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## .NET Helps Frequent Fliers Soar

JetBlue Airways leverages .NET technology to bring its TrueBlue Flight Gratitude program online.

by Ron Schwarz

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The U.S. airline industry as a whole is suffering from a faltering economy and the repercussions of the horrendous events of September 2001. As this article goes to press, major airlines are approaching the federal government hat in hand for bailouts to enable them to continue operations. However, a fairly new airline—JetBlue Airways—is not only bucking the unprofitability trend, but also rethinking how a major airline should operate. It saves on maintenance expenses by purchasing new airplanes of the same type, and it saves on customer expenses by using a 100-percent e-ticket system; it then translates these and other savings into low fares with amenities such as free satellite television for each passenger (see [Resources](#)).

JetBlue's practices are paying off handsomely. According to Adam Cohen, JetBlue's manager of development, the company is the "biggest airline start-up in history"; it's already served more than eight million customers and has a market capitalization of more than \$20 billion. The "Forbes on Fox" panel sang JetBlue's praises recently as both an airline and an investment.

Part of JetBlue's success is due to its unique emphasis on managing customer logistics through online transactions. When it set out to create its frequent-flier program—named TrueBlue—it evaluated the available development platforms and decided on .NET.

Cohen's team had a head start, because they had already used .NET to write and deploy the shopBlue "company store" project (see [Resources](#)). However, although the shopBlue framework looks like a twin to the TrueBlue front end, Cohen points out, "They're really two separate applications; the only thing we were able to carry over was the experience of building a .NET application."

The TrueBlue users see a clean, easy-to-navigate Web interface (see [Figure 1](#)). Its simplicity belies

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### Executive Summary

#### Company

JetBlue Airways Corp., the third-largest U.S. airline in terms of market value.

#### Project

Create an interactive Web site for a new, in-house frequent-flier program that relies on an amalgam of internal and third-party data and Web content to give individual fliers the ability to manage their own miles and rewards.

#### Legacy

TrueBlue is JetBlue's first deployed frequent-flier program. Although two prior frequent-flier programs were prototyped, they were discarded without being put into production.

#### Solution

An online frequent-flier system that uses .NET technologies to synchronize and integrate data and functionality from multiple sources seamlessly.

#### Tools

- Windows 2000 SP2
- SQL Server 2000 SP2
- T-SQL
- Internet Information Servers (IIS) 5.0
- ASP.NET
- C#.NET
- T-SQL
- Visual Studio .NET
- Internet Information
- ADO.NET

#### Challenges

- Combining data from multiple sites, maintaining synchronization of the user interface in realtime.
- Working around Windows Scheduler issues.
- Ensuring usability by delivering a high level of abstraction over a complex system.

some fancy footwork behind the scenes. The frequent-flier system must integrate data from different sources, including the third-party Open Skies reservation system. Cohen's team wrote .NET Windows Services that access the back-end databases and integrate with the core code, which drives the ASPX output for the users' browsers. This complex choreography also includes a smattering of Common Gateway Interface (CGI) to tie it all together. Cohen explains: "After you log into the Web site, you're on an ASPX page; when you're booking, you're on CGI pages that drive the booking engine. The login data gets passed back and forth between CGI pages and ASPX pages. It was a big job to get them to work together, but we got Open Skies to help us out, and it actually works pretty well."

### Making Code Fly

Even though the members of Cohen's six-developer team describe themselves as a VB6 shop prior to the move to .NET, they wrote the TrueBlue system's back end in C#. Cohen says, "We'd gone with VB6 for productivity, because we could produce a lot more with VB than we could with Java or C++." So why move to C# rather than VB.NET? Cohen says: "We migrated to C# to familiarize our developers with C/Java syntax. C++ offers performance gains over the other languages on the transactional/COM+ side. We figured it would be easy for C# developers to adapt to C++ if necessary." Cohen originally considered doing the project in legacy ASP 3.0 with C++ 6.0, but after working with a couple of prototypes the team never deployed he says, "We re-evaluated things in terms of productivity and how much code we could produce, or how little code it took to produce the program, and we decided to go with .NET."



Figure 1 Frequent Surfers

Cohen describes .NET as "the next phase of evolution" in Microsoft developer products, and cites the performance of ADO.NET in conjunction with SQL Server 2000 as a deciding factor supporting JetBlue's move. He says the performance "blows away competing database-management technologies." After considering and discarding the alternative technologies in favor of a pure .NET solution, the team crafted the project without relying on any third-party tools. They did it all using C#, ASP.NET, ADO.NET, T-SQL, and SQL Server 2000, running on Windows 2000 and dished up by Internet Information Services 5.0.

The two biggest challenges the developers faced were replicating data from the reservation site and integrating the two separate Web interfaces. One major issue involved syncing up account creation and login steps between the two sites. Cohen explains how they wrestled with different strategies, including confirmation e-mails and Windows Scheduler-driven VBScripts, before settling finally on a C# solution: "We created a Windows service that ran a VBScript every five seconds to query the Open Skies database. The VBScripts were slow, so we switched to C# Windows Services because of their speed, and because of issues with the way the scripts interacted with the Windows Scheduler." He elaborates: "The Windows Scheduler crashed whenever the scripts hung, and the scripts hung whenever something didn't complete from the Open Skies side. So, when we moved to the Windows services, we got a huge speed increase, much better error handling, and we were also able to control creating threads, which we weren't able to do on the script side." In short, C# Windows Services' increased speed and reliability made it an obvious choice.

This choice resolved more than technical issues. Users were growing impatient waiting for the two sites to sync their data. Cohen explains: "We got a little bit creative—we knew that we couldn't be more than five to seven second seconds out of sync with what was on the Open Skies side. Our users would register and then they'd need to log on immediately. We got around that with a confirmation e-mail that activates their accounts. So, they'd have to get the e-mail in their inboxes, then click on Activate; then they'd be activated and logged in."



Adam Cohen, manager of development for JetBlue Airways, and his development team used .NET technologies to create the company's online frequent flier program, TrueBlue Flight Gratitude.

### **Approaching the Destination**

The development team also confronted the need to provide a seamless UI when integrating the two sites. Cohen says, "The challenge was to make it a coherent process for the user, to make it look like a homogeneous site as opposed to having two separate sites—our site and the vendor site." He's proud of what they accomplished: "If you go on the Web site, we've done a pretty good job of it; it's hard to tell that there are two sites there. If you didn't know what you were doing and you didn't know to look at the URLs and the extensions, you probably couldn't tell at all."

The developers did ride through some bumpy air with the move from Visual Studio .NET (VS.NET) Release Candidate 1 (RC1) to the release to manufacture (RTM) version. Cohen says, "We had problems with changes made to the encryption APIs (System.Security.Cryptography) when we upgraded from RC1 to RTM."

He also cites a stability issue with the release version of the Integrated Development Environment. "I don't think it's 100-percent stable right now; it tends to delete code in places randomly, so it's very important that you check your code often." He's otherwise satisfied with the platform's robustness, saying, "Other than that, all of our problems with VS.NET have been solved by service packs."

Cohen admits that as slick as TrueBlue is on the presentation side, the developers are still fleshing out the administration side: "There are also administration pages on the back end, and they need the ability to do logins. This way, when a customer calls in, the administrators can insert comments and each time something is updated or inserted, it goes into a log they can see at the end of every month."

Cohen is pleased with the progress his group has made using .NET technologies and with the performance and reliability the site delivers to JetBlue's frequent fliers. And the system is getting a good workout. More than 58,000 customers signed up in its first few weeks of operation. Cohen acknowledges that the system will continue to evolve and grow. He says, "I think at this point it has all the basics for our frequent-flier system," but adds "I know our marketing team want to add features, such as the ability to use American Express points in our frequent-flier system the way you can with Continental and United."

He also reveals that the second major release will include a TrueBlue-for-kids feature, which will be connected to parents' accounts. Cohen isn't letting success create overconfidence. The upgraded interface will undergo usability testing prior to release. This sound practice—all too often overlooked in the rush to take working code to production—is further evidence of JetBlue's efforts to succeed by cashing in on common sense.

### **About the Author**

Ron Schwarz lurks in rural Michigan. When he's not digging out of the mountain of e-mail in his inbox, he maintains his sanity by restoring classic cameras. He welcomes your comments at <http://www.clubvb.com/>.

