



Welcome to New Zealand Pocket PC Application Demonstrates the Power of the .NET Compact Framework when combined with GPS and Heading Sensors

Published: September 2002

GeoVector's unique combination of heading and attitude sensors, with GPS locators and Pocket PC devices, forms the basis of a whole new class of mobile solutions. The application, Welcome to New Zealand, allows visitors to use their devices to find out about the real world objects near them. More powerful than conventional GPS systems, the GeoVector system can not only tell you what's around you; it can also tell you what you're looking at. The application not only provides tour-oriented and geographical information; it also enables mobile commerce. The application was built in Visual C#™ using Visual Studio® .NET, the .NET Compact Framework, and SQL Server™ 2000 Windows® CE Edition (SQL Server CE). It supports all forms of IP connectivity, which in New Zealand includes GSM, GPRS, CDPD, and CDMA 1xRTT mobile networks.

Situation

GeoVector Corporation is a US-based technology company that has established an advanced development lab in Auckland, New Zealand, to build pointing applications based on their technology. Earlier this year GeoVector decided to move its core software technology development from the USA to New Zealand, and in May started to establish its core technology team in Christchurch. Arron Judson is the company's Director in New Zealand.

Fast Facts	
Number of developers to build application	3-4
Number of months to build application	2*

detect the direction in which the device is pointing. It combines them with GPS, which detects the spatial location of the device, and a geographic information database, to create a new type of mobile solution.

"While GPS alone can tell you what's around you, GeoVector can tell you what you're looking at. GeoVector turns the handheld device into what is essentially a mouse, where the real world is your desktop and you can point and click on any known geo-located object.

"GeoVector not only enhances the user experience of navigation solutions, we are also creating an opportunity for a whole new range of mobile applications based around pointing, including

* Includes two Visual C# .NET versions; does not include time to develop for other technologies



Solution Overview

Customer Profile

GeoVector Corporation is a US-based technology company that has established an advanced development lab in Auckland, New Zealand, to build pointing applications based on its technology. GeoVector's core technology is based around proprietary search software, the use of heading and other attitude sensors, combining them with GPS to create a new type of mobile solution.

Business Situation

The America's Cup will bring a number of VIP visitors to New Zealand this fall. GeoVector's new magnetic pointing technology offers the possibility of creating a "Welcome to New Zealand" application that can tell a visitor what he is looking at.

Solution

Using Visual Studio(r0 .NET, Visual C#™, the .NET Compact Framework, and SQL Server™ 2000 CE, GeoVector has built a handheld, connected smart client that can display information to a user based on her preferences, location, and point of view.

Benefits

- Provides a single, consistent development environment for all platforms
- Speeds product development
- Simplifies mobile database synchronization

Software and Services

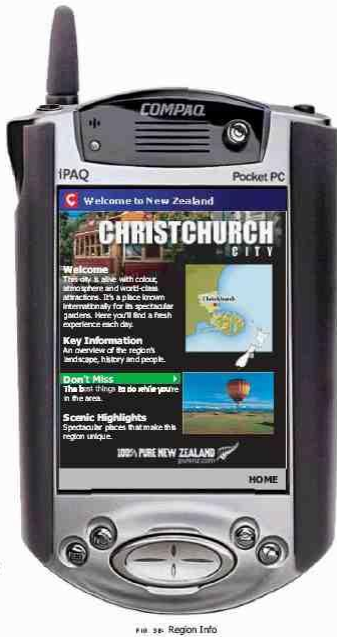
Microsoft® Pocket PC 2002 Software
Microsoft Visual Studio .NET
.NET Compact Framework
Microsoft SQL Server™ CE

Hardware

PC Card or embedded GeoVector technology
Hewlett Packard iPAQ

games. With GeoVector, I can now 'Point and Shoot' in the real world. Add cellular communications, and I have a multi-player game.

"Our initial application is for visitors to New Zealand, called *Welcome To New Zealand (W2NZ)*. We expect to have it ready for visitors who come to New Zealand this fall for the America's Cup.



"We initially tried building a rich client on Palm OS, but it could only handle a very small database. We also built a prototype thin client on Active Perl, WML, and MySQL, with a middle-tier spatial calculation component written in Visual C++®. We then reimplemented the rich client for the Pocket PC using Embedded Visual Tools, with the back end communications via XML over HTTP, although not with SOAP.

Solution

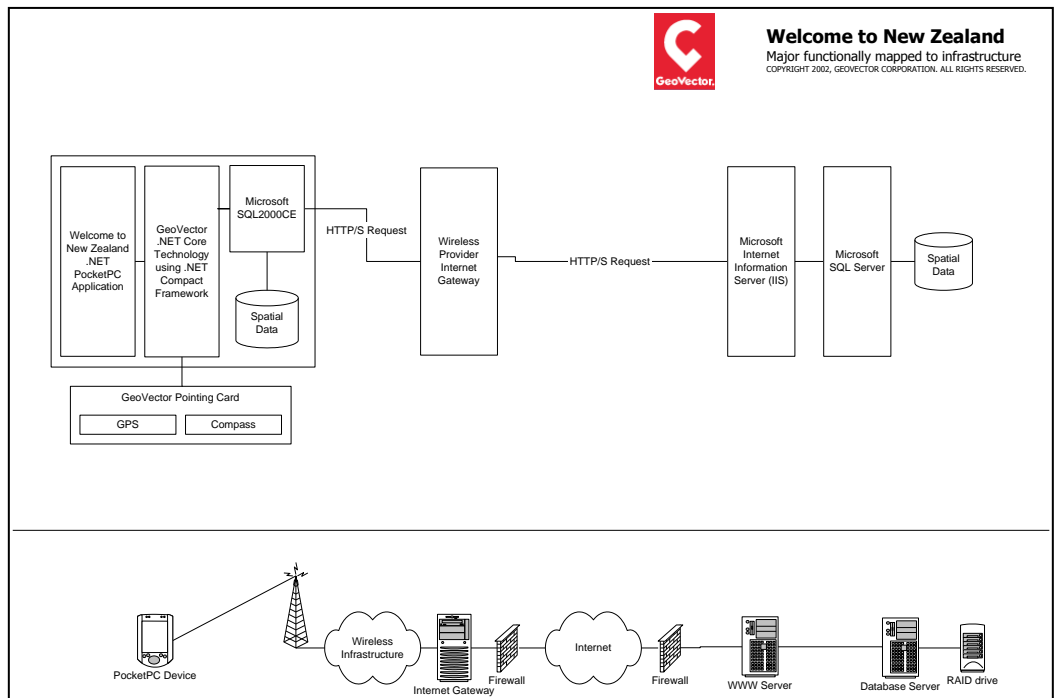
"We have now implemented a new version of the rich client (see figure at left) using Visual Studio .NET and the .NET Compact Framework. The spatial calculations are in C#, the data is stored locally in SQL Server CE, and communications with the back office are via SQL Server merge replication over HTTP (see architecture diagram below).

"We've also implemented a new thin client using Visual Studio .NET, ASP.NET, and Mobile Controls, which generates WML, HDML, HTML, or cHTML as needed by the mobile device. The data for the thin client is stored in SQL Server 2000, and, like the rich client, the spatial calculations are in Visual C#.

"Our aim is to have the spatial calculation code common across all platforms. Consistency between the .NET Compact Framework and .NET Framework enabled us to do that. We have developed our own spatial routines for Minimum Bounding Rectangle intersections, intersections of polygonal, circular and spherical regions, flat earth (which works well enough for the short distances used in pedestrian focused application) and spherical earth geometry (for other applications where distances are greater) and avoid earth geometry (where accuracy is paramount and distances are

"The .NET Compact Framework... gives us a consistent development environment for all platforms"

Arron Judson
Director, New Zealand
GeoVector Corporation



large).

"W2NZ will run on an HP iPAQ 3970, later this year on the iPAQ 5000, and ultimately on a pointing-enabled Microsoft SmartPhone. This application will allow users to be guided around New Zealand, similar to existing Location Based navigation applications.

"The difference is that W2NZ will allow the user to point his mobile device at any known object and gather more information, a 'What's that?' scenario. Or the user could point in a certain direction to find if any categories of objects are that way, 'Are there any restaurants down that street?'

'Once the user locates a restaurant, movie theater or other establishment, one simple action enables GeoVector's "Point to Call™" software to put the user through, to place a reservation either as a voice or data call.'

"Once the user has found the destination they are interested in, they can easily be guided, not with maps, but an arrow that points to the destination from their current location. The arrow will maintain a lock on the object regardless of the orientation of the Pocket PC, because the magnetic heading sensor will determine the heading of the device. Distance to the object can be calculated as the crow flies.

"This application is for pedestrians, particularly visitors and tourists to a new place. It is not designed for in Vehicle Navigation, where heading is sometimes calculated by the direction the vehicle moves, using current and last known GPS position to determine a quasi-direction. Vehicle navigation has to guide the vehicle based on a number of variables, for example one-way streets, no heavy transport, etc. We just point the way and the user can determine the easiest route.

"Our application allows the user to be standing still and pointing all around them to gather information:

- Point at Geographic Points of Interest for more information "Discovery Channel"
- Point at Hotels, Restaurants for room rates and menus.
- Point at the Movie Theatre to find out what's on and reserve tickets.

Benefits

"We chose the .NET Compact Framework because it gives us a consistent development environment for all platforms, and because the combination of Microsoft SQL Server and SQL Server 2000 CE makes data access very easy.

"We wanted to have the same development environment (languages, IDE, and core code modules) for all of our current and future platforms (PocketPC, Smartphone, desktop browser clients and mobile browser client, and Tablet PCs). Visual Studio .NET, combined with the .NET Compact Framework and ASP.NET Mobile controls, achieves that core requirement.

"The Rich Client allowed us to store a lot of the data on the Pocket PC, improving performance and reducing reliance on communications. Also, the Rich Client gave us more flexibility with the user experience and interface.

"The thin client interface will improve once we start development using SmartPhone 2002, and the mobile devices become more data aware. The thin client will always rely on access to the remote dataset, which may impact on performance in some areas of high mobile congestion or

limited mobile infrastructure, but we see this as a minor obstacle that will only impact a small percentage of users.

"The .NET Compact Framework gives us a platform that we can use to build solutions for both environments, utilizing a single development environment and a single back-office dataset.

"XCOPY deployment on the server saves us a *lot* of time. Anonymous Merge database replication between Microsoft SQL Server and SQL Server CE for rich clients makes our application deployment in the field much easier to manage.

Futures

"Integration with MapPoint is on our technology roadmap and we see XML Web services being a key technology in the back office, to allow us to aggregate spatial data from numerous content providers.

"Our technology extends into other scenarios. One we plan to build is a real estate application, 'point at the area you want to live in'. This would be for field sales initially, by building a tool for the real estate agents. Long term, the consumers would subscribe to the listings databases and could look for properties themselves. We are developing other pointing applications, including a Buddy Finder based on MSN Messenger, and some pointing-enabled 'First Person Shooter' games.

"Our core technology will be developed using Visual Studio .NET, and made available to the wider development community as a series of .NET-compliant components. This will allow other .NET developers to develop applications based on our core technology and .NET."

The Microsoft .NET Framework is a platform for building, deploying, and running Extensible Markup Language (XML) Web services and applications. It provides a highly productive, standards-based, multilanguage 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 (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 Web applications and Extensible Markup Language (XML) Web services. Visual Studio .NET empowers developers to rapidly design applications for any device and any platform, building smart device applications with the .NET Compact Framework or broad-reach web applications with the ASP.NET Mobile controls. Visual Studio .NET is fully integrated with the .NET Compact Framework, providing support for multiple programming languages and automatically handling many common programming tasks, freeing developers to rapidly create applications using their language of choice. Visual Studio .NET includes a single integrated development environment with RAD features for building, testing and debugging server, desktop and device applications.

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

For More Information

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For more information about GeoVector's products and services, visit their Web site at:
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