



## Overview

**Country or Region:** United States

**Industry:** Software

### Customer Profile

Based in Raleigh, North Carolina, and employing 2,700 people, Misys Healthcare Systems provides electronic health records and related software solutions and services to physician offices, hospitals and homecare agencies.

### Business Situation

Misys executives wanted to replace their Java development environment with one that would strengthen interoperability, facilitate enhancement and maintenance, and support a more accessible user interface.

### Solution

Misys development executives selected the Microsoft® Visual Studio® 2005 development system and the Microsoft .NET Framework.

### Benefits

- Extensive interoperability
- Available third-party components
- Access into wide developer base
- 50% reduction in code base
- 50% reduction in development time
- Widely familiar user interface

## Healthcare Solution Provider Enjoys Flexible Development, Competitive Advantage

“The .NET family of technologies has really helped us to move seamlessly across the platforms so that we can stay focused on the customer experience.”

Neal Reizer, Director, Research and Development, Misys Healthcare Systems

To continue meeting its mission of connecting healthcare providers with timely and comprehensive patient information, executives at Misys Healthcare Systems wanted to replace the Java environment in which they had developed the company’s flagship electronic-health-record product family. Seeking an environment that would support interoperability, ease of enhancement and maintenance, and simplified user accessibility, they selected Microsoft® Visual Studio® 2005 and the Microsoft .NET Framework. Consequently, developers have taken advantage of a service-oriented architecture and XML Web services model to make their product highly interoperable with diverse hardware and software alike. They have built equivalent functionality with half the code and in half the time as in the Java environment. And they have delivered customers a product that is easily usable in virtually any healthcare setting.

“Having a development environment that supports the effortless porting of code to handheld devices puts Misys in an excellent competitive position.”

Betty Feth, President, Misys Healthcare Systems, Homecare Business Unit

## Situation

Founded in 1979 and headquartered in Raleigh, North Carolina, Misys Healthcare Systems develops and supports software and related services designed to help physicians and other caregivers manage the complexities of healthcare and better care for their patients. Misys designs and develops a broad line of software and services and provides them to more than 110,000 physicians in 18,000 practice locations and 1,200 hospitals; home health providers at more than 600 homecare agencies; and hundreds of commercial laboratories, clinics, managed services organizations, integrated delivery networks, and other related organizations. Misys Healthcare Systems is a division of Misys PLC, which provides software products and related services to customers in more than 120 countries.

As Marc Winchester, Senior Vice President, Market Development, puts it, “A central mission at Misys Healthcare Systems is to connect healthcare providers with comprehensive and timely information on patients, when and where the providers need that information, so they can make the wisest clinical decisions.”

For this reason, the company’s flagship product family focuses on an electronic health record (EHR) solutions for use in the hospital setting, physicians’ office, homecare agency, or mobile homecare setting. Leveraging a service-oriented architecture and XML Web services model, the EHR product family supports a fully integrated workflow, from patient check-in through point-of-care and check-out, including practice management and billing.

To remain a leader in this fiercely competitive field, Misys must ensure that its EHR solution is affordable and attractive to hospitals and physicians at all practice levels. To achieve this, Misys development executives are

always seeking ways to make the solution more versatile, easier to enhance and maintain, and more intuitive to use.

For example, the solution must be readily able to run on hardware platforms ranging from clustered servers in a large hospital to a single desktop or portable computer in a solo physician practice, from the most sophisticated tablet PC to the simplest handheld PDA. The solution also must provide seamless interoperability among the component products within it and with third-party products, such as legacy laboratory information systems or practice management systems.

Mike Pritts, Vice President, Research and Development, explains that outside of cost, interoperability is the single biggest challenge facing suppliers of healthcare-information products. “When a patient enters the emergency room at two in the morning, the physician wants to be able to go to one EHR solution and find out all there is to know regarding the patient’s history. Our solutions must interoperate with other products already in use and others still to come in order to deliver this capability.”

Similarly, if a patient is under the care of more than one physician, it is vital that the EHR and related information be easily shared between physicians—whatever EHR or other solutions the physicians might already have installed. All of this means that when it’s time to enhance the Misys solution to integrate with newly emerging products, developers must have an integrated and comprehensive environment in which to work—and one that is widely familiar in the profession.

A related need, ease of enhancement and maintenance, is crucial for being able to offer a solution and follow-up support in the price range that many physicians require. “A low licensing price is essential for reaching a

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Mike Pritts, Vice President, Research and Development, Misys Healthcare Systems

broad swath of physician practices, because they are very price-sensitive,” says Tyler Patterson, Vice President, Product Management.

Finally, the solution must support the kind of user interaction that makes it easily accessible in a variety of settings. Patterson explains that this is especially true for physicians: “If there’s something about the design of the software that causes a slowdown in their practice, or something about the user interface that causes the physician to look even the least bit confused in eyes of the patient, they won’t use that software.”

### **Solution**

To address these challenges, the development team at Misys Healthcare Systems recently approached a major upgrade by seeking an alternative to the Java environment they had used for the initial development of the Misys EHR product family serving the physician office and homecare environments. After a thorough evaluation, they selected the Microsoft® Visual Studio® 2005 development system and other technologies in the Microsoft .NET Framework and .NET Compact Framework product families.

Neal Reizer, Director, Research and Development, says the choice of Visual Studio 2005 and the .NET Framework was an obvious one, considering the challenges his team faced. “We saw that with the support in the .NET Framework for XML Web services, database access, and mainframe connectivity, we could develop products running on virtually any hardware platform. We also saw that we could provide niche functionalities by integrating with the abundantly available third-party products that run in a Microsoft environment.”

Pritts concurs, adding that the integrated family of .NET Framework products clearly supported an easier approach to enhancement and maintenance. “We figured we could write code a lot more efficiently, not having to jump back and forth from tool to tool.”

With the help of Microsoft Consulting Services, Misys developers deployed Visual Studio 2005, the .NET Framework, and the .NET Compact Framework and used those tools to implement significant enhancements to the EHR product family, including an executive-dashboard user interface based on Microsoft Office 2003 SharePoint® Portal Server.

### **Benefits**

Misys development executives are quick to agree that everything they were seeking in a new development environment has come to pass with the implementation of Visual Studio 2005 and the Microsoft .NET Framework. Interoperability through support for XML Web services and other key technologies, ease of enhancement and maintenance through a thoroughly integrated toolset, and accessibility for users through a user interface that is familiar to virtually anyone who has ever used a computer—these are solid advantages the Misys developers have enjoyed since moving from the Java environment to one based entirely on Microsoft technologies.

### **“Write it Once ...”**

The portability provided by Visual Studio 2005 and the Microsoft .NET Framework provides a powerful advantage for Misys developers and the company as a whole. “We can code originally for a traditional desktop or laptop computer and can port that same code base to a pen-based tablet PC, PDA, or other handheld device with no modification whatsoever,” Reizer explains. “In other words, write it once and run it wherever.”

“Our focus all along has been to build products that a physician can just pick up and begin using so they can maintain their focus where it belongs—on the patient.”

Tyler Patterson, Vice President, Product Management, Misys Healthcare Systems

Betty Feth, President of the Homecare Systems business, points to specific advantages in the area of home healthcare. “Homecare is one of the fastest-growing fields of healthcare, and any technologies that can help home healthcare workers to access and enter information on tablet PCs and other handheld devices are crucial,” she says. “Having a development environment that supports the effortless porting of code to handheld devices puts Misys in an excellent competitive position.”

Interoperability in terms of software is equally vital, Pritts adds. “Using the service-oriented architecture fully supported by the Microsoft .NET Framework, the solution integrates and interoperates with other Misys products and is open to doing the same for external products in a way that maintains performance, security, and scalability,” he explains, referring to the hundreds of third-party healthcare information-management solutions available or already installed.

#### **Half the Code, Half the Work**

Other competitive benefits come from the ease of enhancement and maintenance that developers are enjoying through the overall infrastructure provided by the Microsoft .NET Framework. “With the .NET Framework, we didn’t need to spend time and effort building an infrastructure and then wondering whether it would function throughout development and beyond,” Patterson says.

Pritts concurs. “It would have taken weeks - if not months - to specify and build what was available essentially out-of-the-box with Visual Studio 2005 and the .NET Framework,” he says. “As a result, to produce functionality comparable with earlier work we did in a Java environment, we only had to write half as much code and work half as long.”

For example, developers built the home care solution’s executive dashboard in less than two weeks by taking advantage of support in Microsoft Office SharePoint Portal Server for Web parts. “This enabled us to make the dashboard easily customizable by the user with very little work on our part,” Reizer says.

Yet another competitive advantage enabled for Misys now is that developers work more productively when they have the right tools. “It increases the morale of developers when they’re working with best-of-breed tools like Visual Studio 2005 and the Microsoft .NET Framework and able to collaborate and produce code efficiently,” Pritts says. “It’s motivating for the developers, it’s good for the business, and everybody wins.”

The fact that these Microsoft products are so extensively used among developers is a bonus. “A key part of our strategy is enticing the best and brightest talent, and people just naturally want to work in a place that helps them to keep their skills current in a widely used and respected technology,” Pritts says. “Having a Microsoft development platform in place helps us to be a place where people want to come to work.”

#### **User Accessibility Critical**

Of course, as Patterson points out, Microsoft technologies are equally familiar to users as to developers, and this addresses the challenge of offering customers products that are easily accessible. “This is especially essential for the customer base that Misys serves, because if there is any working environment that does not provide time out for learning a new user interface, it is healthcare,” he says. “Our focus all along has been to build products that a physician can just pick up and begin using so they can maintain their focus where it belongs—on the patient.” This ease of use has stimulated adoption, critical to the success of practice automation.

“Time to market is critical in our marketplace, and with the Microsoft technologies, we know we can deliver the right product at the right time.”

Marc Winchester, Senior Vice President,  
Market Development, Misys Healthcare  
Systems

Another benefit of developing products based on a highly familiar user interface is that Misys Healthcare Systems can more easily broaden its customer base. “It’s good to know that when the time comes, we’ll be able to reach new groups of users on both the clinical and business sides of healthcare,” Pritts says.

#### **Capitalizing on Industry Growth**

According to Winchester, the Misys research and development team is optimistic on many fronts about the flexibility of basing their EHR product family on Visual Studio 2005 and the Microsoft .NET Framework. “Time to market is critical in our marketplace, and with the Microsoft technologies we know we can deliver the right product at the right time into a market that is growing between 15 and 20 percent a year,” he says. “With .NET, we’ll be able to capitalize on that growth.”

Reizer concurs. “The biggest difference between using the Microsoft .NET Framework and other technologies we have used in the past is that we can be confident the .NET family of products will be around today and tomorrow,” he says. “That includes third-party niche components built on .NET and supporting potentially transforming technologies like speech recognition -- components that Misys can plug into its products without having to invest a lot of time and effort in development and testing. As a result, the Microsoft technologies have opened up solutions that were simply not possible before.”

(The remainder of this article goes into more detail on the technical architecture of the solution).

## Architecture Synopsis

Microsoft's Visual Studio 2005 development suite was instrumental in Misys developing the Misys Homecare PDA Solution. Visual Studio allowed Misys developers to use a single tool to creating the Windows Mobile application, mobile database, synchronization web service, and device installer.

The Misys Homecare PDA solution is an add-on application to the Misys Homecare system. The Misys Homecare system is a complete clinical and financial solution supporting home health, hospice, and private duty agencies. The Misys Homecare system includes the capability to use laptops or tablet PCs in the patient's home with the all the necessary information about the patient downloaded to an offline database on the laptop. Nurses or therapists can use the laptops or tablets to collect and update information about the condition of the patient and upload that data back to the main system.

To extend similar functionality to the home health aide and homemaker employees, Misys decided to design and develop a PDA based solution. This decision was based on a number of factors:

- Home health aides and homemakers typically document time and attendance along with tasks performed. This amount of documentation is significantly less than the amount of documentation filled out by nurses or therapists.
- Home health aides and homemakers typically records their time and attendance on paper. The paper must be transported back to the agency and manually entered in to the backend system or scanned in. This can introduce data entry mistakes.
- Home health aides and homemakers spend little time documenting. PDAs are instantly turned on and off which speeds up the time to collect the necessary information.

- Laptops and tablets are a lot more expensive than PDAs.

Misys' decision on platform and development environment was based on the following factors:

- Misys wanted to extend its investment in .NET. Misys had already developed other add-on applications in .NET and had just recently re-written its security system in .NET.
- Misys wanted to leverage the experience and expertise it's development staff had gained in .NET and Visual Studio.
- Misys wanted to support a PDA platform that is widely available, both in a standalone PDA form factor and as a PDA phone.
- Misys wanted to use Web Services to facilitate the communication and transmission of data between the backend database and the device database. .NET is a robust web services environment.

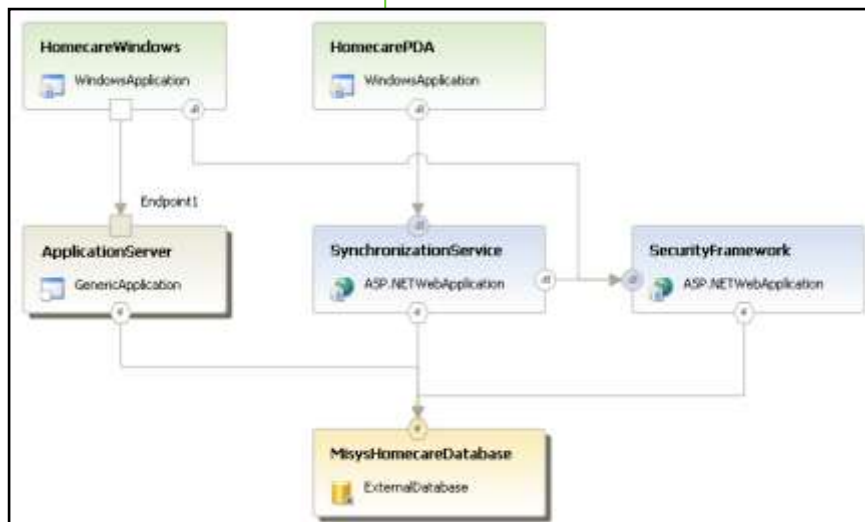
Based on the factors above, Misys chose to develop its Homecare PDA solution in .NET running on Windows Mobile 2003 SE and Windows Mobile 5. Early in the development process, Microsoft engaged Misys in early adopter programs for Visual Studio 2005 and SQL Server 2005 before these applications had been released to market. This gave Misys access to the latest stable builds of these products and support for these products. With those tools and support services in hand, Misys made the decision to build its solution on the .NET Compact Framework 2.0 and SQL Server 2005 Mobile Edition.

The Misys Homecare PDA application is a Windows Forms application written in C# using the .NET Compact Framework 2.0. The application uses SQL Server 2005 Mobile edition as its data store. Data is downloaded and uploaded through a .NET web service hosted in the homecare agencies server environment. The Web service handles authentication and authorization for the PDA

user. This is done through another set of web services for the Misys Homecare Security Framework. Upon successful authentication and authorization, the web service accepts an upload of data documented on the PDA and applies it the Homecare system database (SQL Server 2000). The Web service then creates a package of all the necessary information that should be on the PDA and sends it back to the PDA in a compressed stream. This data is then uncompressed on the PDA and applied to the local database.

Combining the power of Visual Studio 2005 with the advanced features in SQL Server Management Studio, a comprehensive database tool available in the SQL Server 2005 installation, we were able to achieve new levels of rapid application development. In the development of the Misys Homecare PDA solution, the ability to treat the SQL Mobile database file as a registered server allowed the development team to immediately detect and remove any issues in the code base. The common UI metaphor between Visual Studio 2005 and SQL Server Management Studio reduced time for our new staff to become familiar with the tools.

The Security Framework consists of two layers. The first layer is a web service written entirely in C# .NET to manage client requests. The second layer is the policy store that maintains groups, roles, permissions, and scopes, and their relationships. A facade is provided to ensure a clear layer of separation between the application and the underlying policy store. It may be deployed with the application server or a different machine entirely. The Security Framework was designed to accommodate requests from all applications currently in the Misys Homecare suite, as well as be flexible enough to accommodate future applications without requiring changes. The Security Framework policy store is a robust and flexible design that supports both the Misys Homecare client and Misys Homecare Web Applications. Entirely data driven, new features and permissions can be dynamically added to the application without requiring any programming changes to the Security Framework. Stored procedures ensure that communication to and from the Security Framework is minimized. Misys Homecare native authentication and Windows Domain authentication are supported out of the box.



**Figure 1: Application architecture of the Misys Homecare PDA solution.**

The core application is a Windows Mobile Forms application. Visual Studio 2005 increased productivity in developing this application because of support for different screen orientations and shapes, support for SQL Mobile 2005 (especially mobile database development and debugging directly through VS2005), support for Windows Mobile 2003 and Windows Mobile 5 emulators. Visual Studio 2005 also increased developer productivity with its enhanced Intellisense, making it easier to remember class and variable names. The new Intellisense also includes code snippets that makes it quicker and easier to create common methods like properties.

## 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](http://www.microsoft.com)

For more information about Misys Healthcare Systems products and services, visit the Web site at: [www.misyshealthcare.com](http://www.misyshealthcare.com)

## Microsoft Visual Studio 2005

Microsoft Visual Studio 2005 is the world's most popular development environment for designing, developing, and testing next-generation Windows®-based solutions and Web applications and services. By improving the development experience for Windows, the Web, mobile devices, and Microsoft Office, Visual Studio 2005 helps organizations deliver a variety of solutions more productively than ever before. Visual Studio Team System expands the product line with new software tools that enable greater communication and collaboration throughout the development life cycle. With Visual Studio 2005, businesses can deliver modern service-oriented solutions more efficiently.

For more information about Visual Studio 2005, go to: [msdn.microsoft.com/vstudio](http://msdn.microsoft.com/vstudio)

## Software and Services

### ■ Products

- Microsoft Visual Studio 2005
- Microsoft SQL Server 2005
- Microsoft Windows Server 2003
- Microsoft Windows XP Professional
- Microsoft Windows Mobile 5.0
- Microsoft Windows Mobile 2003
- Microsoft® Office System
- Microsoft SharePoint® Portal Server 2003

### ■ Technologies

- Microsoft .NET Compact Framework
- Microsoft .NET Framework

### ■ Services

- Microsoft Consulting Services