

Company Saves \$1 Million Annually and Opens Up New Business Opportunities

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JetBlue Airways Corporation has recently introduced a new shipping system that provides an effective means for scheduling and tracking packages shipped on JetBlue flights. The system is made up of multiple Windows-based applications that work with the same back-end architecture. One of these applications is used internally and is allowing JetBlue to eliminate U.S.\$1 million in annual shipping expenses. A second application is a business-to-business shipping portal that is helping the company pursue valuable new air cargo business opportunities. Additionally, a separate application was developed to run on the handheld devices used by JetBlue cargo handlers. Using Microsoft Visual Studio .NET 2003, Windows Server 2003, the Microsoft .NET Framework, and the Microsoft .NET Compact Framework, three JetBlue developers produced the new shipping system in just six months.

Situation

JetBlue Airways Corporation is a low-fare, low-cost passenger airline that provides high-quality customer service. Based at John F. Kennedy International Airport in New York, JetBlue serves 22 cities across the United States. The company was founded in February 2000 with the intention of bringing passengers a better travel experience. All JetBlue aircraft feature roomy, all-leather seats, with free live satellite television at every seat. JetBlue distinguishes itself from the competition with innovative business practices that allow it to provide a better product at a lower cost. Technology plays a key role in JetBlue's ability to contain operating costs and pass value on to customers.

JetBlue was paying approximately U.S.\$1 million annually to companies like Federal Express and United Parcel Service to ship internal mail and packages. Without an internal shipping system in place, there was no effective way for employees to schedule shipments on JetBlue flights or gain

Fast Facts	
Number of developers to build application	2 developers, 1 DBA
Number of months to build application	6
Savings	\$1 million
Increased revenue (estimated)	\$1 million

visibility into the status of shipments sent through the company's own system. As it existed, internal shipping was simply a matter of putting the item on a plane and hoping it arrived as intended. For most items, this kind of uncertainty was not an option. Therefore, even though a package might only need to go from one JetBlue branch office to another, the employee would most likely ship the item through an outside carrier. Most companies would not consider this to be a problem. For

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Solution Overview

Customer Profile

JetBlue Airways Corporation is based at John F. Kennedy International Airport in New York. The airline offers its passengers both value and exceptional customer service.

Business Situation

To send internal company mail and packages, JetBlue was paying U.S.\$1 million per year to have items delivered to destinations that its own planes fly to. Additionally, JetBlue realized that there was value to be gained by providing its commercial air cargo customers with a higher level of service.

Solution

JetBlue has now introduced a new shipping system that handles the company's internal shipping needs. The system also allows air cargo customers to schedule and track shipments. Using Microsoft® Visual Studio® .NET 2003, Windows Server™ 2003, and the .NET Compact Framework, JetBlue has produced one system that meets two different business needs.

Benefits

- Rapid development cycle
- Easily extended to mobile devices
- Easy implementation of bar code standards
- Fast and flexible data access method
- \$1 million in annual savings
- Increased revenues from new business opportunities

Software and Services

Microsoft Windows Server 2003
 Microsoft Windows® CE Edition version 2.0
 Microsoft Windows CE .NET
 Microsoft Visual Studio .NET 2003
 Microsoft .NET Framework
 Microsoft .NET Compact Framework
 Microsoft SQL Server™ 2000

JetBlue, however, paying to have items delivered to destinations that its own planes were already flying to was unacceptable. The company recognized the inefficiency of its internal shipping situation and decided to develop an application for scheduling and tracking items shipped on JetBlue flights.

Like most passenger airlines, JetBlue also serves commercial shipping companies by providing air cargo services—that is, adding commercial freight to the cargo load of its passenger flights. Having a system in place to improve that service would extend JetBlue’s reputation for outstanding service to its commercial shipping customers. The company wanted to capitalize on the unrealized business opportunities that its air cargo business offered. This was another key consideration in JetBlue’s plan to develop a shipping system.

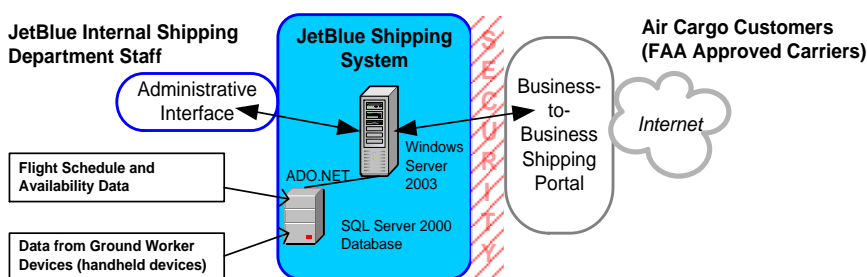
Solution

JetBlue recently introduced its new shipping system to accommodate the scheduling and tracking of items shipped on its flights. The JetBlue shipping solution was built using the Microsoft® Visual Studio® .NET 2003 development system and the Microsoft Windows Server™ 2003 operating system, including the Microsoft .NET Framework version 1.1 (an integral Microsoft Windows® component for building and running the next generation of applications and XML Web services). The new shipping system meets the company’s need for both an internal mail solution and an externally facing customer shipping portal. To meet these needs, JetBlue built two separate applications and interfaces that tie into one back-end architecture.

JetBlue has created a department that handles the scheduling and tracking of the company’s internal shipments. To access the shipping system, the department uses an administrative interface that allows users to view which flights are available for a shipment and what delivery options are available (overnight, second-day, etc.). The system also allows users to track packages that are en route. For air cargo customers, JetBlue provides a separate interface. The business-to-business Web portal provides scheduling and tracking services in addition to features like the ability to estimate shipping costs and produce bar-coded shipping labels directly from the browser interface.

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Adam Cohen
Manager of Development
JetBlue Airways Corporation



Whether they are for internal shipments or air cargo shipments, bar-coded shipping labels are attached to all packages. JetBlue cargo handlers use handheld devices to scan the bar codes as the packages move through the system. The handheld devices run a separate application that was developed using the Microsoft .NET Compact Framework—a subset of the Microsoft .NET Framework designed to run in the constrained environment of mobile devices. The handheld devices leverage Microsoft SQL Server™ 2000 Windows CE Edition version 2.0 (SQL Server CE)—the compact database for rapidly developing applications that extend enterprise data management capabilities to mobile devices. The data is synchronized regularly with the Microsoft

SQL Server 2000 database that provides data services for the JetBlue shipping system. This frequent synchronization provides visibility into the life of shipments and gives shippers the tracking details that they need and expect. The ability to extend the shipping system to include handheld devices was a key requirement in the system's design.

To develop this complex shipping solution, JetBlue took advantage of the powerful Visual Studio .NET developer tools and the rich set of Framework class libraries—an object-oriented, extensible set of classes that facilitate the rapid development of rich Windows-based applications. Of those classes, Microsoft ASP.NET Web Forms and Windows Forms played important roles in accelerating the development of the administrative interface and the shipping portal, but it was Microsoft ADO.NET and the GDI+ that were of particular value to JetBlue developers. Connecting data to the JetBlue shipping system was accomplished using the ADO.NET data classes, while the ability to produce printable bar codes—deliverable over the Internet—was accomplished with the System.Drawing namespace.

Benefits

JetBlue is now using its new shipping system to handle internal mail and packages. The company expects that in the first year of operation the new shipping system will all but eliminate the \$1 million expense of using third-party shippers to handle the company's internal shipping needs.

The ability to extend the new system to include a business-to-business portal for air cargo customers is allowing JetBlue to fully realize the business opportunity that commercial air cargo promises. Initial estimates suggest that the business-to-business shipping portal will result in a \$1 million annual increase in revenues.

Just two developers and one database architect (DBA) were able to produce the back-end system, the two user interfaces, and the handheld application in just six months. This rapid development cycle was possible because of the high level of developer productivity that JetBlue realized from working with Visual Studio .NET, Windows Server 2003, and the Microsoft .NET Framework and Compact Framework. Another advantage of building a Windows-based application on the Framework is that it gives JetBlue several options for future technical challenges, such as data integration with customers—for instance, a customer that requires JetBlue's real-time shipping data can integrate that information into its own electronic data interchange (EDI) system.

"With Visual Studio .NET 2003 and the Framework, it was easy for us to produce our new system," says Adam Cohen, Manager of Development, JetBlue Airways Corporation. "We didn't really run into any problems along the way. Visual Studio .NET 2003 offers powerful developer tools that helped us deliver the new system in an impressive timeframe, with just two developers and one architect working on the project."

Connecting Shippers to Shipping Data with ADO.NET

ADO.NET simplified the process of mapping data to the new shipping system. Two of the features in ADO.NET that were especially valuable in the production of the JetBlue shipping system were the DataSet and DataReader objects. The DataSet object is a kind of in-memory database. Using a DataSet, a user can add, edit, and delete data. DataSets can be used, among other things, to retrieve from a data source data that is to be displayed in controls on a form. The DataSet, unlike the DataReader, can be passed to a remote client. The DataReader object is a familiar, forward-only type of insertion point that provides a very fast way to retrieve records from

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a data source. Because its direction is limited to forward-only, it provides great performance for programmatically processing results or loading list boxes or combo boxes.

“DataSet and DataReader provide functionality and performance,” says Cohen. “We used DataReader to enhance performance and deliver results quickly. We used DataSet to add a lot of functionality to our data. For our users, it’s important not only to be connected to the data, but also to be able to easily view and work with the data. DataSet allows us to provide this functionality, while DataReader assures that we’ll have a high level of performance.”

JetBlue developers were familiar with—and impressed by—previous releases of Microsoft ActiveX® Data Objects (ADO) but found that ADO.NET provided even more valuable functionality and performance. Microsoft built ADO.NET from the ground up on an XML substrate, so ADO.NET is able to consume, manipulate, and process information regardless of its source. Because of its XML-based foundation, ADO.NET delivers robust integration with a variety of back-end data stores. ADO.NET libraries enable programmers to use a familiar programming model to access and manipulate data sources, including SQL Server CE.

“With ADO.NET, connecting data to an application is a simple process,” says Cohen. “It’s just a matter of mapping your tables to your middle tier. ADO has always been a very powerful tool in terms of providing an easy-to-use interface for working with SQL Server or any ODBC [Open Database Connectivity]–compliant database platform. But with ADO.NET, you get the benefits of IntelliSense® in Visual Studio .NET 2003 along with it.”

Producing Consistent, Readable Bar Codes

One of the key requirements of the new system was that users be able to easily produce printable, bar-coded shipping labels. JetBlue accomplished this with the use of the Framework System.Drawing namespace. The System.Drawing namespace provides easy access to the Windows GDI (Graphics Device Interface), which actually produces—or draws—the display created by any Windows-based application. GDI+ for the Microsoft .NET Framework is a class-based, application programming interface (API) for programmers using managed code. It enables applications to use graphics and formatted text on both the display and the printer, which is very important in the production of JetBlue’s bar-coded shipping labels.

“When we produce a label, we produce an image file,” says Cohen. “It was real straightforward with System.Drawing. There is an actual bar code font, and we needed to be able to reproduce it so that it could be scanned. Getting it right was important. We were easily able to draw out the bar code font and include it as part of the label image using System.Drawing.”

Extending the System to Smart Devices

Although JetBlue’s developers had never extended applications to the Windows CE environment, the Microsoft .NET Compact Framework and Visual Studio .NET made the development of a separate application to run on the ground workers’ handheld devices quick and trouble-free.

Historically, developing smart client applications for mobile devices has been difficult. Programmers often had to switch to entirely different tools, which required additional skills and training. With Visual Studio .NET, however, producing applications for handheld devices is very similar to producing any other Windows-based application.

Of particular value for JetBlue’s project was the Compact Framework smart device client for SQL Server CE. JetBlue used the Compact Framework to build a smart device application that targets

Microsoft Windows Powered Pocket PC devices. For JetBlue, the transition from desktop to smart device development involved different development requirements, but not different skills. Visual Studio .NET enabled developers to easily meet the new requirements with smart device programmability features that extend the capabilities of the integrated development environment (IDE). These features promoted the kind of rapid development cycles that JetBlue is accustomed to.

Developing for Future Growth

One challenge that JetBlue is currently facing involves the United States Postal Service (USPS), which will soon be implementing a new standard requiring all of its air cargo handlers (like JetBlue) to provide real-time access to shipping data. Essentially, this standard will require JetBlue to interact with the USPS EDI system. JetBlue recognizes the value of being one of the first carriers to offer compliance with the new USPS standard.

“So far we have explored just two of the options that .NET technologies offer us for interfacing with the USPS system,” says Cohen. “The first option would be to use Microsoft BizTalk® Server 2002—which was designed for this kind of task. The other option involves developing a socket-level communications service that talks back and forth with the Postal Service’s system. This is the approach that we are leaning toward at this time.

“Previously, developing against the socket layers like this required us to jump out of the rapid application development environment that we were used to,” continues Cohen. “We would have to write a separate C++ application to handle the interaction with the Windows API. With the Microsoft .NET Framework, all of the work to interact with the Windows API and to use it in our applications is taken care of for us. Working with the Framework is going to allow us to be one of the first two airlines to meet the new USPS standard. Given the volume of business that the United States Postal Service could represent, this is an obvious advantage for us.”

The Microsoft .NET Framework is an integral Windows component for building and running the next generation of applications and Web services. It provides a highly productive, standards-based, enterprise-ready, multilanguage environment that simplifies application development, enables developers to take advantage of their existing skill set, facilitates integration with existing software, and eases the challenges of deploying and operating Internet-scale applications. The Framework consists of two main parts: the common language runtime and a unified, hierarchical class library that includes a revolutionary advance to Active Server Pages (ASP.NET), an environment for building smart client applications (Windows Forms), and a loosely coupled data access subsystem (ADO.NET).

For more information about the Framework, go to:
<http://msdn.microsoft.com/netframework/>

Microsoft Visual Studio .NET is the rapid application development (RAD) tool for building next-generation Web applications and Web services. Visual Studio .NET empowers developers to rapidly design broad-reach Web applications for any device and any platform. In addition, Visual Studio .NET is fully integrated with the Microsoft .NET Framework, providing support for multiple programming languages and automatically handling many common programming tasks, freeing developers to rapidly create Web applications using their language of choice. Visual Studio .NET includes a single integrated development environment with RAD features for building Web applications and middle-tier business logic, and RAD XML designers for working with data.

For more information about Visual Studio .NET, go to:
<http://www.visualstudio.net/>

To acquire Visual Studio .NET, please see your reseller or go to:
<http://shop.microsoft.com/devtools/default.asp>

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