



10,000+ Concurrent Users with SQL Server

Overview

Country or Region: United States

Industry: Financial Services - Banking

Customer Profile

Based in Lake Mary, Florida, Fiserv CBS Worldwide provides end-to-end business and technology solutions for banks and other financial organizations in 66 countries around the world.

Business Situation

Fiserv wanted to test its Aperio solution, which it built using the Microsoft® Application Platform, including Microsoft SQL Server® 2005 Enterprise Edition (64-bit), to ensure it would scale to 10,000 concurrent users.

Solution

Fiserv tested Aperio 6.0 at the Microsoft Test Labs in Sammamish, Washington, and found it supported more than 10,000 concurrent users.

Benefits

- Scalability
- Ease of customization
- Better view of the business
- offline capability

“We were very happy to exceed 10,000 concurrent users in our SQL Server testing. This positions us to confidently provide our solution to the world’s largest financial institutions.”

Andrew Steadman, Director of Strategy, Fiserv CBS Worldwide

With more than 18,000 clients in 66 countries throughout the world, Fiserv CBS Worldwide is a leader in providing solutions for banks and other financial institutions. With growing demand for its Aperio 6.0 customer interaction management application, the company wanted to test its scalability for large organizations. Fiserv engineers, working with their own data at the Microsoft Test Labs at Sammamish, Washington, tested Aperio, which was created using the Microsoft® Application Platform, including Microsoft SQL Server® 2005 Enterprise Edition (64-bit), and deployed on server computers using Intel® Itanium® multi-core processors. Engineers found Aperio could support more than 10,000 concurrent users, generating more than 18 complex banking transactions per second. The company is also enjoying the ease of customizing its solution to meet exacting customer needs.

Portrait™



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Fast Facts

Number of concurrent users	10,000+
Number of banking transactions (requiring multiple database reads and writes)	60,000+ per hour
Response times (with 10,000+ concurrent users)	Less than 2 seconds
Application Platform Capabilities	Development, Data Management, Business Intelligence

Situation

Fiserv CBS Worldwide is a unit of Fiserv Inc., a Fortune 500 company that serves more than 18,000 clients in 66 countries around the world. Fiserv CBS Worldwide delivers end-to-end business and technology solutions for retail financial organizations, consumer finance institutions, and credit unions throughout Europe, Asia-Pacific, Latin America, the Caribbean, Canada, and the United States.

With extensive business banking knowledge and a strong track record, Fiserv CBS Worldwide provides retail banks, consumer finance institutions, credit co-operatives and credit unions with leading technology solutions designed to meet their specific challenges. Enabling financial organizations with solutions for core banking, customer interaction management, data reporting and seamless integration, Fiserv CBS Worldwide is able to offer a dynamic portfolio of solutions to the financial services industry.

The company's Aperio product is a next-generation customer interaction management solution and the culmination of Fiserv's 14 years of experience in servicing and interaction management, and more than 20 years in financial services. Aperio's powerful business process management technology helps streamline sales and service operations to improve efficiency and optimize the customer experience. Where fulfillment work stems from customer interactions, Aperio manages workflow end-

to-end across banks' front, middle and back offices. Created using the Microsoft® Application Platform, including Microsoft SQL Server® 2005 Enterprise Edition (64-bit) database software, Aperio combines data from disparate systems to give customer facing staff a more complete picture of the customer they are serving. This more complete picture enables financial institutions to more precisely offer products and services to best meet customer needs.

Aperio has proven so popular with small to mid-sized banks, credit unions, and other financial institutions that Fiserv was eager to test its scalability. It wanted to see if an Aperio deployment could support at least 10,000 simultaneous users. "The idea was to get a ballpark estimate of our scalability," says Steve Lepine, Lead Developer, Fiserv CBS Worldwide. "And we wanted to do our scalability testing using real-world loads and conditions."

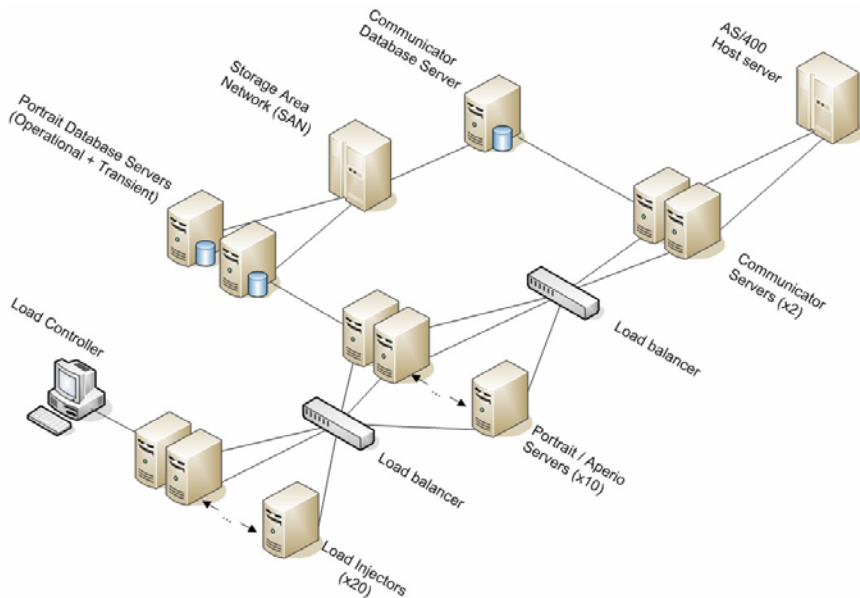
Solution

Fiserv brought its Aperio 6.0 application to the Microsoft Test Labs in Sammamish, Washington in June 2007 for testing carried out by a team from Fiserv and Microsoft working together to create an environment that replicated real-world demand. To better appreciate the test environment the team created, it is helpful to take a look at the architecture of Aperio.

Aperio Architecture

Aperio provides an integrated solution for banks and other financial institutions that works by pulling real-time data from disparate backend systems to provide a unified single-screen portrait of the customer. Efficiency can be greatly increased as a teller or loan officer doesn't have to access multiple systems individually to piece together bank account, credit card, loan, trust, and other records to fully understand the customer's relationship with the bank. Aperio created its

Aperio - Architectural overview showing Aperio deployment used for testing



solution using Microsoft Visual Studio® development system. The company currently uses Visual Studio 2005, Visual Studio Team System, and Microsoft Visual Studio 2005 Team Foundation Server.

Aperio provides its integrated solution using a multi-tier architecture that includes:

- **Presentation Tier.** A simple and clean Web-based interface is used for accessing Aperio. This removes the need for deploying, managing, and upgrading client applications.
- **Web Servers.** Traffic from and to the Web-based interface is handled by multiple servers running the Internet Information Services (IIS) feature of the Windows Server® 2003 operating system. Fiserv CBS uses a combination of hardware and software load balancers to direct traffic to the IIS servers.
- **Application Tier.** The Aperio application was designed using a solution from Portrait Software, a Microsoft Gold Certified Partner. Aperio is built upon Portrait

Foundation, a customer interaction optimization platform built using the Microsoft .NET Framework 2.0. Portrait Foundation specializes in applications that drive critical customer experience management processes—including real-time customer interactions and the longer-term follow-up processes that can involve many different systems, departments and partners.

- **Application Data Tier.** The Aperio application has a dedicated database, hosted on SQL Server 2005, which stores business logic and process definitions to support application flexibility. Process definitions, stored as XML data, are referenced as needed on a runtime basis. Aperio accesses the process definitions using SQL Server 2005 stored procedures. The application database also temporarily stores records during the time of the customer engagement.
- **Communicator Tier.** The solution uses Fiserv CBS Communicator, a middle-tier application created by the company to communicate with backend systems, including the IBM iSeries computers the company uses for core banking when offering its services as an application service provider (which represents about half of its business engagements in the United States.) Communicator translates proprietary interfaces, based on standard XML messaging, supporting Aperio communication with multiple backend applications.
- **Communicator Database Tier.** Communicator has a dedicated database, hosted on SQL Server 2005 that stores definition parameters for accessing a range of backend systems.
- **Transient Data Tier.** Transient data, hosted on SQL Server 2005, supports runtime operational activity, including support for tracking transaction state so interactions operate as stateless from the UI, increasing scalability.

“We’ve consistently found that SQL Server provides a solid, reliable platform and that it scales up very well. It is an excellent environment to be working in.”

David Saunders, Technical Architect, Portrait Software

Aperio Testing - Testing found SQL Server 2005 supported more than 10,000 concurrent users across a range of transactional interactions including new accounts, new customers, and customer service inquiries.

■ **Reporting Tier.** Reports are generated across all databases using SQL Server 2005 Reporting Services. Reports are accessed from a portal created using Microsoft Office SharePoint® Server.

Aperio Testing

The team of Fiserv CBS and Microsoft engineers conducted extensive scalability tests of Aperio 6.0 at the Microsoft Test Labs, simulating real-life banking activity and transactions. “We brought along real data, and even brought an IBM iSeries to more completely match a production environment,” says Andrew Steadman, Director of Strategy, of Fiserv CBS. “We wanted to replicate what our clients would experience, which meant interacting with a core banking system on a real-time basis.”

In addition to the iSeries-based core banking system, the test bed included using 10 Aperio application servers and 2 Communicator servers, deployed on server computers using 64-bit multi-core Intel® Itanium® processors. The Intel-based server computers, built on

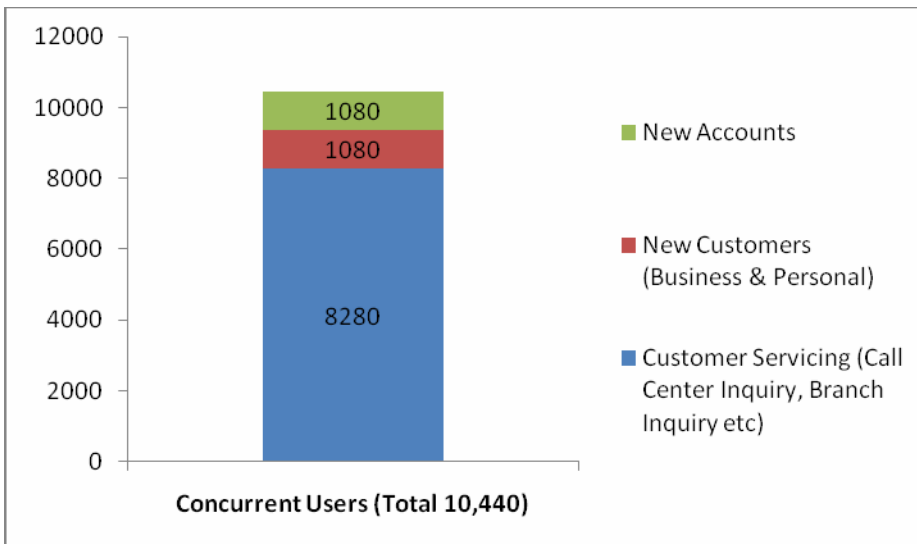
Intel Core™ micro architecture, were chosen over other architectures because they provide a cost-effective foundation for delivering innovative performance and energy efficiency features that provides scalability, reliability and performance to accurately and quickly extract and analyze data. Fiserv CBS and its customers can save money by using industry-standard hardware to deliver enterprise performance.

The Intel-based server computers hosting the databases ran the Windows Server 2003 R2 Enterprise Edition for Itanium-based Systems operating system and SQL Server 2005 Enterprise Edition (64-bit). Testing found that Aperio 6.0, deployed on the Microsoft Application Platform, including SQL Server 2005, scaled to the company’s needs, including:

- Support for more than 10,000 concurrent users.
- Support for more than 60,000 banking transactions per hour, while supporting 10,000 concurrent users. Each transaction was defined as opening one new account, or serving one new customer, or handling a customer service call. Each of these banking transactions typically require multiple host transactions and database reads and writes.
- Response times of less than 2 seconds while supporting more than 10,000 concurrent users.

Benefits

Fiserv CBS Worldwide found that the Microsoft Application Platform and SQL Server 2005 provided the company with the scalability it needed to support more than 10,000 concurrent users. The company is also benefitting from the ability to easily customize Aperio for each customer’s deployment, a better view of the business from using Reporting Services, and the offline



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Steve Lepine, Lead Developer, Fiserv CBS Worldwide

capabilities provided by SQL Server 2005 Express Edition for teller solutions.

Scalability

The testing found that the scalability of SQL Server enables Fiserv CBS to approach larger customers that had already been expressing interest in the solution. “We are already supporting clients with 6,000 to 7,000 concurrent users. We were very happy to exceed 10,000 concurrent users in our SQL Server testing,” says Steadman. “This positions us to confidently provide our solution to the world’s largest financial institutions.”

Steadman notes that during the lab testing the company identified ways in which it could tune its solution to grow substantially beyond the 10,000+ concurrent users it supported in the lab. David Saunders, Technical Architect at Portrait Software, agrees and says SQL Server database can support even higher processing.

“We’ve always been impressed by the scalability of SQL Server,” says Saunders. “We’ve consistently found that SQL Server provides a solid, reliable platform and that it scales up very well. It is an excellent environment to be working in.”

Ease of Customization

Building upon the Microsoft Application Platform has helped Fiserv CBS to create a solution that is easy to customize, something much appreciated by Aperio customers.

“I don’t think we have a single customer that has gone with a solution straight out of the box,” says Lepine. “Every bank, every financial institution we deal with has its own processes and they expect our software to be very easily customizable to match their processes. The Microsoft Application Platform gives us the flexibility to meet our customers’ needs, and I believe this gives us a

competitive advantage over competitors that lack this agility.”

This flexibility has enabled Fiserv CBS developers to use the same code to support multiple channels.

“A customer interaction that starts off with a phone call, can be completed on the Web, if the customer likes, because the same code and backend integration is working for phone centers, the Web, and for tellers at the bank,” says Lepine. “This means that each process is executed the same, regardless of which channel it’s coming from. And it means there is just one set of code to maintain.”

Better View into the Business with Reporting Services

Fiserv CBS values the reporting solutions it is able to create for its customers by using SQL Server 2005 Reporting Services to deliver online reporting throughout an organization using a portal created with Microsoft Office SharePoint Server.

“With Reporting Services and SharePoint Server we’re able to push information out to wherever it is needed in an organization,” says Steadman. “This gives our customers deep visibility into their operations. How much business is happening? How many complaints have been received? Did the ATM network have problems over the weekend? Reporting Services enables organizations to gather a holistic view of what is happening.”

The immediacy of Reporting Services is appreciated. “Reporting Services gives managers the ability to see what is happening immediately,” says Steadman. “They don’t have to wait until the following day. And it is simple for non-technical users to pull value from.”

Offline Capability with SQL Server Express

Fiserv CBS specifies use of SQL Server 2005 Express Edition for many of its branch office teller solutions. Available as a free download, SQL Server Express helps reduce the cost of branch deployments, while helping to ensure continuity of service if network access is lost.

“We like SQL Server Express for our tellering platform because it is free of licensing costs while providing offline capability and redundancy in case a road crew accidentally cuts a cable or connectivity is lost in any other way,” says Steadman. “We see SQL Server Express, Reporting Services, and SharePoint Server as being part of a great overall integration value that we gain from the Microsoft Application Platform. Microsoft has invested a lot of work in recent years in creating a well integrated platform and this helps us to provide a more complete solution to our customers while reducing the code we would otherwise have to be creating.”

Summary

In summary Fiserv CBS Worldwide has the ability to support more than 10,000 concurrent users with its Aperio 6.0 application that was created for the Microsoft Application Platform, including SQL Server 2005. The company is able to easily customize its solutions to meet exact customer needs, and is using Reporting Services and SharePoint Server to give its customers a better view into their business.

For More Information

For more information about Microsoft products and services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada Information Centre at (877) 568-2495. Customers who are deaf or hard-of-hearing can reach Microsoft text telephone (TTY/TDD) services at (800) 892-5234 in the United States or (905) 568-9641 in Canada. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information using the World Wide Web, go to: www.microsoft.com

For more information about Portrait Software products and services, call +44 (0) 1491 416 600 or visit the Web site at: www.portraitsoftware.com

For more information about Intel products and services, visit the Web site at: www.intel.com

For more information about Fiserv CBS Worldwide products and services, call (407) 299-5400 or visit the Web site at: www.cbs.fiserv.com

Microsoft Server Product Portfolio

For more information about the Microsoft server product portfolio, go to: www.microsoft.com/servers/default.mspx

Microsoft SQL Server 2005

Microsoft SQL Server 2005 is comprehensive, integrated data management and analysis software that enables organizations to reliably manage mission-critical information and confidently run today's increasingly complex business applications. By providing high availability, security enhancements, and embedded reporting and data analysis tools, SQL Server 2005 helps companies gain greater insight from their business information and achieve faster results for a competitive advantage. And, because it's part of the Microsoft server product portfolio, SQL Server 2005 is designed to integrate seamlessly with your other server infrastructure investments.

For more information about SQL Server 2005, go to: www.microsoft.com/sqlserver

Software and Services

- Microsoft Servers
 - Windows Server 2003 R2 Enterprise Edition for Itanium-based Systems
 - Microsoft SQL Server 2005 Enterprise Edition (64-bit)
- Microsoft Office System
 - Microsoft Office SharePoint Server 2007
- Microsoft Visual Studio 2005
- Microsoft Visual Studio Team System
 - Microsoft Visual Studio 2005 Team Foundation Server

Technologies

- Microsoft Internet Information Server version 6.0
- Microsoft .NET Framework 2.0
- Microsoft SQL Server 2005 Reporting Services

Hardware

- Intel-based server computers with multi-core Intel Itanium processors

Partners

Portrait Software
Intel