also includes the SAP Solution Manager with embedded application lifecycle management (ALM), transport management, extensive and extensible application monitoring capabilities, and more.
- A dynamic SQL layer. This isolates the software from database dependencies.

SAP for Banking applications

For business applications, the SAP for Banking solutions and the SAP technical stack consist of multiple components. These include transactional banking, analytical banking, and customer relationship management.

Transactional banking

The SAP for Banking portfolio contains a unified set of service-enabled applications to support the following range of transactional banking processes:

- Customer Information File (CIF) management
- Financial services product management
- Finance operations, such as loans, facilities, and collateral
- Checking and savings account operations, such as card management, term deposits and deposits at notice, capital-yield tax management
- Corporate cash management (pooling and bundled pricing, for example)

SAP Deposits Management

SAP Deposits Management supports retail account products, including current accounts (without checks and debit card), savings accounts, notice accounts, fixed-term deposits, and savings plans. It also supports corporate account products, such as current accounts, investment accounts, and interest calculation.

Products in Deposits Management are defined through a flexible product configurator with customer-level adjustments and flexible condition handling. It has a posting control office for efficient post processing and exception handling, such as overdraft processing. Product configuration has multiple approval levels on changes.

For European customers, there is integration with Single Euro Payments Area (SEPA) mandate management (for example, lock mandates that use posting lock management).

SAP Loans Management

SAP Loans Management for Banking provides flexible management of all types of retail loans, secured or non-secured, such as mortgage loans, personal loans (consumer and installment), and revolving credit loans.

It supports flexible definition of standard products, flexible condition handling (either product or customer level), automated process support for business processes, such as extra payments, and business operations, such as account holder change and product change.

SAP Master Contract Management

SAP Master Contract Management bundles contracts into groups and hierarchies for corresponding managed retail banking capabilities, such as product bundles or packages, overdraft protection, payment distribution, and facilities. It has an application-dependent maximum number of levels in the hierarchies.

Master Contract Management handles corporate banking products, such as cross-account funds validation, multilevel notional pooling, zero-balance accounts, intraday and end-of-day, multi-bank interest calculation, sweeps-trigger and target, multi-bank, investment, cross-border, and foreign exchange.

SAP Collateral Management

SAP Collateral Management lets banks maintain flexible definitions of collateral objects:

- Immovable, such as real estate
- Movable, such as ships, aircraft, and vehicles

The collateral agreements that are supported are real estate liens, registered liens, pledges, assignments, and guarantees.

Banks can use the feature to maintain collateral amounts and asset values, encumbrances (their own or third parties'), and relationships between assets, transactions, and collateral agreements, including collateral pools.

Collateral Management supports rich calculations, including collateral cover, collateral distribution, loan-to-value ratios, free collateral, collateral shortfalls, and comprehensive processes.

Analytical banking

The SAP solution for analytical banking is based on SAP Bank Analyzer, a component of SAP Banking Services. It supports overall bank control by calculating, evaluating, and analyzing financial products.

It is based on the SAP Integrated Finance and Risk Architecture (IFRA) and meets current requirements, including International Accounting Standards (IAS), Generally Accepted Accounting Principles (GAAP), Basel II, Risk-Adjusted Performance Measurement (RAPM), and Sarbanes-Oxley for a wide range of financial products. This component supports several scenarios:

- SAP Basel II solution supports Basel II regulations for risk and capital adequacy management.
- The SAP Accounting and Financial Instruments solution (AFI) supports compliance with IAS. It uses a subledger scenario to handle accounting for financial instruments and a merge scenario to process financial instruments in accordance with IFRS.
- The SAP Hedge Management solution controls all hedging activities in line with the IAS Regulation 39.

Beyond that, it contains tools such as the strategy analyzer to manage market risk, profit analyzer, counter party risk analyzer, and country-specific risk analyzer. All support standard analytical banking requirements by using the best information from various banks' operational systems, both SAP and non-SAP.

Note: There is an advantage to using SAP transactional banking with SAP analytical banking, because SAP provides standard content to integrate its core banking systems with the analytical ones with much less effort. This is basically a "deploy and facilitate interface connection" type of implementation.

CRM for banking

SAP provides operational CRM support for many of the best-run banks and for companies in more than 25 other industries. It provides functional CRM coverage for banking customers, ranging from simple sales force automation and campaign management implementations to fully integrated, end-to-end, multichannel sales, and account origination. It also includes capabilities that range from leads and opportunity management, through managing requests for financing and other financial service quotations, to account creation in the target account management system.

SAP CRM connects people, processes, and communications within a customer service network by providing these benefits:

- Consistent and relevant interactions across channels
- Seamless integration with marketing, sales, and service processes
- 360° view of the customer, process access, and collaboration

SAP for Banking on IBM System z Reference Architecture

To support the System z solutions, SAP provides a helpful document titled *SAP for Banking on System z Reference Architecture*.[1] It focuses on the system infrastructure and is a guideline for how to best implement and run SAP for Banking solutions on System z to meet your stringent infrastructure needs. It is

[1] http://scn.sap.com/docs/DOC-14357

based on real-world experiences gained at many SAP for Banking implementations at large banks worldwide. A more generalized architecture is described in *SAP Business Suite on IBM System z Reference Architecture for System Infrastructure*.[2] Both documents are available from the SAP Community Network.

These are some of the core infrastructure products and technologies that are part of the reference architecture:

- IBM System z
- IBM DB2 for z/OS with data sharing
- IBM Disk Storage DS8000® with fast replication services, such as Metro Mirror or Global Mirror and IBM FlashCopy®
- IBM Parallel Sysplex and Geographically Dispersed Parallel Sysplex (GDPS)
- SAP Central Services with a replicated enqueue server
- IBM Tivoli® System Automation

SAP for Banking Reference Architecture on System z provides a blueprint for how to meet the infrastructure requirements of SAP for Banking solutions. The products and components of this reference architecture are available, mature, and proven in many banking infrastructure environments that also run the latest SAP core banking solutions. The flexible reference architecture can be varied and combined according to your needs and situation.

IBM zEnterprise unique features for SAP

Banking systems must be able to process large workloads in a scalable, continuously available, and highly secure environment without failure or error. The zEnterprise platform, running z/OS and DB2 software, has unique features that SAP for Banking services use to meet the demanding requirements of banking. These tightly integrated hardware and software features of zEnterprise increase reliability, operability, and performance, while reducing the total cost of ownership (TCO).

Modern business applications, such as SAP applications, are heterogeneous by definition and often span multiple platforms. To address the issue with management of complex cross-platform workloads as one logical system, IBM developed zEnterprise System (zEnterprise).[3]

Reduce the outages and overhead of traditional high-availability clustering

A banking service needs to be available 24x7. Therefore, it requires *continuous availability* that is based on *continuous operation* and *high availability*. Traditional technologies attempt to provide this by using clustering to protect key system components, such as the database server. In the event of the loss of the database server on these clustering technologies, the SAP banking system goes down while the clustering software moves the service to the backup server.

With SAP Banking Services running on zEnterprise, this is not the case. If there is a loss of a critical component, such as the database server, the SAP banking

[2] http://scn.sap.com/docs/DOC-14431

[3] For more information, see “zEnterprise, the system of systems” on page 21.

system stays up, because the remaining members of the zEnterprise Parallel Sysplex continue without interruption. Another member seamlessly takes over the application workload of the failing server. The performance overhead that is incurred with some vendors' clustering technologies is also eliminated because the messaging traffic that is required between the database servers is integrated into the zEnterprise hardware, its microcode, and the integrated software stack.

Continuous operation

In addition to reducing single points of failure to support a bank's high availability requirements, the zEnterprise platform, running DB2 on z/OS, also provides for continuous operation through various features. Rolling upgrades of operating system and database systems are possible (almost instantaneous), and nondisruptive backups at the physical and logical levels are supported. Other regular database tasks, such as nondisruptive reorganizations, are possible by using the integrated hardware and DB2 facilities.

Ease of management for reducing single points of failure

Running the SAP Banking Services with IBM DB2 for z/OS in a zEnterprise Parallel Sysplex removes single points of failure and increases operability and performance. One single point of failure that needed to be managed was the SAP replicated enqueue server. For all other SAP system platforms, the standard mechanism for ensuring high availability for the enqueue server is by running a replicated enqueue server on a remote host. The enqueue server replicates its lock data by sending it to a shadow lock table in the replicated enqueue server. The switchover to the shadow replication server is managed by system automation software.

With zEnterprise running in Parallel Sysplex mode, this is greatly simplified. Rather than sending replication lock data to the replicated enqueue server on a remote host, the enqueue server writes the lock data directly to the coupling facility (CF) hardware that links the members of the Parallel Sysplex. If the primary enqueue server fails, the enqueue server can be restarted either manually or by the automation software on any logical partition (LPAR) within the sysplex. The new server automatically reads the replicated lock data from the CF. This makes system administration much easier. It also improves the reliability of the SAP system by removing the margin for error in the management of the replication of the enqueue server. This feature is unique to the zEnterprise platform.

Simplify SAP Landscape Management with Cloud on zEnterprise

All SAP implementations require a series of *project* and *support* systems for the production system, and SAP banking is no different. Creating and managing these systems can be difficult, time-consuming, and costly. This adds to project costs, time scales, and the TCO. With the IBM Entry Cloud Configuration for SAP Solutions on zEnterprise,[4] optionally in combination with SAP NetWeaver Landscape Virtualization Management (LVM), you can automatically deploy new or cloned SAP systems with DB2 for z/OS databases in minutes, rather than days or weeks, as Table 1 shows.

[4] IBM Entry Cloud Configuration for SAP Solutions on zEnterprise
http://www.ibm.com/common/ssi/cgi-bin/ssialias?subtype=SP&infotype=PM&appname=STGE_ZS_ZS_USEN&htmlfid=ZSSO3074USEN&attachment=ZSSO3074USEN.PDF

Table 1 IBM entry cloud configuration for SAP benefits

SAP LVM with IBM Entry Cloud Configuration
Experienced Savings

	Use Case	Frequency	Before	After
DB Admin	Install DB2	weekly/daily	**1 day**	**5-10 min**
	Maintain DB2 libraries	weekly/daily	**½ day**	**5-10 min**
	DB2 release migration	Not frequently but many instances	**1 day**	**20 min**
	Clone DB2	weekly/daily	**2-3 days**	**10 – 50 min**
SAP Basis	SAP System Refresh (DB only)	weekly	**3-4 days**	**40 – 240 min**

Shrink the database

The zEnterprise platform, running DB2 for z/OS, provides a powerful license-free hardware data compression facility that can reduce SAP database size by up to 60%. The DB2 software also offloads the compression or decompression to special zEnterprise processors, which means that processor cycles for instructions are minimized.

Reduce total cost of ownership

The total cost of ownership (TCO) is significantly reduced for an SAP Banking Services system that runs on the zEnterprise platform, because up to 50% of the workload can be offloaded to zEnterprise specialty processing engines that cost significantly less: either System z Integrated Information Processor (zIIP) or the System z Integrated Facility for Linux (IFL). This results in reduced hardware and license costs. An alternative is the IBM System z Solution Edition that is competitively priced and uses the IBM specialty engines. The reliability of System z saves you money by reducing or eliminating the high costs of downtime. Centralized operability also reduces costs.

Ensure high levels of system security

Banking systems require high levels of security to protect them. There are often serious financial and legal penalties that are imposed by banking regulators for lapses in security.

The zEnterprise platform offers powerful levels of security for an SAP banking system. The closed internal LAN and VLAN network inside the zEnterprise system provides secure non-exposed connections between the servers of SAP systems. In addition, the separation of workloads within the virtualized environment of the zEnterprise makes System z the only platform that complies with the most stringent EAL5+ rating of the Common Criteria Security Certification international standard.

Further security facilities within the SAP and DB2 for z/OS software stack enable separation of duties through role-based access and ensure that key system personnel, such as database administrators, cannot view data that is held in DB2 database tables. Powerful auditing capabilities back up these features. Data can be encrypted at all levels of the system, from the database to the network. These and many other features provide a secure environment for an SAP banking system.

zEnterprise, the system of systems

zEnterprise is sometimes referred as “the system of systems,” because it was designed to integrate mainframe and distributed server technologies and deliver legendary System z quality of service to the entire complex.

It is the result of continuous technological evolution since the introduction of the first IBM S/360 mainframe in 1964. To protect your investment, it maintains compatibility with earlier versions. At the same time, it is ready for the most advanced applications and innovative workloads.

zEnterprise consists of these components:

- The System z server
  - IBM zEnterprise EC12 delivers new levels of performance. It is the world’s fastest, most scalable, and secure enterprise system, based on its 5.5 GHz core processor speed. zEC12 has tremendous capacity for large-scale consolidation and growth. A single box can have up to 101 central processors. Clients can cluster up to 32 computers into a single system image by using Parallel Sysplex technology. I/O processing is offloaded to a dedicated subsystem that is not using central processors. It can routinely handle hundreds of thousands of I/O operations per second.
  - IBM zEnterprise BC12 helps enterprises of all sizes improve customer service by using the latest capabilities of the zEnterprise System. As an entry point for Enterprise Systems computing, the zBC12 is cost-effective. It contains up to six 4.2 GHz general-purpose central processors, which offer up to a 2x increase in available memory (496 GB).
- The IBM zEnterprise BladeCenter Extension (zBX)

  This extension can host both general-purpose blade servers and appliance-like workload optimizers. They can all be managed as though they are a single mainframe. zBX is connected to System z by using a private high-speed internal network, which reduces the need for networking hardware and provides inherently high security. It can be used for new and existing blade workloads with affinity to data and applications hosted on System z. zBX can also host selected IBM POWER7 running IBM AIX (virtualized by IBM PowerVM®) or IBM System x® blades that are running Microsoft Windows or Linux (virtualized by an integrated hypervisor that is based on a kernel-based virtual machine, or KVM).
- The management layer: IBM zEnterprise Unified Resource Manager

  This provides a single management view of the complete zEnterprise (resource management, energy monitoring and management, security, and networking). In a failure, it can dynamically reallocate system resources to prevent or reduce application problems.

Unified Resource Manager is an end-to-end management tool. Along with the new architecture provided by IBM zEnterprise System, it transforms the existing IT infrastructure paradigm and helps solve the challenge with management of complex workloads implemented on multiple heterogeneous servers. This system design can lead to efficient and effective enterprise solutions.

Real-world results and proof points

This chapter describes use cases that demonstrate the benefits of the SAP for Banking solutions on the IBM zEnterprise System. We describe the effort to evaluate the capability of the infrastructure for SAP Banking Service as the most critical retail banking application from a client point of view. In addition, more SAP modules are frequently analyzed jointly by IBM and SAP to test function and scalability of new products on behalf of customer requests. The results for tests of the following modules were published: SAP Bank Analyzer, SAP Business Information Warehouse (BW), SAP Payment Solution, and SAP Banking Services loans.

Reduce business risk and increase resilience with zEnterprise

Increasing business resilience is a key challenge that bank CIOs face. Critical banking systems need to be always available and operational. The zEnterprise platform running SAP for Banking software can meet these challenges. To respond to client interest, a proof of concept (POC) test was designed and conducted. It was based on previous successful “high watermark” tests. In other words, these tests show the highest workload capacity that is possible in the test system configuration.

Objective

A reliable system can be enriched with appropriate tools and processes. However, if an IT system is not reliable, no tool can ever deliver the necessary service quality at a sustained workload.

The primary objective of the POC test was to show the built-in capabilities of IBM zEnterprise. The exercise included the IBM DS8000 storage subsystem enterprise for its replication technologies and DB2 10 for z/OS as database server. These addressed customer requirements for business continuity as a balanced combination of high availability (HA), continuous operation (CO), and disaster recovery (DR) capabilities. The system needed to be reliable, available, and serviceable (RAS). Some experts add a requirement that it be secure (which results in RASS).

These carefully designed testing scenarios were developed from several client' requirements and discussions with them. The tests incorporated the most important base requirements:

- Take advantage of pure zEnterprise built-in reliability, availability, and serviceability (RAS) capabilities
- Achieve a recovery point objective (RPO) of 0 (no data loss) in every test.
- Minimize the recovery time objective (RTO) within the scope of manual intervention

Project: SAP Transaction Banking Services

In this business case proof of concept, SAP Transaction Banking Services was the application foundation for the workload. For technical scenarios, there was no need for different types of workloads, because the daytime workload stress test driver code was identified as suitable. The daytime workload from the SAP suite offers a simple workload generation, ease of restart, and stable workload for up to 30 minutes of runs.

System setup

The principles and guidelines in *SAP for Banking on System z Reference Architecture* documentation were implemented. Those include these components and requirements:

- Two physical System z servers with 100% failover capabilities
- Ability to process about 30 million postings per hour as a reference workload
- Synchronous mirroring of the 150 million account database
- Tools and systems management that are delivered by z/OS and DB2 10 built-in capabilities

This configuration is close to customer real-life environments, so the workload and testing scenarios were also designed from existing customer requirements. See Figure 2.

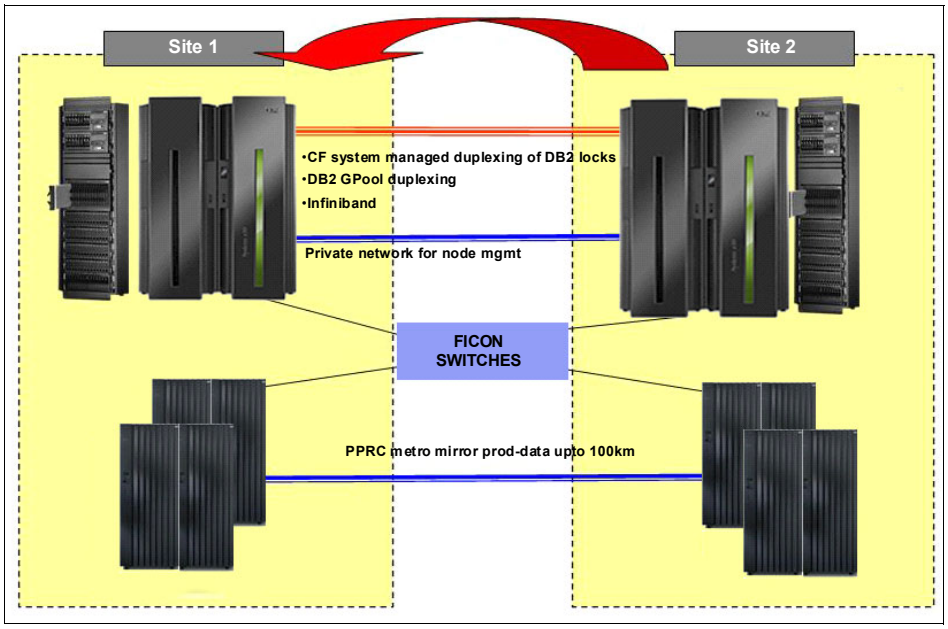

Figure 2 Customer failover scenario

Grouped into 4 categories, 16 different scenarios were designed and executed. The results were designed as closely as possible to real customer future production workloads and data processing center infrastructure setups. These are listed in Table 2 on page 25.

Table 2 Customer scenario categories and test cases

Category	Test case	
Continuous operation (planned maintenance)	Switch SAP (Central Services) to standby server	
	DB2 nondisruptive maintenance	
	Coupling facility (CF) DB2 lock structure rebuild	
	Primary disk maintenance: Planned IBM HyperSwap®	
High availability (unplanned scenarios)	DB2 member failure	
	LPAR failure, including one DB2 member	
	Server failure, including LPARs and a DB2 member	
	Primary disk failure: Unplanned HyperSwap	
	zBX intraensemble data network (IEDN) private high-speed data network error	
	CF DB2 lock structure failover	
Performance	SAP HA	SAP without ERS
		SAP with ERS
		SAP with replication into CF
		SAP with replication into CF, restart

Category	Test case
Disaster recovery (unplanned scenarios)	Site failure, including the SAP application server and database
	Primary disk failure: Unplanned HyperSwap

Result: No loss or corruption of data

The series of critical scenarios demonstrated the overall high quality and reliable behavior of the infrastructure landscape that was based on System z. In both types of outage (planned and unplanned), no data was lost or corrupted. Therefore, the top-priority requirement of RPO=0 was achieved. This confirmed that System z is an exceptionally reliable platform.

Representative examples of the results are the scenarios where a major site failure or planned maintenance was simulated. A built-in function of z/OS called basic HyperSwap worked seamlessly and quickly. After an entire swap of all I/O access paths to the secondary site, SAP work processes immediately continue to work at the surviving site.

In the case of a component failure (such as one member or instance in a DB2 for SAP data sharing group that has two or more members in different partitions of the server), an apparent failover of the workload to the surviving instances was managed internally by the System z sysplex failure management technology. Built-in functions provided automatic restart of the failed components. If this fails also, after some wait time, the workload is moved to the surviving component, which can be at a remote site. Meanwhile, the SAP workload originally directed to the not-affected instance continues to operate. In this model of continuous availability, the configuration was implemented within metro distance, so it achieved RTO = 0.

SAP-HA

To enhance the process of HA and CO, clients asked SAP to develop a way to handle a potential failure of the SAP enqueue recovery server, which takes care of the business transition serialization and consistency. In early 2013, IBM and SAP provided an optimized architecture to significantly reduce system overhead by using the System z coupling facility (CF) of zEnterprise Parallel Sysplex technology. The results clearly showed the benefits of this optimized solution, providing much better scalability and avoiding existing enqueue recovery server throughput constraints with significantly reduced resource use.[1]

Conclusion: Continuous operation

The facilities and capabilities of the zEnterprise platform enable SAP for Banking software to scale seamlessly and massively to process mixed workloads. System z is designed to provide continuous operation and five 9s availability. These features address the key challenges that banking CIOs face: To implement systems that provide business agility through seamless scalability and high performance, along with the business resilience required to safely operate their banks.

[1] IBM zEnterprise System: SAP Enqueue Replication into System z Coupling Facility Performance Test Report http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102248

Competitive agility through zEnterprise platform scalability

Competitive agility is one of the key challenges for banks. IT systems need to be able to scale rapidly and to maintain performance of a mixed workload to meet new business demands. This is even more important while you are growing new markets through increased customer focus. Agility increases when you can bring new products to market rapidly by using SAP for Banking software. The IBM zEnterprise platform running SAP for Banking software can help you achieve this.

Core banking transformation projects are complex, lengthy, and costly. They call for enterprise-wide effort and involve significant resources. Stakeholders and managers need representative and reliable information about the behavior of the application landscape. The ultimate proof is the service level that the bank offers to its customers and the resulting cost of ownership. You need confidence in the application system from a business and functional perspective, and your bank needs to comply with requirements for performance, scalability, reliability, and overall efficiency. Risk mitigation on a core banking system focuses on two key factors:

- Performance

  In terms of core banking, a critical business process consists of a mixed workload of online activities at a bank, mostly accumulated during daytime working hours. Another is the end processing to finalize the balance of an account, calculate interest and rates, and deliver information for any subsequent business and IT processes. Banks must provide their customers with round-the-clock, real-time access to their current data, plus the possibility of conducting account transactions 365 days a year, 24 hours a day. At the same time, they must ensure that batch processes, such as account balancing or the creation of bank statements, can be processed simultaneously. This calls for bank CIOs to focus on new distribution channels and innovative products that require an increased throughput of transactions.

- Reliability

  Bank customers need to have numerous routes of access available, such as electronic banking on the Internet, other online services, self-service terminals, and mobile devices. These options not only increase the service quality but also reduce costs. From a technical perspective, this means that, along with system reliability, round-the-clock system availability is also provided. This promotes customer acceptance of the new forms of banking.

Objective

In response to requests from several worldwide clients who are planning new transformation projects or growing existing core SAP Banking Services, the IBM Systems and Technology Group's SAP on System z Performance Group launched a major client-oriented stress test to evaluate the most critical banking services workload categories. The test, although not a benchmark, was modeled on the SAP standard application benchmarks, which have been available with R/3 since 1993 and are now available for numerous components. The goal with the Parallel Sysplex data sharing configuration was primarily high throughput and, to a lesser extent, scalability.

Project: SAP application stress tests

SAP's Standard Benchmark for Banking Services, which was the starting point for the stress tests, is subdivided into online use and account balancing during two times:

- Day processing describes a mixture of online entry and batch-like requests (typical daytime requirement), for posting large numbers of items.
- Night processing is account balancing, requiring the calculation of interest and charges.

Figure 3 shows both types of processing.

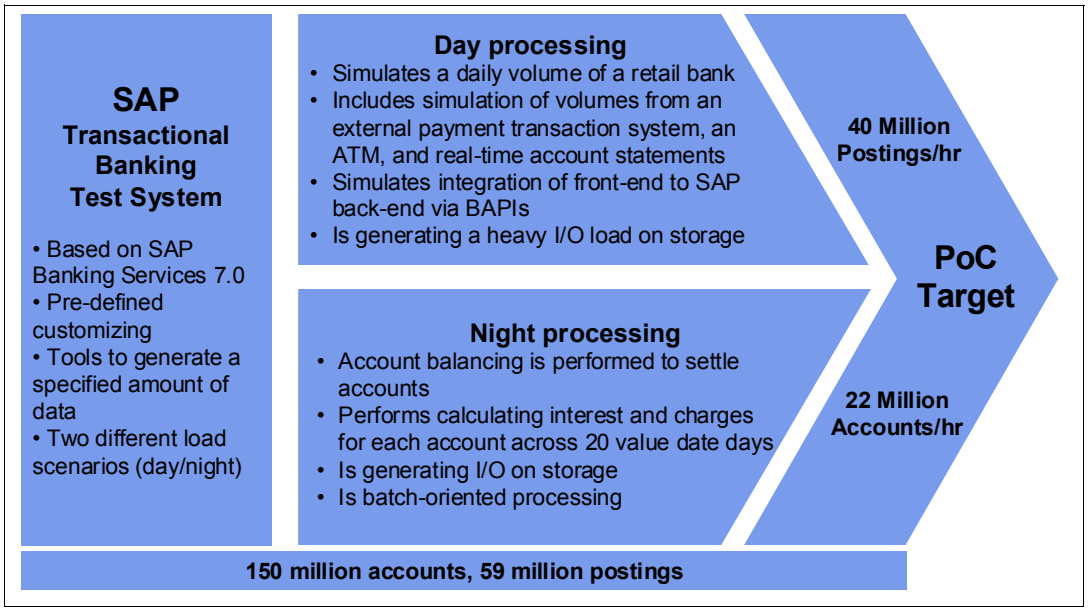

Figure 3 SAP standard stress test scenarios

Business process description of day processing

For this scenario, the stress test simulated typical daily volumes of a retail bank, including the quantity of payment transaction operations received from external payment transaction systems. Parallel to online entries, mass postings of incoming payments received from external payment transaction systems were simulated. The target was to achieve more than 40 million postings per hour.

Business process description of night processing

Along with finding out how many payment transaction operations can be processed per hour, another task was to test account balancing. Accounts are balanced at regular intervals. The system triggers account balancing periodically, although it is possible to set the time periods. For the stress test, account balancing was simulated as follows: 20 value date days were taken as basis for the calculation of interest and charges for each account. The target was to achieve more than 22 million balanced accounts per hour.

Environment description

The system was set up in an SAP very large database (VLDB) configuration with 150 million accounts, SAP SBS 7.0, IBM DB2 10 for z/OS, a large zEnterprise server, and an advanced enterprise IBM System Storage® DS8800 unit. The

goal was to reach significantly higher business transaction processing rates in a stressed 150 million-account environment than had been reached in stress tests or client implementations. This list gives a short introduction about the setup of this stress test:

- **System z DB server:** Measurements were on a zEnterprise system (single 4-book z196 M80 with 80 central processors and 655 GB memory). The configuration included two z/OS LPARs, each with 30 CPs and 192 GB memory, additionally added two CFs, each with 8 ICFs and 64 GB of memory. The database manager was DB2 10 for z/OS.
- **Storage:** For the database, four IBM Enterprise Storage Servers DS8800 Dual Frame were used, each with eight ranks of 300 GB solid-state drives (SSDs), totaling 32 ranks of 15 K RPM 146 GB
- **Hard disk drives (HDDs):** A dedicated disk subsystem was exclusively configured for database logs. In total, approximately 37 TB disk space was provided for the DB2 subsystems, including all database components and SAP Basis components. The allocated disk space for the core SAP BS database was 12.5 TB including banking tables and indexes. All of this was assigned to SSDs.
- **Application servers:** We used up to 65 IBM POWER7 model PS701 blades, populating five BladeCenters, and a presentation server that was running on a p7 740 model with 16-core 3.55 GHz SMT4 with 256 GB of memory. The PS701 blades each had eight cores that were running 3.0 GHz, SMT4, and 128 GB of memory. One of the blades ran a stand-alone ENQ without replication. The rest of the blades were for regular dialog and batch processing. The stress test used these blade application servers in two configurations: BladeCenter and System z BladeCenter Extensions (zBXes).
- **Network:** 10-Gigabit Ethernet networks were used for all connections. The application servers were connected to the z196 with a 10-Gigabit Ethernet switch, using 8 short-range (SR) ports and Open Systems Adapters (OSA-Express3).

The IBM Techdoc titled *IBM System zEnterprise, System Storage, and DB2 10 for z/OS: SAP Banking Services 7.0 150 Million Accounts Measurements* provides details about setup, configuration, and results:

http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101978

Result: Significant gains in throughput

Figure 4 compares the results of this new stress test to previous System z results. The goal was achieved within the testing time. Our configuration can achieve up to the limit of the given resources. The per-hour throughput reached close to 60 million postings and 31 million balances.

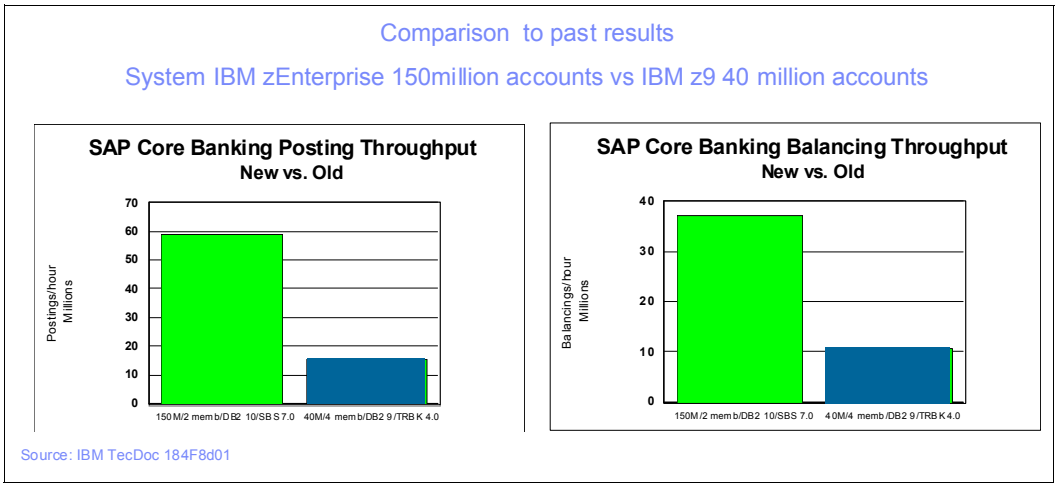

Figure 4 SAP banking 150 million account stress test results

Our optimized subsystems were major contributors to the throughput.

Note: Keep in mind that a lot has changed since this test. For example, significant advances have been made in the hardware (processor and storage systems) and software (especially DB2). There is a strong synergy among the hardware, operating system, and database, plus many more optimized access patterns for SAP.

DB2 for z/OS

Examples are DB2 use of 1 MB page frames, long-term page fixes, and special optimizations for more recent System z machines. In addition, DB2 10 showed significant improvements in scalability, supporting large numbers of concurrent operations. Items that were particularly important for these workloads were the below-the-bar (2 GB) virtual storage constraint relief, extended exploitation of 64-bit virtual storage, environmental descriptor manager (EDM) pool, buffer manager serialization improvements, and latch contention improvements. For example, the latch contention improvements directly help logging for both posting and balancing workloads.

In October 2013, IBM and SAP jointly announced the general availability of the next database version, IBM DB2 11 for z/OS, which fully supports all SAP for Banking applications. It was certified by SAP on the day that it was announced. More than 50 major functional enhancements provide further significant increases in performance and capacity, reduced processor use, and optimized TCO characteristics. This includes all of the latest zEC12 features, such as flash memory, 2 GB pages, and compression.

High Performance FICON for System z

Another instance of the deep synergy is the High Performance FICON® for System z (zHPF) protocol. This significantly improves I/O capacities of FICON channels during small block transfers (such as 4 KB). This is because zHPF reduces the resources that are required in channel processors, control unit ports, and links. DB2 uses zHPF through the z/OS Media Manager. SAP environments do an excellent job of using the capabilities of zHPF. They have been measured at over 94%.

System z Integrated Information Processor

The System z Integrated Information Processor (zIIP) has been quite popular with clients since it was introduced. It is used by DB2 for z/OS database servers for SAP. It was confirmed that the SAP for Banking 7.0 workloads continue to be excellent in taking advantage of zIIP. This can represent a significantly lower cost, because work redirected to zIIPs does not contribute to management services units (MSUs) that are used, and zIIP processors have a lower cost.

Data sharing

This initial configuration did not aim for high-end availability characteristics. A dedicated series of stress test scenarios with higher availability was built along this configuration, as described in “Reduce business risk and increase resilience with zEnterprise” on page 23.

The ultimate efficiency of DB2 data sharing in a multi-member (instance) mode of operation was confirmed by the results. Neither workload was constrained by the coupling facilities or their links. The posting workload had a higher cross-system interest than balancing, but it never exceeded 23%.The balancing workload never exceeded 2%, partly because it was designed for DB2 data sharing.

Database growth

Always of primary interest to clients is the issue of growth without changing platform and components. The database growth during these measurements was analyzed in detail, and no constraint was identified. The results for the DB2 tables that contributed the most to DB growth are documented[2] for further planning. Consider these results a starting estimate for DB growth. The actual physical DB growth depends on the size of individual and critical tables and the compression options. We chose data compression, which uses unique System z hardware and DB2 directories components. When you are planning an implementation, consider the requirements for keeping data online and your archiving strategies.

Posting workload

The highest result of 59.1 million postings per hour significantly surpassed the previous 15.7 million postings per hour and the planned target of 40 million per hour. This was accomplished with 150 million accounts in an SAP for Banking 7.0 environment. The technological enhancements of the system, z/OS operating system, and database, in combination, enabled this impressive throughput. In particular, the full redesign of DB2 10 for z/OS, using 64-bit system architecture, eliminated the barriers of the previous version. It is even more impressive that the below-the-bar (2 GB) virtual storage constraint relief and extended exploitation of

[2] IBM System zEnterprise, System Storage, and DB2 10 for z/OS: SAP Banking Services 7.0 150 Million Accounts Measurements
http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101978

64-bit virtual storage that DB2 10 provides allowed us to reach 59.1 million postings per hour by using only two DB2 data-sharing members. This makes system management easier and requires less costly resources to manage. The response time was usually in the 1 – 2 second range.

Account balancing workload

With just two DB2 members, the high watermark result was 37.2 million accounts that are balanced per hour. In this highly parallel workload, DB2 achieved these results because of the efficient 64-bit technology and reduced number of data sharing members and LPARs. The well-balanced system components, memory and the I/O subsystem, provided good scalability during the ramp-up phase.

Conclusion: Excellent scalability and performance

The tests confirmed that SAP software running on IBM zEnterprise scales to handle up to four times more users than in our previous tests, and each user transaction was processed quickly. In addition, our new system handled two to four times as many transactions per hour. This confirmed several of our expectations:

- SAP software combined with IBM zEnterprise has a justifiably good reputation.
- SAP and IBM continue to be excellent choices for core banking applications.
- The zEnterprise hybrid platform brings new flexibility with central control to the enterprise IT area.
- The IBM zEnterprise System has strong storage systems that can meet heavy I/O demands.
- The reference architecture for banking solutions that SAP and IBM teams developed collaboratively was successful on the test floor.

Summary

In our executive overview, we highlighted some of the major challenges that today's banking CIOs are facing:

- Reducing business risk that is involved with operating IT systems and improving infrastructure resilience
- Enabling business growth by quickly meeting increasing demands from customers
- Meeting rapidly changing regulatory compliance requirements

We then explored these challenges and expanded on the issues. We explained how the functions and facilities that are provided by the combination of SAP's banking software running on the IBM zEnterprise platform provides an effective solution to address each of these challenges.

We explained how this joint solution can achieve these objectives:

- Provide world-class resilience and reduce business risk by using the zEnterprise platform to provide continuous system operation and five 9s availability. Supported by a global pool of skilled SAP and IBM resources, this solution is able to cope with the challenge of supporting your business-critical banking services for many years to come.
- Provide agile responses to customer demand because of the seamless scalability of the zEnterprise platform's processing power. This responsiveness grows new markets through an increased customer focus on product innovation by using the rapid product development facilities of the SAP for Banking software. As a result, your bank can bring products to market in weeks, as opposed to months or even years on existing systems.
- Respond to regulatory requirements through the adoption of the SAP integrated banking solution. SAP software uses the processing capabilities of the zEnterprise platform to rapidly access and process the big data volume that is required to analyze and report on operations.

For more information, see your IBM or SAP representative, and read the publications that are listed in, "Other resources for more information" on page 34.

Other resources for more information

For more information, consult the following resources:

- *Running SAP Solutions with IBM DB2 10 for z/OS on the IBM zEnterprise System*, SG24-7978

  http://www.redbooks.ibm.com/abstracts/sg247978.html

- *SAP on DB2 9 for z/OS: Implementing Application Servers on Linux for System z*, SG24-6847

  http://www.redbooks.ibm.com/abstracts/sg246847.html

- SAP for Banking on System z Reference Architecture

  http://scn.sap.com/docs/DOC-14357

- SAP Business Suite on IBM System z Reference Architecture for System Infrastructure

  http://scn.sap.com/docs/DOC-14431

- IBM Technical Brief: IBM Enterprise System, SAP Bank Analyzer 8.0 AFI Loan Tests

  http://www.ibm.com/support/techdocs/atsmastr.nsf/5cb5ed706d254a8186256c71006d2e0a/5b77b9b40fc1d1e986257aac0026d93b/$FILE/System_z_SAP_BA8.pdf

- White paper: SAP Loans Management for Banking Services with IBM DB2 for z/OS Performance Test Report

  http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102350

Authors

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David Bellion is an SAP Technical Architect who is based in Switzerland. He has 32 years of IT experience in the IBM mainframe environment, moving from systems programming in 1992 to work for the past 21 years as an SAP consultant, mostly on System z. His particular industry expertise is SAP banking. For the past 13 years, he has worked mostly on large SAP banking projects throughout Europe. He has a functional knowledge of SAP banking from working as a banking solution architect on several projects in Europe and in roles as a Technical Architect, supporting large banking implementations on IBM System z. David also co-authored the following IBM Redbooks® publications: *Best Practices for SAP Business Information Warehouse on DB2 UDB for z/OS V8*,

SG24-7644 and *SAP on DB2 for z/OS and OS/390: High Availability and Performance Monitoring with Data Sharing*, SG24-6950.

Martin Dvorsky started his IT career in 1987 as System Programmer in Nova Hut, Czech Republic. After seven years, he joined IBM and worked in different sales and technical roles, supporting mainframe clients. Since 2010, Martin has worked as a Technical Director, supporting worldwide System z Workload teams. His job is to lead local sales and technical teams into new projects and help with solution design. Martin works with numerous System z SAP clients and runs SAP enablement activities.

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