



Migration to 64-bit Platform Improves Performance of Growing Bank's Core

Overview

Country or Region: Mexico
Industry: Banking

Customer Profile

Founded in 2002, Banco Azteca runs 850 branches with 3 million accounts. The bank reaches out to the 16 million Mexicans of modest income, who are not yet served by other financial institutions.

Business Situation

The key to Banco Azteca's success is its efficient handling of a large volume of banking and credit transactions. Scalable server technology would help enable the bank's continued growth in this area.

Solution

As a proof of concept, a critical component of banking services was migrated to a 64-bit Microsoft® Windows Server 2003™ platform. Tests showed dramatic improvements in performance and reliability.

Benefits

- Increased performance—up to 70 times faster
- Scalable solution for a growing business
- Better customer service enabled
- Compatible with existing 32-bit systems

“The improvement of performance and scalability provided by the Windows Server 2003 64-bit solution supports Banco Azteca's central services and continuing growth.”

Jorge Arturo Mendoza del Angel, Architecture Manager, Banco Azteca

Banco Azteca is the newest and fastest growing bank in Mexico and serves nearly a million customers through 850 branches across the country. The bank's mission—provide financial services to the mostly underserved, working population—depends on efficiently handling large numbers of small transactions. Banco Azteca wanted to explore the performance and scalability advantages of 64-bit computing. With support from Microsoft Corporation and Intel, the bank implemented a proof-of-concept (POC) solution using the 64-bit version of Microsoft® Windows Server™ 2003 Datacenter Edition operating system on HP Superdome servers with Intel Itanium2 processors. The result was a dramatic increase in the speed and reliability of transaction handling. With the POC successfully completed, Banco Azteca will move forward with porting the rest of its core banking services to the 64-bit version of Windows Server 2003.



“Banco Azteca built an advanced technological infrastructure that allowed us to have an efficient and profitable business around our accounts and offered tangible benefits to our customer.”

Joshua Bernal Castro, Operations and Technology Area Manager, Banco Azteca

Situation

Banco Azteca is a working person's bank, targeting the 70 percent of the Mexican population who do not currently use banking services. A wholly owned subsidiary of specialty retailer Grupo Elektra, the bank has 850 branches located inside Grupo Elektra stores throughout Mexico. This extensive network gives Banco Azteca the low-cost infrastructure and volume potential to make a profitable business out of micro-savings accounts and small credits.

Although banking operations began only in 2002, Banco Azteca is building on more than 50 years of credit experience at Grupo Elektra. Customers were already familiar with many of Banco Azteca's financial products and services, so the bank was able to experience rapid, early growth.

Banco Azteca's mission is to be the first to satisfy the banking needs of lower and middle-income customers by developing innovative processes and using state-of-the-art technologies for efficient customer service. Accordingly, the bank wanted to migrate its core banking systems to a scalable platform that can support continued growth and provide the high performance required to service hundreds of branches and millions of accounts. This migration needs to be incremental, so the new platform needs to remain compatible with existing technologies.

Because the bank's business model is to manage large numbers of small accounts, Banco Azteca wanted transaction costs kept low through maximum efficiencies in its core systems.

“In order to maintain our transaction costs as low as possible, Banco Azteca built an advanced technological infrastructure that allowed us to have an efficient and profitable business around our accounts and offered tangible benefits to our customers”, says

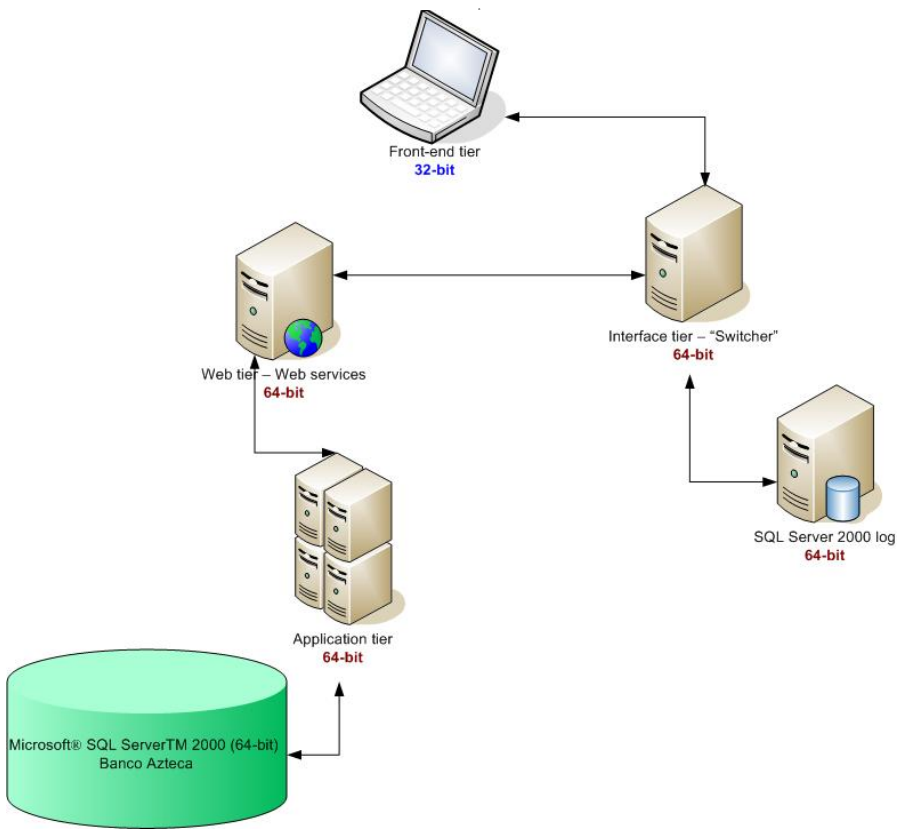
Joshua Bernal Castro, Operations and Technology Area Manager, Banco Azteca.

Solution

Banco Azteca recognized the superior scalability and performance characteristics of 64-bit platforms and chose to use the Microsoft® Windows Server™ 2003 64-bit operating system running on Superdome servers from Hewlett Packard (HP). With powerful Intel Itanium2 processors, these high-end servers could provide the scalable performance and reliability needed grow the bank's systems.

Banco Azteca's system architecture is tiered and built around a number of different technologies:

- The front-end tier that runs in its branch offices uses 32-bit applications written in various programming languages, including Microsoft Visual Basic®, American National Standards Institute (ANSI) C, and others.
- The Web tier uses Microsoft Internet Information Services (IIS) 6.0 to perform Web operations, based on Web services developed with the Microsoft Visual Studio® .NET 2003 development system.
- The application tier processes all incoming transactions by using Common Business Oriented Language (COBOL) routines and Common Object Model (COM)+ components, and executes the bank's batch process. This tier also uses Microsoft Message Queuing (MSMQ) Services components as listeners, and interacts with the databases by using Open Database Connectivity (ODBC).
- The database tier includes transactions, log storage, and error storage. This tier is already running on a 64-bit platform using Microsoft SQL Server™ 2000 (64-bit).
- The interface tier, a set of programs, collectively known as the “Switcher,” performs communication operations with



Architecture of Banco Azteca Systems after migration to 64-bit

the front-end tier and the Web tier. The Switcher is written in the (ANSI) C programming language.

The existing architecture is all 32-bit based except the database tier. Eventually, all tiers will be 64-bit based except the front-end that runs in the branch offices.

The first step in the migration of the core banking services to a 64-bit platform was to conduct a proof-of-concept (POC) migration on the Switcher, the key interface component. Microsoft Corporation and Intel, working jointly in the Propulsion Program conducted the POC in conjunction with the Banco Azteca IT department and Microsoft Certified Partner ArtinSoft. ArtinSoft works

closely with Microsoft worldwide, being a preferred supplier of worldwide upgrade and migration services to the .NET platform.

The Switcher is mission critical because it needs to be able to accept immediately hundreds of transactions arriving simultaneously and validate each one on the first try. Higher performance and reliability levels in the Switcher component will translate directly into better customer service both at the branches and on the Web.

The original operating system platform on which the Switcher component ran was the 32-bit version of Windows Server 2003 installed on an HP server with four Intel Xeon MP processors running at 2.0 GHz and with 8.2 gigabytes (GB) of random access memory (RAM). The Switcher software included 24,085 lines of code in ANSI C.

The POC team ran the migration and tests on a 4-processor Itanium2 Superdome system running the 64-bit version of Windows Server 2003. In anticipation of migrating all the central banking services to the new solution, Banco Azteca acquired four HP Integrity Superdome—16 servers, each with 32 Itanium2 (1.5GHz) processors and 6 GB of RAM each.

The POC team copied the Switcher components onto a 64-bit Windows Server machine where, after some minor modifications, they compiled successfully. Initially, the application testing occurred both in the Banco Azteca offices and in dedicated 64-bit labs in Redmond, Washington. The Redmond team identified some bugs hidden previously by bad synchronization practices. Once the code was working on the 64-bit Windows Server 2003 platform, the engineers determined it would be beneficial to redo the mechanisms used for handling synchronization of threads and for

Table 1. Performance test results

Test case	Times faster using 64-bit Windows Server
A single branch office sends 1,000 transactions	58x
A single branch office sends 5,000 transactions	71x
20 branch offices send 1,000 transactions simultaneously	23x

Transmission Control Protocol (TCP) connection management.

The POC team replaced the original TCP socket handling code with the much more robust and scalable mechanism provided by input/output (I/O) completion ports. The team also replaced the original, non-scalable method of synchronization (which ensured only a small number of connections could be made simultaneously) with the built-in synchronization that accompanies the completion ports application programming interface (API) and improved the thread handling code. At all times, the POC team made sure that the code was 32-bit compatible.

The POC team conducted performance tests for various environments and scenarios. The new application displayed impressive improvements in both performance and scalability. Based on the positive results of the POC, Banco Azteca is moving forward, first, with a full 64-bit implementation of the Switcher interface tier and, eventually, with a migration to 64-bits of all its back-end core banking services.

“The improvement of performance and scalability provided by the Windows Server 2003 64-bit solution supports Banco Azteca’s central services and continuing growth”, says Jorge Arturo Mendoza del Angel, Architecture Manager, Banco Azteca.

Benefits

The side-by-side tests clearly demonstrated the improved performance and scalability of the migrated Switcher running on the 64-bit version of Windows Server 2003 against the 32-bit version. As the bank grows its customer base, the new platform will help to enable better customer service at the branches. Meanwhile, an orderly incremental migration of the back-end components can occur because of the ability of the new platform to work together with the existing 32-bit servers.

The hardware configurations tested and compared were as follows:

- The 64-bit Windows Server 2003 ran on an Intel Itanium2 server with four processors at 1 MHz each and 4 GB RAM
- The 32-bit Windows Server 2003 ran on an Intel 32-bit server with four processors at 1.5 MHz and 4 GB RAM.

Increased Performance—Up to 70 Times Faster

Performance tests compared the transaction handling speed of the Switcher running on the 64-bit Windows Server with the existing 32-bit system. Table 1 shows by what factor the Switcher outperformed the 32-bit configuration as measured by the amount of time taken to process transactions under different scenarios.

These results are dramatic and show that the 64-bit Windows Server platform enabled the Switcher to handle, in minutes, what would take the 32-bit server hours to process.

“The speed of the transaction management that Windows Server 2003 64-bit provides is much higher than with the 32-bit version,” comments Hamurabi Moreno Aguilar, Interfaces Manager, Banco Azteca.

Scalable solution for a growing business

Table 2. Transactions test results

Test case	Sent transactions	Lost transactions	
		32-bit	64-bit
20 branch offices send 1,000 transactions simultaneously	20,000	0	0
50 branch offices send 1,000 transactions simultaneously	50,000	41,463	0

“The speed of the transaction management that Windows Server 2003 64-bit provides is much higher than with the 32-bit version.”

Hamurabi Moreno Aguilar, Interfaces Manager, Banco Azteca

Scalability tests compared the success rates of the Switcher in handling extremely large numbers of simultaneous transactions from multiple sources when running on the 32-bit and 64-bit versions of Windows Server 2003.

Clearly, the 64-bit Windows Server 2003 configuration demonstrated the superior capability of the Switcher to handle peak workloads error-free. When 50,000 transactions arrived from 20 sources, it proved too much for the 32-bit Switcher to handle, but the Switcher running on the 64-bit version of Windows Server 2003 proved equal to the task.

Better Customer Service

The superior speed and scalable reliability of the Switcher on the 64-bit version of Windows Server 2003, once fully implemented, will help ensure better customer service well into the future of this growing bank. Many of the transactions that the Switcher currently handles transmit manually from its 850 branch offices. To serve their customers well, the branches must handle these transactions quickly and efficiently, without errors.

As Banco Azteca grows the number of its branches, customers, products, and accounts, the number of transactions the Switcher needs to handle will increase dramatically, especially during peak hours. The solid foundation of Windows Server 2003 64-bit running on HP Superdomes with Itanium2 processors will help ensure state-of-the-art core banking services to support every customer transaction.

Compatible with Existing 32-bit Systems

The Switcher code for this POC was migrated to the 64-bit Windows Server 2003 environment in a week and optimized after two more weeks. The result is a program capable of running on either 32-bit or 64-bit Windows Server 2003 machines. Once the Switcher component has been fully migrated

and implemented, it will work well with all the other tiers of the bank's architecture that have not yet been migrated to 64-bit.

This kind of compatibility is extremely important to any migration process that, like Banco Azteca's, is proceeding incrementally. The ability to have new 64-bit Windows Server 2003 platforms up and running, side by side with existing 32-bit systems, allows for secure redundancy as well as flexibility in the migration schedule.

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Hardware

- HP Integrity Superdome—16 servers with 32 Intel Itanium2 1.5GHz processors and 6 GB of RAM each

Partners

- ArtinSoft
- Intel
- HP

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