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## JetBlue Airways Builds on Early Successes and Maintains Technology Lead with the Help of the Microsoft .NET Platform and Visual Studio .NET



### Solution Overview

#### **Profile**

JetBlue was founded in 1998 and launched its first flight in February 2000. It serves 4 million customers in more than 16 U.S. cities and its 2001 annualized business sales were \$300 million. JetBlue employs 2,100 people.

#### **Business Need**

JetBlue developers needed a development platform and environment that would provide them the performance, scalability, reliability, and integration required to take productivity to a higher level and keep it there.

#### **Benefits**

Developers built a Web-based company store relying on a SQL Server 2000 back end and developed in Visual Studio .NET. By using the .NET Framework, they enjoyed simplified API access, increased efficiencies in cross-language coding and debugging of up to 80 percent, a reduced need for developer specialization, and a 50 percent decrease in overall development time.

#### **Microsoft Technologies Used**

Microsoft® Windows® 2000 Server  
Microsoft .NET Framework  
Microsoft Visual Studio® .NET  
Microsoft .NET Enterprise Servers  
SharePoint™ Portal Server  
SQL Server™ 2000  
Microsoft Message Queuing 3.0

#### **Hardware**

Three Compaq ProLiant dual processor ML530s with 1 GB of RAM

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*Seeking to build on its commitment to technology leadership in the airline industry, JetBlue Airways has implemented the Microsoft® .NET Framework platform for its developers. Using Microsoft Visual Studio® .NET, JetBlue developers built a high-performance application supporting a Web-based company store in record time.*

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### **Company Overview**

In the nearly four years since its launch, JetBlue Airways has grown into a \$300 million business serving more than 4 million travelers in 16 U.S. cities. According to its founders, it's JetBlue's commitment to working at the forefront of technology that's largely responsible for the young company's success in an industry that's been struggling for much of that four years. The company pioneered the paperless cockpit, including paperless pilot manuals; it also offers handheld wireless check-in and is looking seriously into building systems using SmartCard technology, biometrics, and wireless data links to its planes.

"The way technology is going, there's a tremendous advantage for companies starting out fresh, companies that aren't tied to a legacy environment," says Jeff Cohen, JetBlue CIO and vice president. "We've taken this advantage to the fullest, embracing and implementing new technology to the benefit of employees and customers alike."

### **Solution**

One example of the company's technology mission is its adoption of the Microsoft .NET Framework for development and deployment of its popular online company store. Known as ShopBlue and receiving 50,000 hits per day, the store features T-shirts, luggage, sports equipment, model airplanes, and other consumer goods designed to appeal to JetBlue customers, aviation buffs, and the general online public. ShopBlue is a rich-client application running on three Windows® 2000 Server machines and relying on a SQL Server™ 2000 back

end. It was developed in Visual Studio.NET and, among other .NET Framework technologies, uses ASP.NET Web Forms for its user interface and XML Web services for remote-code calls to a VeriSign payment-processing application running in the store's fulfillment house.

## **Benefits**

### **XML Web Services Provides Key Functionality**

For Cohen and his colleagues, the most essential technology for developers working on the ShopBlue project has been the XML Web services. As he explains, the application relies on XML Web services to encrypt credit-card data from the JetBlue data center in Salt Lake City to the VeriSign application in New York. XML Web services also enables the application to ensure that sales-tax charges are applied only where they are called for, that is, when the fulfillment house handling purchases from the store is in a sales-tax state and the customer also resides in that state.

Other vital .NET Framework technologies in the ShopBlue application include COM interoperability and p/invoke. Communicating with the VeriSign application requires the calling of a Visual Basic® 6.0 COM DLL in the application, and COM interoperability accomplishes this through its support of communication between COM and .NET. To streamline communication with order delivery, the ShopBlue application uses p/invoke to call the FedEx Ship Manager API.

### **Vastly Simplified Cross-Language Development**

Another Cohen at JetBlue, Chief Developer Adam Cohen, is convinced that the .NET Framework has simplified Windows programming in general because it provides such a manageable API. "Before, we had to search a text list of single-function calls into the WinAPI," he says. "But now we just enter 'System.AnyNamespace' into our code editor and get a listing of every API(Namespace) in the environment. This is a far cry from having to search a text file."

Another way that the .NET Framework has simplified programming work at JetBlue is by reducing the level of frustration so commonly involved in coding and debugging. "The .NET Framework accomplishes this largely through the performance advantage of precompiled code," Cohen explains. "In addition, because all Visual Studio .NET languages compile into MSIL (Microsoft Intermediate Language), developers on a cross-language team can work a lot more efficiently."

At JetBlue, front-end developers work in Visual Basic .NET and middle-tier developers work in Visual C#™ .NET. "For maximum productivity, it's essential that middle-tier developers be able to pass compiled code to their front-end counterparts in an immediately understandable fashion," Cohen says. "To do this in the past, they had to learn and use the IDL (Interface Definition Language) to describe various functions and types, but since that's no longer necessary they're able to pass code back and forth in about one-fifth of the time." And it's not just cross-language coding that's simplified with Visual Studio .NET; it's also cross-language debugging," Cohen adds. "For JetBlue this means that developers can debug code segments based on their functionality rather than the artificial distinction of the high-level language they were coded in."

### **Code-Behind Provides One of Many Productivity Benefits**

For Cohen, the true beauty of the .NET Framework is its code-behind approach to forms posting. As he explains, when a form was submitted on an earlier development platform its data would

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Chief Developer  
JetBlue Airways

usually be posted for handling on a separate page. In contrast, on the .NET Framework platform, forms post back to a DLL while the page is regenerated, and the .NET Framework maintains the control state even as the application is processing user input. The advantage for Cohen and his colleagues is that JetBlue no longer needs two developers—one working with Windows Forms and one working with HTML—because now there's only a single architecture, object model, and object orientation. This has standardized the company's interface development as a whole and reduced the need for specialization.

For example, with ASP.NET a JetBlue developer built a pure Visual Basic .NET-based shopping cart in less than a day. "In the past this would have required work in Java for validations and Visual Basic for database access and would easily have taken twice the time," Cohen says. "But with the post-back architecture of ASP.NET we're able to get by without any developer-written Java code." Cohen goes on to say that if JetBlue developers were developing XML Web services using a different environment, such as IBM WebSphere, they would need to add another programmer to the team. By using the .NET Framework and Visual Studio .NET instead, they are saving the significant costs of that additional headcount.

In another example, Cohen compares productivity during different phases of ShopBlue development. "We began developing ShopBlue in an earlier version of ASP, and it took us about a month to get a third of the way through," he reports. "Then we moved to the .NET Framework, including ASP.NET, ADO.NET, and XML Web services, and in the same period of time we got the rest of the application done." In other words, even without counting the time spent learning the new platform, the JetBlue developers worked twice as efficiently. "This kind of productivity enhancement is an enormous benefit to a company like ours, which is dedicated to offering customers the high-service, low-cost product they are used to," says Jeff Cohen. "That's what made our company successful in the beginning, and that's what will keep it successful into the future."

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The Microsoft .NET Framework is a platform for building, deploying, and running XML Web services and applications. It provides a highly productive, standards-based, multi-language environment for integrating existing investments with next-generation applications and services as well as the agility to solve the challenges of deployment and operation of Internet-scale applications. The .NET Framework consists of two main parts: the common language runtime and a hierarchical set of unified class libraries that includes a componentized version of Active Server Pages called ASP.NET, a loosely coupled data access subsystem (ADO.NET), and an environment for building rich Windows®-based applications (Windows Forms).

Microsoft Visual Studio .NET is the rapid application development (RAD) tool for building next-generation Web applications and XML 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 .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 IDE with RAD features for building Web applications and middle-tier business logic, and RAD XML designers for working with data. More information about Visual Studio .NET can be found at <http://www.visualstudio.net/>.

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