



Nationwide Ensures Basel II Compliance Using New Data Warehouse Solution

Overview

Customer Profile

Nationwide is the world's largest Building Society and the U.K.'s seventh largest financial organization. It is the U.K.'s fourth largest mortgage lender and second largest High Street savings provider. It has 11 million members and assets of £112 billion.

Business Situation

To comply with the Basel II Capital Accord, Nationwide has to store and maintain business information dating back at least seven years. To do this Nationwide needed a new data management and reporting solution.

Solution

Nationwide decided to base its new solution on Microsoft® SQL Server™ 2005, and employed Microsoft® Visual Studio® 2005 to aid development work.

Benefits

- Nationwide benefits from early compliance
- Partitioning accelerates database efficiency
- Faster access to information using SQL Server™ 2005 Analysis Services
- Project lays groundwork for even further SQL Server 2005 adoption

“The integrated nature of SQL Server 2005 and Visual Studio 2005, therefore, provided the ideal backbone to our Basel II project.”

Robert Lee, Software Architect, Nationwide

As a leading U.K. Building Society, Nationwide is required to comply with the Basel II Capital Accord, a new global regulation covering financial institutions. Fundamental to Basel II is the requirement to maintain a certain amount of money in reserve, termed capital adequacy, to cover unforeseen circumstances. To calculate the required capital adequacy, financial institutions must store and maintain records dating back at least seven years and covering every part of their organisation. Nationwide began work on a new data warehousing solution that would help it to meet the rigorous requirements of Basel II. With Microsoft support, it has created a data warehouse based on Microsoft® SQL Server™ 2005, and employed Microsoft® Visual Studio® 2005 with the Microsoft Visual C#® development tool. The new architecture gives Nationwide the ability to develop and demonstrate solutions that will mean early compliance with Basel II. This will assist Nationwide to improve its risk management capabilities and potentially to benefit from reduced capital adequacy requirements.

“By re-writing all the user defined functions (UDFs) in the .NET Framework 2.0, Nationwide is seeing a big improvement in performance. The execution time of our initial benchmark query reduced from 75 minutes to about five minutes when the .NET Framework 2.0 was introduced in our test environment. The string manipulation within the functions is performed quicker in .NET Framework 2.0, and the functions are incorporated into the overall query plan in a much more efficient way.”

Rob Lee, Software Architect, Nationwide

Situation

As a leading U.K. building society, Nationwide is required to meet the strict requirements of the Basel II Capital Accord. Implementing Basel II involves identifying an organisation's credit risk, market risk, and operational risk, and then allocating adequate capital to cover any potential losses. To accurately calculate these 'capital adequacy' requirements, Nationwide must maintain huge amounts of data. To help Nationwide to comply with Basel II, the society needs to have rapid access to business information, so that it can create reports on request from the regulator. Providing reporting at this level has traditionally been very time consuming, as it involves wading through vast quantities of risk data relating to 11 million customers across all of its products.

Risk data needs to be enterprise wide and tied in to all aspects of customer, financial, commercial, and operational data, to ensure that the necessary statistical analysis can be undertaken.

Nationwide recognised that it needed to deploy a new data management solution to manage the huge reserves of data required by Basel II. This solution had to meet the following criteria:

- Capture all historical data and ensure data exploration;
- Support a range of user queries against current and historical data;
- Deliver high performance for end-user queries;
- Provide a consistent 'single view' of data to all user groups;
- Minimise duplication of data and cost of data storage;
- Provide a full audit trail from source data to model output and reporting;
- Be flexible and extensible to support other business areas and future needs within

Nationwide.

Solution

Nationwide turned to Microsoft® SQL Server™ 2005—the Database Engine running on a Unisys ES7000 Enterprise Server and operating a Panorama front end—to underpin the new IT environment. Robert Lee, Software Architect, Nationwide, explains why the company decided to implement the application using SQL Server 2005. “When the Basel II project first came to light in 2002, we had intended to use Microsoft® SQL Server™ 2000, data transformation services (DTS), and a third-party front-end tool,” he says. “However, Microsoft invited us to a technical design preview in February 2003 at which Microsoft profiled SQL Server 2005. We knew that the vast quantity of data we were being asked to maintain would require a highly-scalable data warehouse, and SQL Server 2005 fulfilled this requirement perfectly. We were also impressed by the rich developer environment offered by Microsoft® Visual Studio® 2005 development system. The integrated nature of SQL Server 2005 and Visual Studio 2005, therefore, provided the ideal backbone to our Basel II project.”

Detica Ltd., a U.K.-based Information Intelligence consultancy, provided the specialist data warehousing expertise required to design and develop the core warehouse. As the project gained momentum, Nationwide turned to Microsoft partners Veritas and EMC to provide additional consultancy and support around its storage requirements, in particular, producing and validating the physical storage design. Both EMC and Veritas have a long and successful history of working with Microsoft products, and provided valuable contributions to the project, which ultimately helped accelerate development. In addition, U.K.-based business intelligence (BI)

“The success of our organisation hinges on being able to take on new challenges, and to drive them forward, not in isolation, but in partnership with suppliers who understand our needs. Microsoft has been extremely supportive in the development phase. Perhaps more importantly, Microsoft is not afraid to ask us demanding questions and this forces us to develop a deep understanding of the issues ourselves. Ultimately, this approach ensures the end solution is an exact fit with our requirements. All in all, Microsoft has been first class.”

Jim Willens, Group Services Director,
Nationwide

consultancy Thorogood supplied essential BI knowledge supporting the migration.

Scalability Supports Historical Data Store

At the heart of the Nationwide solution lies the task of migrating all of the data it produces across approximately 80 source systems into a consolidated, long-term storage area called the Historical Data Store (HDS). Basel II demands financial institutions maintain substantial records of data that may influence risk calculations, such as customer transactions across all products for a seven-year period. For an organisation of Nationwide's size this equates to a vast quantity of data (6.4TB in the HDS plus log and working space). The HDS serves as the repository for this information and makes it readily available to other parts of the data warehouse when required.

Ian Jones, Principal Consultant, Microsoft, explains how the HDS operates: “The HDS is a long-term information storage solution based on SQL Server 2005. Each time it receives a data feed from a source system it compares the feed to the data already housed in the HDS and adds any changes as a new row. In this way it eliminates duplicate data being stored and inflating disk capacity requirements. Given the volume of data we are dealing with, this task can be extremely time consuming and complex, and the time and complexity will only increase as the HDS assimilates ever-more information.”

At present there are 348 gigabytes (GB) of content in the HDS, including data and indexes, and the largest single table is 28GB. This represents about nine months of data for a subset of feeds—however, there are still several feeds that have not yet been loaded into the HDS (including the largest, which will add 2-3 million records per day). It is estimated that these extra feeds plus the additional three months of history, which should be loaded at the start of 2006, will

increase the size of the HDS to approximately 1,200GB.

Once all the source feeds are added, Nationwide estimates that approximately 72GB of data will be added to the HDS per month. After seven years of this growth on top of the initial load of data, the HDS is predicted to reach 6,900GB, approximately seven terabytes; that doesn't include the size of the Enterprise Layer (EL) and any online analytical processing (OLAP) cubes we will build. “We simply could not handle this extraordinary amount of data were it not for the scalability of SQL Server 2005,” says Jones.

To help the database perform more efficiently, Nationwide employed the partitioning functionality of SQL Server 2005. Partitioning helps the developer to segregate closed records. This means that the HDS need only concentrate on the latest record for each account when processing data feeds. Jones explains: “All the records that have not been closed are stored in a separate partition. This makes accessing and updating that current information much quicker.”

A Reliable Enterprise Layer

However, a rapid, scalable HDS is only part of the equation. The speed and reliability SQL Server 2005 brings to the HDS is fundamental to the second stage of the Basel II project; the creation of the Enterprise Layer (EL).

The EL is a star schema database, again based on SQL Server 2005. The data held in the EL is a subset of that within the HDS, but it is housed in a different format. The HDS uses a single table for each source system, whereas the EL uses fact tables that store raw information. Partitioning has proved to be a valuable tool for accelerating the processing of the raw information. The size

of the current EL is predicted to rise to 2.5TB after seven years.

Work on the EL began some time before Nationwide decided to employ SQL Server 2005. Consequently, much of the coding had been done in Transact SQL. Nationwide decided to continue along this route rather than starting over using SQL Server 2005 Integration Services. However, upcoming projects will employ the rich functionality of Integration Services to migrate different datasets and accelerate the integration process.

This could have proved problematic, were it not for the close integration of SQL Server 2005 and Visual Studio 2005. Lee says: "Visual Studio 2005 gives us the ability to employ the Microsoft [Visual] C# development tool, which handles string manipulation far better than Transact SQL (T-SQL). When we are moving millions of rows of data every night between the HDS and EL, we need to conduct string manipulations on each row. Much of the string manipulation is being performed within scalar functions to encapsulate this functionality. We're seeing great improvements when C# functions are used rather than T-SQL functions. The Visual Studio 2005 element has proved fundamental to the success of the project in that respect."

Benefits

Early Compliance Improves Nationwide's Risk Management Capability

By implementing the SQL Server 2005-based solution, the society will meet the requirements of Basel II. This means Nationwide can use its risk calculations and potentially take advantage of the predicted reduction in its capital adequacy requirements. "This reduction in capital requirements will, in time, help us to deliver even greater value for our members," says

Lee. "We are measuring the risk far more accurately than we have been able to before. This is essentially good corporate governance, and as an additional benefit, we are learning a lot about ourselves and our members," he adds.

Partitioning Underlies Entire Basel II Project

After performing comparison tests between SQL Server 2005 and solutions that lack the partitioning functionality, Jones says: "For this type of system and this quantity of data, partitioning is not just useful, it is essential." He continues: "When we come to load a data feed, we know that all we have to do is look at the latest partition and that is a fraction of the size of the whole table." He adds that Nationwide can expect to see the time they save grow exponentially as the database itself grows. As a further benefit, partitioning improves the group's back-up and restore procedure. Once information has been labeled read only, it cannot be changed and the group has no need to worry about backing it up on a regular basis.

.NET Framework 2.0 Dramatically Accelerates UDF Performance

By using the Microsoft® .NET Framework 2.0, developers can write Visual Studio 2005 scalar functions in C#. Lee says: "By re-writing all the user defined functions (UDFs) in .NET Framework 2.0, Nationwide is seeing a big improvement in performance. The execution time of our initial benchmark query reduced from 75 minutes to about five minutes when .NET Framework 2.0 was introduced in our test environment. The string manipulation within the functions is performed quicker in .NET Framework 2.0, and the functions are incorporated into the overall query plan in a much more efficient way."

Analysis Services Ensures Rapid Retrieval of Information

Nationwide has also been impressed with the Analysis Services component of SQL Server 2005. "Analysis Services was a fundamental reason for us choosing SQL Server 2005 and it has proved to be as significant a benefit as we hoped," says Lee. "Attribute-based dimensions, rather than the hierarchy-based equivalent, is a fantastic innovation. It helps us to put the data that the user requires in the cube rather than being limited to a single fact table." As a result, users access data more quickly, and because they are spending less time searching for data, they can compile reports and extract business critical information much faster than was possible in the past.

Reporting Services to Rapidly Develop 'Health Check' Reports

Nationwide is using SQL Server 2005 Reporting Services to generate its relational reports and intends to expand its use over time. Lee says: "A warehouse of this size needs careful management. Reporting Services helps us to surface the reconciliation of the data with our general ledger, see the operational characteristics within the warehouse and highlight data problems as they occur."

Basel II Project a 'Pathfinder' for Future SQL Server 2005 Deployment

SQL Server 2005 will be the environment of choice for future development across the organisation and the group's recent experience has proved a fantastic pathfinder, according to Lee.

Looking ahead, Nationwide intends to deploy SQL Server 2005 across additional business units, using Integration Services to seamlessly integrate systems. "I believe that the benefits of [SQL Server Integration Services] are going to be hugely significant both for us and the marketplace in general," says Lee.

Excellent Partner Relationships Support Rapid Development

The scale of the Nationwide data warehouse project makes it unique in many ways. Consequently, Microsoft's technical expertise has been reinforced by the support of key partners including Panorama, Detica, Veritas, EMC, and Thorogood.

Lee is full of praise for the technical partners who ensured the migration ran smoothly and successfully. "The Panorama front end has proved extremely popular with users, who have readily embraced the interface," he says. "In addition, the business intelligence guidance provided by Thorogood proved invaluable and undoubtedly saved us time and resources over the course of the project. Similarly, EMC and Veritas proved the importance of having experienced storage experts to hand for guidance and support. Detica have been instrumental in ensuring a successful implementation of the design pattern."

The technical support and guidance provided by Microsoft has also been praised by the society. Jim Willens, Group Services Director, Nationwide, says: "The success of our organisation hinges on being able to take on new challenges, and to drive them forward, not in isolation, but in partnership with suppliers who understand our needs. Microsoft has been extremely supportive in the development phase. Perhaps more importantly, Microsoft is not afraid to ask us demanding questions and this forces us to develop a deep understanding of the issues ourselves. Ultimately, this approach ensures the end solution is an exact fit with our requirements. All in all, Microsoft has been first class."

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 Nationwide products and services, visit the Web site at: www.nationwide.co.uk

Microsoft SQL Server 2005

Microsoft SQL Server 2005 is comprehensive, integrated data management and analysis software that enables organisations 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 Windows Server System™, 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

- Products
 - Microsoft SQL Server 2005
 - Microsoft Visual Studio 2005
- Partner Products
 - Panorama
 - EMC Powerpath
 - Veritas Storage Foundation For Windows
 - Veritas NetBackup

Hardware

- Products
 - Unisys ES7000/550
 - EMC Clariion CX700 Storage Array

© 2005 Microsoft Corporation. All rights reserved. This case study is for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS SUMMARY. Microsoft, Visual C#, Visual Studio, Windows, the Windows logo, Windows Server, and Windows Server System are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. All other trademarks are property of their respective owners.

Document published March 2004

Microsoft®