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New Issues in Internet Security



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COVER STORY



Computing
After September 11th

8 New Issues in Internet Security

As with so many aspects of our daily lives, the September 11th World Trade Center attacks have impacted Internet security and will continue to have a profound effect. In the aftermath, debate over Internet security and privacy has heated up and brought the issue to the forefront.

BY STEVE BACKMAN

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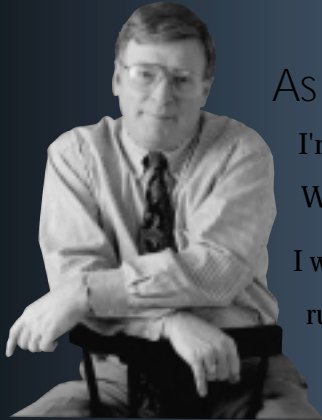
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**NEW
FEATURES**

The Ever Increasing Price of Freedom



As long as the USA is at war with terrorists, I'm all in favor of adding hackers to the FBI's "Most Wanted" list!

I would begin this phase of "cyberwar" by changing the rules such that every Internet user can voluntarily ask his or her Internet provider to physically visit and verify a site location and then electronically attach a complete identity to everything that site sends through the Internet.

On the flip side, each Internet user could then have the option of asking the Internet provider to block any information being sent to him or her from an "unverified" sender. Internet providers would have to agree to this new set of rules or they couldn't participate in the net.

This way, the billions of people, companies and organizations worldwide who have nothing to hide and who don't send threats or viruses to other people can "opt out" of the world of the misfits who do, by exercising the right to reject anonymous mail. On the other side of the coin, the people who want to remain anonymous can still do that, and still access everything they want. They can also continue to send anything they like, and it will be delivered to people who don't mind receiving anonymous mail. Since nobody is being "forced" to do anything in this scenario, that should satisfy even the most radical civil liberties groups.

Also, and I never thought I would say this, I think its time to institute a nominal charge to send an email. I suggest this as a funding vehicle for enforcing the verified site identity plan and an additional deterrent to hackers and terrorists who count on their anonymity and a free Internet to carry on their despicable work.

Its just another new line item in the bill for freedom.

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Computing

After **September 11th**



New Issues in BY STEVEN BACKMAN Internet Security

favor of new fads, collapse of its own weight, or perish in a business downturn, most of us expect it to stay and grow. Yes, a huge gap remains between digital haves and have nots, but this gap will

In the September 11 aftermath, debate over Internet security and privacy has heated up and spilled over into wider public discussion. America On Line and Earthlink attracted attention when they unceremoniously allowed the FBI to hook up their servers to its controversial Carnivore email scanning software. Attorney General Ashcroft then turned to Congress to approve what has become known as the PATRIOT act to open up federal government interception of electronic communications.

Meanwhile, the media has confirmed that virtually no links to the terrorist attacks have surfaced from detaining suspects based on cell phone records, scanned emails or other electronic and traditional leads. And coincidentally (we assume), network and Web administrators as well as the general public have had to suffer through a wave of fairly nasty virus attacks. Though virus protection and privacy rights generally need separate treatment, they tie together in the public and computer professionals' presumed heightened concerns about security.

From its inception, each step of the Internet's growth has required attention to privacy, both technically and as a matter of public policy. While some folks still imagine the Internet will go away in

probably narrow, just as it gradually did for telephone and television use. And as Internet use grows, more and more people will use it to purchase goods and services, express consumer preferences, communicate private views and desires, seek out like-minded people on a variety of public policy and political issues and on and on. This rhythm of growth will continue to depend on users' confidence in their privacy—for financial information, private tastes, and personal views, just as we expect our mail to go through unmonitored.

Ensuring privacy today has to do with both policy and technology. The technology issues reflect the unfortunate presence of snoops, hackers, common criminals and the like who want to steal your credit card, break into your bank account, sell your buying habits profiles, auction off your customer list to your biggest competitors, blackmail you for your (alleged) strange personal habits and so on. The policy issues have to do with how society and the government will balance privacy needs against requirements for a reasonable criminal justice system.

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Protecting eCommerce

Before weighing in on that one, let's look at the technical issues involved.

In today's world of burgeoning eCommerce and global communication, Internet security needs to happen on each leg of Internet-based computing:

- ◆ Securing Web, mail and other Internet servers, the databases behind them, and the entire private network infrastructure from intrusion and disruption;
- ◆ Securing Internet-based connections for the passage of private information — credit card numbers and other financially sensitive information, orders and other sorts of business transactions, private personal and internal business correspondence;
- ◆ Securing individual users' Internet experiences so that downloaded pages or emails do what we expect them to and no more.

Protecting these elements begins with routers, firewalls, proxy servers, anti-virus software and other typical networking issues not the concern of this article, not to mention physical plant security. At the software level, however, very little could take place reliably on the Internet today without the use of encryption. Encryption and cryptography predate computers and have been around for centuries, going back perhaps to the Egyptian era. Modern computing didn't create encryption. On the contrary, Professor Alan Turing's British-led effort during World War II to unlock the German Enigma military communications system, a mechanical device, helped pave the way to the modern electronic digital computer.

In the Internet era, encryption has become an essential part of doing business. Take a typical eCommerce example. You want to order some stuff from *moreclothes.com*.

You browse, put in, take out items into your on-line shopping basket and generally have a good time. Now you want to check out.

Have you shopped here before? You may log in using a user id and PIN, either directly or through the use of retained settings on your computer—cookies. We'll leave for another time whether or not cookies are a good thing or not from a security point of view. With or without cookies, when you log in, typically the browser sends the user ID/PIN pair back to the Web site for checking. How secure is this? Not very. Basic HTTP authentication sends the information in a slightly protected manner that still allows snooping to capture the information.

When you actually go to check out, however, the connection may slow down, even on a high-speed connection, and a key or other symbol appears on the bottom of your browser. Now you have passed into a secure area of the Web site, typically activating a Secure Sockets Layer connection. The trigger for this move comes from the Web site programmer having switched the HTML next page tag reference from *http* to *https*, where the "s" stands for secure. This in turn routes the incoming data stream differently inside the Web site's own network, again a realm we will leave for another time.

Certificates and Keys

More significantly for the consumer seeking a secure way to send credit card information, the Web server now sends a specially coded text file called a certificate back to your browser. In order to use *https* and secure sockets, the Web site generally has to have a recognizable digital certificate that identifies it as the truly *moreclothes.com*, trusted retailer to the masses. Certificates get issued by a tiny group of

Web sites called certificate authority, such as VeriSign. The certificate authorities in turn must have their own authorities established by an issuing authority.

The banks do their own checking before allowing folks like *moreclothes.com* to take credit card payments. Since with consumer credit reform, the banks have the bulk of the liability for credit card fraud, they constitute a fairly reliable step in the process.

The digital certificate includes information the browser can use to verify its authenticity, but it also includes a long string of characters that the browser can use in turn to encrypt messages sent to the server. The browser program now generates its own keys to use to protect its information and sends that back to the server, encrypted using the previously received server certificate. Now the protected "conversation" can take place. Among other things, the encryption and decryption of each message slow things down.

In the past, including in earlier days of comput-

ing, this kind of secure communication required the parties to have previously exchanged their encryption/decryption keys with each other. I have to tell you how I'm changing the text around to make it unreadable except to you and *how* you can undo the damage at your end to return it to readability—plain text. If we meet in person and give each other the information, we have a relationship of trust set up that can last as long as we want.

This requirement could work for a company that needed to share information among branch offices. At the training meeting at the main office, everyone re-

Congress in fact has adopted new legislation covering security issues. So far, however, it has wisely not rushed to adopt private security restrictions that will further weaken the economy as well as erode civil liberties.

Continues on page 12

HostACCESS

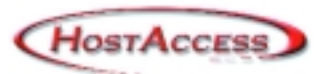
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ceives keys on diskettes, which they guard carefully on the trip back home, and then load up on their machines. As casual use of the Internet for commerce has grown, this scenario won't work, for obvious reasons.

Public key cryptology cleverly bypasses this problem. The theoretical basis for this technology has been around for a long time, but gained ground as a practical technique as need for it grew. In public key technology, the encryption pro-

gram needs two keys together to encrypt or decrypt a message or transaction, much like some mechanical vaults. One key, the user or server keeps private, protected. The other key can go out publicly. Unlike the older style, anyone can see anyone else's public key, but they can't use it without the matching private key. OK, you called my bluff, so find my public key below.

You may consciously seek out one or more permanent key pairs for yourself.

But the SSL-enabled modern browsers can also handle the same process on the fly in order for you to complete your moreclothes.com transaction.

For the most part, developers working on eCommerce projects don't have to worry about getting certificates and encryption directly into their databases. Ten years ago, when MultiValue still sought to act as an all in one database and network environment, the issue would have been, who can write a server function so Multi-

OK, here we go. See if you can guess my credit card number from this:

Version: PGPfreeware 6.5.8 for non-commercial use <<http://www.pgp.com>>

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mQGiBdkLls0RBADxirSiLYvWvflCEQ6HS3NHlfodGHpUITdieFsFFzSHMX1miu0
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=zSwc
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EDITOR'S NOTE: If you view this month's Spectrum issue on-line at intl-spectrum.com, you can copy and paste this text into your PGP key ring. For the curious or paranoid, Steve will send detailed instructions on getting set up.

Value can handle encryption directly. MultiValue systems typically have only primitive password functions, intended only for use at a system level, and only for very limited level protection.

Handling SSL certainly can be done, and MultiValue software that acts as a Web server—that is, directly managing an HTTP channel—will address this need. But otherwise, working in multi-layered, object-based development architectures means that elements such as encryption of data get done at one, appropriate point, and none of the rest of the software has to worry about it.

So far, we have talked only about one element of the Internet—the World Wide Web. Suppose however, you needed a developer to program a daily batch transmission of confidential financial information via email to key associates. Setting up an eCommerce Web infrastructure may not do the trick. And it certainly won't for private individuals who want to communicate without fear of eavesdropping.

Pretty Good Privacy for Your Email

The same public key exchange process can take place in the Internet channel for email. The most renowned software enabling this technique in the United States goes by the name of Pretty Good Privacy or PGP. MIT Professor Phil Zimmerman began work on the project in the 1980s and released it to the public in the 1990s. You can (still) download it at <http://www.pgpi.org/>, and it will integrate quite nicely into any normal email program, notably Eudora and the Outlooks for Windows or the Mac. Developers can also download software development kits that will permit integration or encryption and decryption into standard applications using Visual Basic or Linux/UNIX-oriented programming models. This in turn would permit easy integration into daily database extracts or other automatic regular distributions.

Needless to say, many other models exist and get daily use in the business world,

and security consulting for business and organizational processes has grown tremendously over the last ten years. This has been a need-driven growth, but the ready availability of public key technologies has been one crucial enabling technology.

With this technical background, the public policy debate comes into focus. For years, the federal government has sought to control the business and private use of encryption. Notably the Clinton administration proposed a mechanism where it could have something like a third, master key into encryption key pairs. This would give government agencies a back door into private commerce and email. This came under the name of “key escrow.” So far, Congress has not gone along with this notion. Even those who felt the government would never (again) violate its trust in keeping such information, wondered whether we could count on it to keep safe from intruders a tempting treasure trove of millions of personal and business keys.

Continues on page 42

Introducing...

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Putting a Face on the Technology

Basic Four, Microdata & Dick Pick

As related in Chapter 1 (p. 6, *International Spectrum*, Sept./Oct. 2001), the MultiValue database concept was born in the late sixties out of the necessity of creating a computing environment in which data could be stored as it occurs in the real world, and at the same time, conserve expensive and scarce data storage space.

While the new MultiValue database did in fact achieve the goal of creating a computing environment in which data could be stored in a manner that mirrored information as it occurred in the real world, that accomplishment was rendered somewhat moot because of the limitations of computer memory available in the late sixties and early seventies.

Hard to imagine in today's terms, a typical memory board in 1970 contained only 8K bytes (8,000 characters or numbers) of memory, and cost about \$3,500.00. Maximum configurations of 64K memory, a 10MB disk drive, a monitor and a magnetic tape unit for file



A 10MB Microdata "Reality" System

backup would cost over \$100,000.00.

Since all manipulation of data and execution of application software in a computer can only take place in computer memory, the contention for such minuscule amounts of memory resulted in unacceptable response times between user requests. The sad fact was that even a single user could choke the typical computer of the day by throwing in a secondary processing request—especially a print request.

To solve this problem, an innovative company in Irvine, Calif., called Microdata began experimenting with the concept of "canning" proven and tested software on a



Dick Pick



"The author circa 1980," Gus Giobbi

hardware board. This "firmware," as it became known, acted essentially as an auxiliary memory board with "hard-wired" software permanently "burned" on it. To understand the step forward in technology this represented, one need only to understand that in 1970, data and programs from the typical disk drive could be moved in and out of memory at only

about 30,000 characters per second. Once in memory, the typical central processing unit (CPU) of a computer could operate at hundreds of thousands of instructions per second, so the ability to have portions of the operating system software constantly available at that speed was phenomenal.

As was intuitively expected, the firmware concept resulted in an order of magnitude increase in overall processing speed, and lent itself to early minicomputer attempts to create real-time computing environments which could simultaneously support multiple users using different applications.

Continues on page 43

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STRATEGY 7 CORPORATION *Aligns with Brence to Offer Cutting-Edge Wireless Services*

Leading IT Solution Provider Becomes Nationally Recognized Value Added Partner

Strategy 7 Corp. (www.s7.com), a leading provider and integrator of technology products and services, announced that it will become a nationally recognized Value Added Partner for Brence (www.brence.com), a leading mobile infrastructure software company.

Brence Inc., one of the fastest-growing global providers of mobile infrastructure software, extends existing business infrastructure to a multitude of communication networks and Internet devices for increased accessibility, improved business efficiency, and a compelling end user experience. Brence supports over 250 devices including Internet-enabled cellular phones, Windows CE Pocket PC, SMS pagers, RIM Blackberry and Palm.

"Our relationship with Brence provides Strategy 7 with the ability to provide our existing, as well as new, customers, not only a leading-edge technology, but a new way of working," comments Strategy 7 Corp.'s president Joseph Rodriguez II. "As mobile and broadband innovations enable new opportunities for business, Brence-powered companies will be flexible enough to quickly and cost effectively take advantage of the emerging wireless capabilities for the mobile workforce,"

Brence's goal is to provide customers with a seamless transition to the next generation of wireless eBusiness. According to Brence CMO Keyur Patel, the company is dedicated to helping companies extend their eBusinesses to their mobile employees to strengthen customer loyalty, improve employee effectiveness and maximize partner relationships.

"New opportunities in mobile and broadband access are driving a new standard of service for nonstop access via the customer's device, providing universal access with simple, effective communication vehicles," Rodriguez says. "We're delighted to be working with leaders in the industry."

Since 1991, Strategy 7 Corporation has helped hundreds of organizations, large and small, adapt in the face of rapidly changing technology. The Strategy 7 team has consistently helped clients define, develop and deploy business solutions across many industries. Strategy 7 is a nationally recognized value added partner for top vendors including Hewlett-Packard, IBM, Informix, Oracle, JBASE, Raining Data and BroadVision. The company combines expert level delivery skills with a passion for partnering with its clients including American Express Financial Services, Ryder Logistics, Signa, NuSkin, AT&T and the state of New Mexico. ■

ON Corp. Completes Oracle Migration in

With 11 different databases acquired over years of mergers and re-organizations, the Orange County Transportation Authority adopted a strategy of centralized computing, standardizing on the Oracle DBMS. "We lead in the nation's transportation industry," stated William Mao, manager of Information Systems for the Authority. "We follow leaders in the IT industry. Oracle leads, we follow."

Understanding the value of the Authority's core-business systems that run on IBM's UniVerse, Ray

Zumasys Appointed IBM Business Partner

Reseller to Provide Zero Downtime System Migrations to IBM RS/6000

Zumasys Inc., a national solutions integrator and the leading provider of MultiValue database support, has been awarded RS/6000 Business Partner status with IBM. This coveted vendor authorization will allow Zumasys to offer the IBM RS/6000 to customers in North America, the company said.

Companies today require a computing platform that delivers maximum uptime and scalability. The IBM RS/6000 outperforms competing midrange Unix platforms and is backed with mission-critical same-day, on-site service from the world's largest technology company.

"The IBM RS/6000 is the premiere Unix business system and we are pleased to offer this solution," said Paul Giobbi, president of Zumasys. "35 percent of our customers run on IBM AIX and our technical group has more than 20 years combined experience working with the RS/6000 platform so this partnership makes sense."

Under the terms of the arrangement, Zumasys will sell IBM's RS/6000 pSeries and Netfinity Intel-based servers to end users in North America. The company will offer application migration services, systems integration and on-site installation nationally.

"The IBM pSeries systems offer customers far superior performance at a better price than competing midrange UNIX platforms," Giobbi said. The IBM RS/6000 pSeries servers are available in rack and tower models. ■

UniVerse to Six Months

Riggins, manager of Application Development, looked for a solution that would preserve the mission critical applications and allow him to move to Oracle.

"I thought about this problem for months," he said. "The development of these applications was a 26 man-year effort refined over 13 years. Re-engineering was not an option. The funny thing is, I had the solution sitting on my desk, in a flyer I had been moving around with no time to read. ON Corp. claimed they could preserve my UniVerse applications and run them directly on Oracle Server, and then they proved it.

"We started by compiling all the applications to find any land mines, then chose a pilot application as a proof of concept, and signed off on January 12, 2001. The next step was a detailed project plan, then execution. We chose to move an application at a time to limit risk and disruption; the first application went live on Oracle on February 2, 2001, with the last of the 13 applications going live on June 13, 2001," Riggins described.

With its core-business systems now running live on Oracle, the Authority is making decisions

Continues on page 18

WaveLink Corp. Acquires ROI Systems

Acquisition Creates Complete Wireless Systems Software Solutions for Enterprise Customers

ROI Systems Inc. has announced that it has been acquired by WaveLink Corp., a wireless platform technology developer that enables enterprises to develop, manage, and deploy wireless applications. The combination of the two companies strengthens their complementary products and provides partners and enterprise customers with innovative and complete wireless deployment and management solutions.

"We are very pleased to have ROI join our team," said Robert Whelan, WaveLink's president and chief executive officer. "The company has an excellent reputation for great wireless products and customer support. Combining the companies' portfolios gives us a great opportunity to provide customers with complete end-to-end wireless software products and services."

In addition to connectivity software, WaveLink will be adding ROI's newest product, Avalanche, to its current solutions. Avalanche provides remote mobile device configuration and management which complements WaveLink's network management product,

WaveLink SNC24TM. Now, customers will have a complete network and end-device management system—for install, updating and management of both the network and devices, which greatly simplifies IT's job of deploying and administering their wireless systems.

"We are very happy to be working with an established company like WaveLink," said Fran Black, president of ROI Systems. "This acquisition will give us approximately 30,000 wireless sites running WaveLink and/or ROI and over 3,000 customers worldwide. The combination of ROI and WaveLink is a perfect match, bringing together complementary resources and product features that deliver wireless solutions that people all over the world need and want."

As part of the merger, ROI's staff and operations in Salt Lake City will remain there and continue to operate as usual, handling sales and technical support.

"Both WaveLink and ROI have a proven track record of delivering quality software," said Keith Kanneg, senior director of Software Marketing for Symbol Technologies Inc.

"WaveLink's network management combined with device management from ROI provides us with an excellent solution for our customers. We look forward to additional technology benefits that will result from this merger."

The combined WaveLink product line now includes a full range of wireless application development and networking products. WaveLink's network products manage 900Mhz and 2.4Ghz wireless LAN networks as well as DOS, PalmOS, and PocketPC wireless devices. The company's application development tools include Java and COM libraries that allow programmers to create wireless applications in today's most popular languages. Supporting a wide range of server operating systems including Windows NT, Windows 2000, Unix, and Linux, these applications run server-side while communicating with thin clients on a variety of wireless PalmOS, DOS and PocketPC devices. WaveLink also delivers a complete set of terminal emulation products supporting such emulation types as 5250, 3270, VT100 and VT220. ■

NEWS MAKERS

Continued from page 17

using state-of-the-art reporting tools, such as Crystal Reports, integrating mainstream packaged solutions and introducing Web-based tools. "The best compliment I can give ON Corp.," Mao stated, "is to freely offer to be a reference. ON didn't ask for the reference; I offered it."

ON Corp. is helping organizations like OCTA who have a need to re-deploy business applications developed on one of the common MultiValue DBMSs—such as IBM's UniVerse and UniData, PI/Open and Pick varieties such as D3—on relational DBMS such as Oracle and SQL Server. ON's suite of products and services transform applications, without change, to run independently of the database, operating system and user interface, running legacy applications directly on the operating system of choice and performing I/O concurrently with multiple choices of databases.

1mage Software Forms New Alliance to Bring Integrated Document Management to the Construction Industry

1mage Software Inc. and Ferrell Companies announced a new strategic alliance that will provide state-of-the-art integrated document management (IDM) tools to the construction industry.

"We are pleased to welcome Ferrell Companies as our business partner," said David R. DeYoung, president of 1mage Software. "In the construction industry, document imaging and the Internet are becoming increasingly important ways to improve business controls and cut costs. IDM will provide Ferrell's customers with a secure repository for all their important business documents."

Ferrell Companies currently provides products and services to more than 300 construction

firms across the U.S. It also supports systems integration and communications for more than 100 additional businesses. Through this new alliance, Ferrell will offer image-enabled systems to its clients.

Jerry Ferrell, president of Ferrell Companies, explained: "Construction companies will be able to tie documents and images directly to their key business systems with the help of integrated 1MAGE and Ferrell products. This can enhance efficiency and document security for both construction companies and their customers. We investigated several imaging systems, and 1MAGE exceeded our expectations for integration capabilities. Also, its availability on Linux, UNIX, and Windows NT made 1MAGE particularly attractive."

Ferrell is also a national distributor for Tarantella Enterprise software, which manages Web-based access to corporate applications from network clients anywhere in the world, and also for Tricord appliances, which offer seamless growth and unprecedented ease of storage management. The combination of 1MAGE document imaging solutions,

Ferrell construction software, and products by Tarantella and Tricord creates one of the most powerful solutions for the construction industry.

Ferrell introduced the 1MAGE IDM system at its July 2001 user conference in Denver, Colo. As a result, Schlouch Inc. (a Blandon, Pa.-based construction company) will become Ferrell's first customer to implement 1MAGE. Schlouch evaluated solutions from several different vendors but decided that the integrated solution provided by Ferrell Companies, utilizing the 1MAGE product, was clearly a superior solution. Schlouch is anxiously awaiting implementation of this system. This should help Schlouch significantly streamline its paperwork and business processes, which can get complicated given the diverse invoicing procedures used by its clients.

After installing a server running RedHat Linux, Schlouch will integrate 1MAGE with Tarantella Web access-management software and fault-tolerant scalable network storage cluster by Tricord — thus creating a powerful, scalable, and comprehensive solution.

Ready for a Revelation? They're Back!

After a long detour under the iron rule of former CEO Jim Acquaviva, Revelation Technologies has come full circle and initiated some overtures to International Spectrum and the MultiValue market.

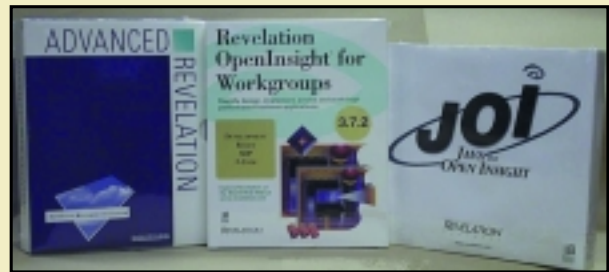
"One of the first things I noticed after I took the helm at Revelation was that *International Spectrum* magazine has faithfully displayed the Revelation logo under its mission statement for years," said Mike Ruane, the new president and CEO of Revelation Technologies. "That told me that maybe we were



Mike Ruane is the new president and CEO of Revelation Technologies.

missing a bet if we didn't let Spectrum's readers know that not only are we still alive, but we're stronger than ever and still dedicated to the Revelation database model that our users swear by."

Headquartered in New Jersey, Revelation Technologies' goal is to lead the market by enabling professional application developers and development teams to implement and deploy distributed Web- and network-based packaged and custom business applications. Long-time Revelation fans have expressed broad approval for Ruane's re-dedication to the



Revelation Technologies re-dedicating itself to the Revelation product and wants the MultiValue community to know that Revelation is "stronger than ever."

Revelation product and orphaned users.

According to Ruane, "Our strength is in our clients — for the most part, application developers — who know their market and serve it well. When WinWin Solutions took control of Revelation, we came from a consulting and development background. We know what end users want and expect because we took care of them. We bring this attitude to Revelation now: Give our

clients the tools and technology that lets them be productive and successful. This makes us productive and successful too."

The company will be an exhibitor at the national Spectrum Exhibition and Conference in February in San Diego and attendees will be able to meet Ruane and hear a presentation on the company's current offerings and future plans for the Revelation product. ■

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MultiValue Toolkits *for* PDA DEVELOPMENT

In this series of articles on Personal Digital Assistants and Multi-Value databases, I've talked about general PDA design, about creating conduits, and about the different programming tools that exist to create PDA applications. What I have *not* talked about is how to develop PDA applications with the two toolkits designed for MultiValue databases.

I mentioned one of them in a previous article: "mvMoble." What I have not talked about is the "mvConduit" software. Even though these two toolkits sound like they work together, they do not. Now let me explain what they are and how to use each one.

mvConduit

The mvConduit is a replacement for the standard Palm conduits used to sync information with the Address book, Date Book, To Do list and Memo Pad. The mvConduit is designed to sync the content in the Palm Pilot with your MultiValue database. It works with D3, Universe, UniData, UniVision and most all native platforms.

The standard Palm applications (Address Book, Date Book, To Do List and Memo Pad) have always been the most widely used applications on the Palm. By using the mvConduit to connect the Palm to your MultiValue system, you can now upload your customer files for your salespeople, as well as keep your appointments up to date.

The mvConduit is designed to call a MultiValue BASIC program to find out how to integrate your Palm and database data together. This gives you full control over how and where the data comes from.

The setup of the mvConduit is easy. Once you setup how you are connecting to your MultiValue system (Figure 1), all you need to do is select the tab for the Palm application you want to sync your MultiValue data with, and enter the BASIC subroutine name that the conduit is to call (Figure 2).

Continues on page 22



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MultiValue Toolkits for PDA Development

Continued from page 20

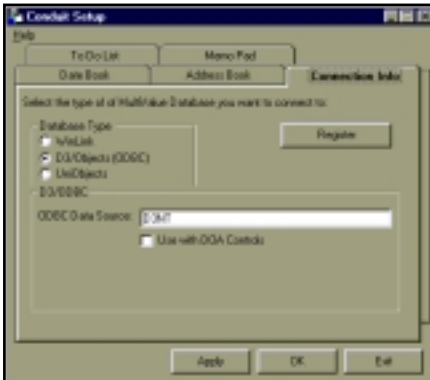


Figure 1



Figure 2

The mvConduit includes a sample program for syncing a customer file with the Palm Address book. It supports all three syncing options: PDA overwrites Desktop; Desktop overwrites PDA; and true Hot Sync. It also allows you to update and change category names used by the Palm.

The mvConduit has fairly good documentation with all the requirements and syntax needed to create the BASIC programs needed to sync with each of the databases.

There is one "gotcha" with the mvConduit. You must already have the Palm Hotsync Version 3.1.1 installed. Palm Hotsync Version 3.1.1 requires Version 4.0.1 of the Palm Desktop. You can download these versions from <http://www.palm.com/support/downloads/>

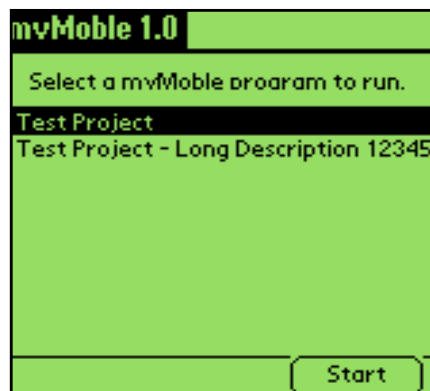
mvMobile

The mvMobile toolkit is used to actually create Palm programs using MultiValue data. The mvMobile program is designed to read a parameter record from your MultiValue system and use it to generate a program that can be run on the Palm.

Since I was using a BETA copy of the mvMobile to write this article, some of the things I will be talking about may change by the time this product goes into production. The production release is scheduled for Spectrum 2002 in February.

The mvMobile includes a conduit that will sync the data from your MultiValue database with your Palm and from the Palm to the MultiValue database. Like the mvConduit, the mvMobile conduit will require a MultiValue BASIC program to sync your data.

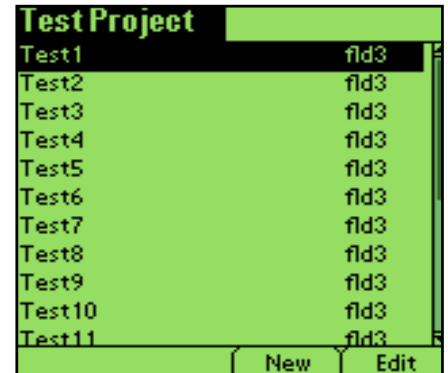
There are a few shortcomings with mvMobile. Since mvMobile is a parameter driven program, you do not get an independent icon for each mvMobile application you design. There will be an icon for mvMobile. After selecting that, it will display a list of all the mvMobile applications loaded onto the Palm:



If you only have one mvMobile application loaded on the Palm, then this screen will be skipped.

There are two ways to display your data once you have chosen the mvMobile applications: List View and Detail View. The List view option will display your application data in a list, allowing you to

select a specific record to view or edit more in-depth:



The Detail view allows you edit or view in more detail your application data. Part of the parameter record defines how the data is displayed and edited in the Detail view. This unfortunately includes another limitation in mvMobile. Since Palm Pilots have such small amounts of active runtime memory (96K on PalmOS 3.0, 128K on PalmOS 3.3, and 256K on PalmOS 3.5), there is a limitation to the number of Labels, TextBoxes, ComboBoxes, and CheckBoxes you can have displayed on the Detail View. You can only have a max of 10 Text Boxes, 10 Combo Boxes, 10 Check Boxes, and 20 Labels.

For most applications, this is plenty. For example, the Address book application only has 10 text boxes, 5 combo boxes, and 10 labels displayed on the screen at a time.

mvMobile also includes support for a barcode scanner, allowing you to use Symbol SPT 1500 and SPT 1700 for data collection. When a barcode is scanned, mvMobile will find the record the barcode is assigned to and displays the Detail view for that record.

You can find more information about these products at my Web site <http://www.natec-systems.com> or you can email me at nrector@natecsystems.com. **is**

NATHAN RECTOR is president of Natec Systems, a firm specializing in custom programming and system administration for D3/AP/R83 environments.

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Use jBASE Web Builder, Java OBJEX, JDBC, and OBJEX with Active Server Pages, Java Applets, Browsers, etc.



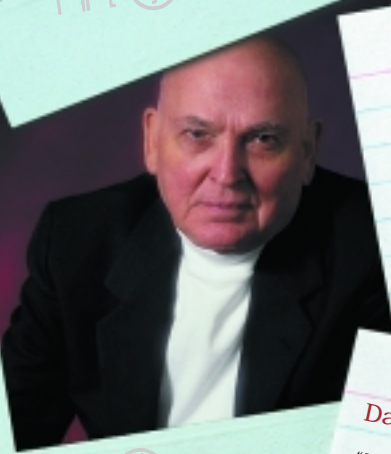
Desktop and Development

"Around here, the process never stops. We're continually enhancing the application and bringing on new functions, which is why we're pleased to have jBASE helping us move the process along. We're fully confident that jBASE will be with us well into the future."

Use JDP (including OLE DB, ODBC, ADO, and JDBC) or OBJEX with Excel, Word, Crystal Reports, etc.



Use Java OBJEX, JDBC with development tools like Cold Fusion, jBuilder, etc., as well as with jBASE OBJEX with Visual Basic or Delphi etc.



Database Interoperability

"Interoperability is critical because everything must interact with everything else. jBASE has been key to allowing us to move from a MultiValue database to a normalized RDBMS system — like Sybase or Oracle — without having to rewrite our application. For us, nothing else was as flexible as jBASE, especially when you consider that we need to access and store data in other database environments."

Use the jEDI with Oracle, Sybase, SQL Server or virtually any data source. jBASE even supports embedded SQL.



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THE iFILES

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DEVELOP USING STATE-OF-THE-ART TOOLS.

jBASE is the launch point for connecting standard tools such as Excel, Word and Crystal Reports to the database. Once the connection is made, just access data or execute code directly from that industry-standard desktop application. jBASE OBJEX integrates seamlessly with Visual Basic for Applications (VBA). Plus, jBASE provides an OLE DB and an ODBC interface. Remember, to develop out-of-this-world applications, start with an out-of-this-world product: jBASE.

THE FREEDOM TO INTEGRATE WITH ALIEN DATABASES.

Another innovation worth investigating is the jEDI. The jBASE External Device Interface provides a common set of rules and syntax to access any database or file system. With it, you can make the move from a Multivalued database to a normalized RDBMS system like Sybase, Oracle or SQL Server without re-writing your applications. Its flexibility even extends to its support of databases using embedded SQL. So, if your environment demands a mixture of different applications and databases, jBASE provides you with a common access method to them. This means that, even when coexisting with other data environments, the investment in knowledge is maintained because the code will be completely compatible.

THE SHORTEST DISTANCE BETWEEN POINTS.

Now that the truth has been exposed about jBASE, doesn't it make sense to investigate further? To begin your mission to the exciting new world that awaits you with jBASE, call us in North America at +1 508 598-4100; in Europe +44 1442 235 515; in Australia +61 (2) 9955 2644; email info@jBASE.com or visit us at www.jbase.com. Once you make contact with us, you'll be well on your way to where you want to be today. And tomorrow.

Latest sighting

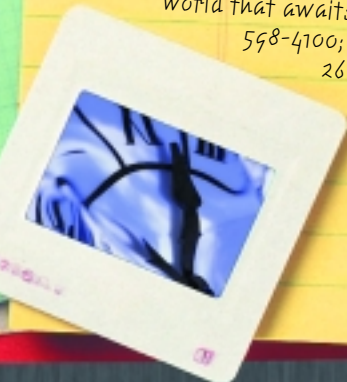
JAVA OBJEX

Java OBJEX is a recent addition to the jBASE product set. It defines BASIC and other important jBASE elements to the Java environment, and allows the interaction of jBASE with any Java technology. Java OBJEX's versatility allows it to be used with any Java integrated development environment such as Visual Age and WebSphere. Or use it to create Enterprise Java Beans. Plus, when it's used with a Java Application Server, Java OBJEX yields a robust scalable implementation of an application for the Web or any Distributed Environment.

Latest sighting

jBASE WEB BUILDER

jBASE Web Builder, the newest component of the jBASE product set, empowers developers to create industrial-strength business applications using Internet technology and their existing jBASE expertise. By providing a browser-based integrated jBASE Web Builder development environment, jBASE Web Builder breaks new ground in the Web application builder arena. Simply put, it is the 'glue' that links widely available, open and standard technologies, ensuring that jBASE Web Builder applications can be deployed on all major technology platforms.



Diamond *in the* (Main) Stream

The MultiValue Role in Data Warehousing

SECTION 4: Meta Data

GOOD DATA ISN'T ENOUGH to make an effective information system. Ensuring a good system, and a good project to get there, requires comprehensive data about the data, or "meta-data." This is particularly true for a data warehouse, where it means more than simply knowing how many characters and what type. The fact is: the more that can be done with the "meta data" in a data warehouse, the more that can be done with the facts.

A multi-valued database holds the metadata in a dictionary file closely integrated with the data file. The integrated data dictionary is a controversial aspect of the MultiValue data model. While having the attribute definitions immediately attached to the data file has advantages for users, data warehousing experts claim it is a problem to have your metadata scattered all over the place. No longer; now consolidating the multi-valued dictionary data is relatively easy. And the MultiValue metadata architecture has several unique features, precisely because of all that can be done with it.

Among the state-of-the-art data warehouse tools, the real strength is sharing metadata. Modern "after-the-fact" or ad hoc query software first works with the metadata (i.e., obtaining the list of fields within the database, and presenting the list to the user to aid in constructing a well-formed query). Metadata is therefore required, in order to successfully present the results. Before the fact, *a priori* software such as ETL tools must have metadata in order to acquire the source data, and to parse the data for loading data warehouse tables. Being able to share this metadata greatly enhances the ease-of-use, and helps the user focus on the data rather than what they have to do to get it.

All the industrial-strength relational databases have metadata. Although in the multi-valued databases it is called a dictionary rather than metadata, there are, nonetheless, very sophisticated structures for "data-about-the-data." The integrated dictionary files always contain simple attribute-defining-items that serve as primitive metadata. When relational rules are added in the form of the "correlative" specifications, the role of dictionary attribute definitions as metadata is fulfilled. Moreover, the modern MultiValue versions have attribute-defining-items with enhanced relational capabilities (i.e., programmed logical values, or "BASIC calls") and multi-dimensional features (dynamic n-way joins and bridge cross-reference correlatives). Modern multi-valued databases such as D3 and

Reality can also service SQL/ODBC queries by means of a dictionary extension that normalizes multi-valued files. This new metadata mechanism extends the MultiValue dictionary structures with a background map, or "schema," that allows the SQL query mechanism (i.e., the D3 "odbcsvr") to dynamically convert a file of multi-valued data items into a normalized column-and-row data set, using real-time production data.

Yet there is still more that can be done with MultiValue metadata. Because the dictionary data is held in the same architecture as the data, this "data about the data" can be used as data itself. The fundamental database tool becomes a data warehouse resource itself. Here is a simple example of the use of metadata as a system resource, and as a project tool.

Dictionary Data as Data

The basic metadata element is, of course, the dictionary item. Specific formatting for this record is well documented, but there are valuable capabilities inherent in this facet of the database that are infrequently used. For example, the first field of the dictionary metadata is the Type, usually an "A," designating the dictionary item to be a definition of a data field or "attribute" in the associated data file. The next field is a number, designating which attribute in the data is being defined. However, the Type can be an "S," designed to designate an alternate name, or "synonym" for the data attribute. Since all advanced functions of the multi-valued database work equally well in A-type and S-type defining items, and there are no restrictions on the number of A-type defining items for each attribute of the data, the use of the S-type code has fallen off.

Now there is a new reason to use S-types. New possibilities open up when A-type defining items are used to define as the original or "real" data in the database, while S-type defining items are used for all other "logical," or "virtual," data elements that can be derived from the data. A user can determine instantly the real data, and its location and format. New "smart" processes can analyze the database. The system can automatically map the multi-valued database into a two-dimensional "first-normal" or spreadsheet form and offer the user a

Continues on page 28

**Before you dump the GREEN SCREEN,
call Modular first! ■**

File Edit View Favorites Tools Help

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choice of available fields of data. This is extremely useful when analyzing and managing the data. It is also useful when designing the data warehouse, as we shall see in the next section.

Mapping the Database Is Only the Beginning

The data warehouse shares one characteristic with a real warehouse of physical goods. Namely, that the value of a warehouse rapidly diminishes for any element that cannot be located. If one element cannot be located, the warehouse has a problem. If two or more elements cannot be located, the problem is very serious. If any of the lost elements are frequently sought, like a commonly ordered sale product or the high-margin item for the week, then the warehouse fails. Moreover, in addition to where a warehouse item is stored, the warehouse manager has to know where an item comes from, in order to use it successfully.

This is equally true for data warehouses. A data element that can only be retrieved has a limit on its value. The database administrator needs to know a lot more about the element to use it, or to offer it to users. For this reason global data mapping is inherent in most relational databases. There are global mapping capabilities in the MultiValue database, although relatively few MV sites take advantage of them. Yet these capabilities are so powerful that it is often worthwhile to maintain the metadata in a MultiValue system, even if the data warehouse and fact tables are in another database. On more than one project, we've designed the database on a MultiValue system and maintained the data dictionary there, while building the data warehouse in another database. The following discussion explains why.

Data Dictionary Usage for Tracking and Searching

A dictionary item in a MultiValue system is an especially powerful metadata record. In the base form, the dictionary item has the field number, data type, and anticipated maximum string size in bytes. The path to the data, specifically the filename and its parent directory (account), are derived from the path of the data dic-

tionary item itself. This is sufficient for all the database functions. In this fundamental form, the metadata dictionary items can be listed, sorted, and searched. But this is just the base form. The dictionary metadata item was designed to also contain relational rules, and even DBMS architecture. These capabilities are coded within a rigidly defined syntax that is easily learned and well-known to all MultiValue database users.

Relational rules in a MultiValue system take the form of correlative codes in the dictionary metadata item. These include reformat masks, complex calculations, even implicit joins, called translations. The metadata dictionary items can also define sub-table constructs (associative codes) within the data table itself, and dimension tables when used with translations. In practice, the MultiValue dictionary metadata item can produce intricate, elegant databases of bewildering complexity and subtle power.

(Bewildering complexity, in the form of two-dimensional presentation of multi-dimensional facts. Modern MultiValue databases with ODBC/SQL capabilities have "maps" of data files that use the dictionary metadata items to dynamically construct flat tables and sub-tables to fulfill SQL queries in the primitive column-and-row form that current business and desktop software expects. This powerful feature is the subject for a complete series of articles to follow. Yet as clever as it may be, there is more power in the subtle things that can be done with MultiValue metadata by the MultiValue system itself.)

That subtle power is that the MultiValue metadata dictionary itself is a relational database file. It is managed by the same database engine as the data that is being defined. As a result, the full array of RDBMS tools can be applied to the metadata. In other words, once a well-formed fact table is defined and stored in a MultiValue system, the metadata for the data warehouse automatically becomes a fully functional relational database itself.

This has many advantages, most of which are well-known to the experienced MultiValue programmer in day-to-day work.

- ◆ Searching dictionaries for controlling/dependent codes to locate multi-value sub-tables, called "associative sets," in complex database constructions

- ◆ Doing a query that sorts dictionary metadata items by the relational code, or correlative, to determine real data recorded in the database files from virtual or logical data derived at the moment of the query

- ◆ Creating specialized views of the data, driven by a set of metadata items with a code in their key item-id, that can be selected, analyzed, or even used for subsequent queries

- ◆ Creating and maintaining a global metadata cross-reference, along with a library of additional metadata, for every field and data element in the database, or the entire data warehouse.

Let's look more closely at that last one.

Metadata Repository: Consolidated, Cross-referenced, and Joined (Translated)

Assume we have a data warehouse with a large table of facts, or even several tables and sub-tables. Naturally, we have a dictionary file for each table, with an attribute-defining-item ("A-type") for each single-valued field (and each multi-valued attribute). Perhaps we have one or even several synonym defining items (S-type) for most attributes, with complex correlatives and relational rules. In an average sized database, this could be hundreds of definitions, some very similar (right-justified versus left) and others very different (two different translations for the same multi-valued attribute, based upon an associated date). Now how do we manage them? Specifically, how does the database administrator define specific data elements, locate physical data fields, or verify sources of derived data?

One way is to list and sort the file dictionary, and then examine the printed results. But this can be time-consuming, and prone to mistakes, such as overlooking an unexpected spelling of an attribute name. It can also be very difficult if there are two or more dictionaries involved, and similar-named but differently derived data elements. One gets the

feeling that with such a flexible data model, there must be a better way.

There is. In a MultiValue data warehouse system, the metadata can be manipulated like the real data. For example, a file can be created with a data item for every data element in the entire system. The item-id is a complex key composed of the attribute name, with its account, a comma, and its filename. Attributes 001 through 010 are a copy of the first ten attributes of the original dictionary item. The remainder of the item can be anything of significance to the data element, for example:

- ◆ the date the element was first defined in the system
- ◆ a "multi-valued" flag, if the element can be multiple valued
- ◆ a multi-valued list of synonym names which refer to this real data element, or
- ◆ the real data element(s) referred to by this synonym

In order to work effectively with this file, of course, it will have a dictionary. The items in this dictionary will define each of these fields of data listed above. More importantly, there will be a set of indexes built on the attributes of this global dictionary file, such as:

- ◆ filename, extracted from the item-id
- ◆ account, also extracted from the item-id
- ◆ attribute name, since there can be duplicate names in different files and accounts
- ◆ synonym names
- ◆ the first letter, or operand, of the correlative code

This last index is especially interesting. The first letter is often the operative end of the correlative code, and reveals the nature of the data element itself. For example, a "G" code means that the element is extracted from within another element of the database, while a "C" code indicates

that the element is composed of one or more parts of other data elements, and a "T" code indicates a translation. This index can be invaluable when a database administrator is attempting to determine how many attribute definitions in a system are translating through a specific file.

And there is still more that can be done with our global dictionary. Imagine that our system has another file, with a set of data items corresponding to the real or A-type attribute definitions in the first file. The item-id is the same complex key as just described, namely, the attribute name * account, filename. The content of this metadata file can be business rules:

- ◆ edits, in the syntax of one or more format masks
- ◆ the source of the data element
- ◆ a knowledgeable reference document, department, or person
- ◆ references to business process or programs that use this element
- ◆ references to business process or programs that update this element
- ◆ references to business process or programs that can delete this element
- ◆ general comments about acceptable values, or even pseudo code
- ◆ warnings about unacceptable values, and methods or processes to detect and correct them

Now the global dictionary gains some

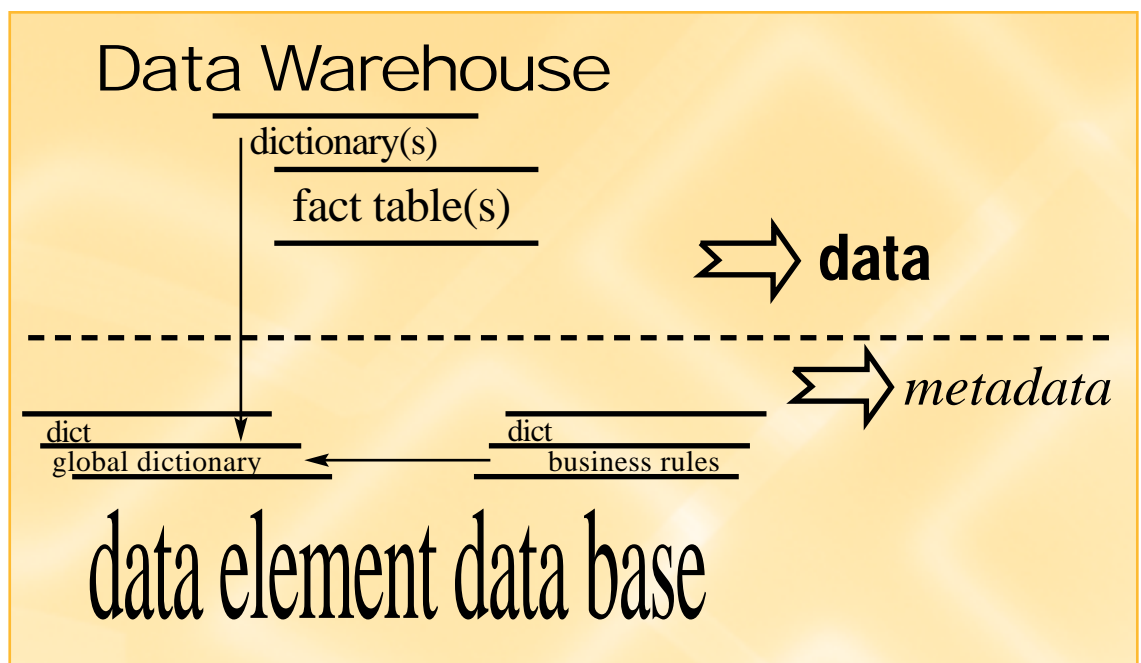
powerful new features. A search of this file can produce troubleshooting diagnostics for any data element in the system. A synonym definition in the dictionary of our first file could translate the complex item-id into the edits associated with the data. Moreover, another translation can join the edits to each of the synonym names, producing a cross-reference listing of the sources, edits, and format of each derived data element in a file, an account, or even the entire database.

Obviously, imagining the global data dictionary is the easy part. Recording the additional metadata information is tedious, but well-worth the relatively minimal effort when the database is designed. As a matter of fact, this effort is essential during the project to create the data warehouse. This information has to be assembled, has to be documented, and has to be disseminated. There is no better way than to do this than in a readily available, highly accessible, relational database.

MultiValue metadata is the new millennium alternative to the project managers' 3-by-5 card file of data elements. the foundation of a good data warehousing project.

Getting there is more than half the fun. Our next section deals with the intrinsic tools to make the foundation an automatic part of the planning. Read on.

Continues on page 30



SECTION 5 Metadata for ETL

So we've discussed building a database of "data-about-the-data" or metadata, to administer our data warehouse. The question becomes: what good is a road, if we need to build a road to get to it? How to maintain our metadata database, without spending as much time on it as we do on the data itself?

As Tim [Allen] the Tool Man said (or should have): "There are ways, then there are tools." Multi-valued databases have extraordinary capabilities for metadata when used as the MROLAP in a data warehouse, or even when used simply as a project management tool

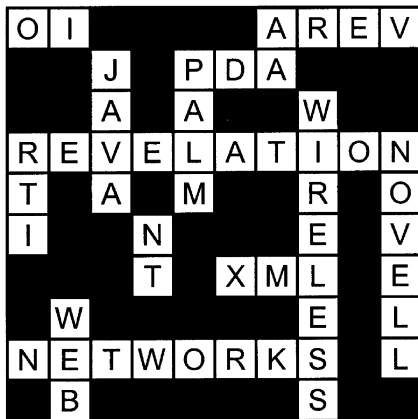
In a data warehouse, a comprehensive dictionary for all the data elements is, as they say, "more than a good idea; it's the law." Project managers know it to be the law of survival. Data warehouse projects, and their project managers, virtually live

and die on the success of the data dictionary. It is the guide as to what must be captured in the data warehouse. It holds the rules on how that data is maintained and presented. It is the framework that determines what, where, when, and how the data warehouse will present data, and in what forms and by what mechanisms. It is also just about the only place where all the little bits and bolts of a major data warehouse project can be ticked off as they are assembled. In a large data warehouse project, the data dictionary is the map.

There are unique capabilities in the multi-valued databases for the data warehouse fact tables (see sections 1, 2, and 3 of this article series, *International Spectrum*, Sept./Oct. 2001) and also for this metadata. Every multi-valued file has a metadata repository attached to it, called the dictionary file. This is a characteristic that distinguishes MultiValue databases from their better-known cousins Oracle, Informix, DB2 and SQL

Server, which have only a single global metadata repository. Yet it is relatively easy to implement a global metadata repository in the multi-valued databases (see the previous section of this article series). A global metadata repository is a simple extension of data dictionary techniques inherent in any MultiValue system. The unique trick is the method to create and maintain a metadata repository easily, reliably, and efficiently.

Many successful MultiValue sites have discovered the techniques, and invented some of their own. The world's largest and probably most successful MultiValue value-added-reseller, ADP Auto Dealer Services, is an example. Years ago the programmers in the corporate headquarters established a practice of using only one program to create and edit dictionary file attribute-defining-items. This program ensured consistency and accuracy, and performed a few other services in the background. While the program it-



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self cannot be published here, we can discuss some of the database administrative chores that such programs do:

1. Ensures that only specific accounts and files have new dictionary definitions created.
2. Establishes and maintains standards for definition items, such as upper case.
3. Formats and "pads" column headings with an appropriate number of spaces or periods.
4. Automatically loads nulls where necessary or required.
5. Controls the use and syntax of conversions, such as dates.
6. Controls and limits the use of some correlatives, such as Functions or BASIC subroutine calls.
7. Edits and limits the width of columns and definitions.
8. Assists with the correct entry and synchronization of associative codes, for multi-value associative sets.
9. Provides on-line assistance with codes, such as the "T" or text-justification code.

As any DBA will attest (along with any after-the-fact programmer) these aids and standards can be invaluable. Yet one of the most important benefits happens when the program writes a second record, a metadata record, in a common file. In a sense, this program is an ETL, or "extract-transform-load" mechanism for the metadata, that extracts meaningful data from the dictionary definition item, transforming the data into a more useful form, and loading it to the global metadata repository. This record can contain, among other things:

- ◆ the date and time that the data element definition, or attribute-defining-item, was created or updated, and
- ◆ who did it
- ◆ why, or more specifically, what the data element does as a result of this definition
- ◆ what program or process will use this definition, at least at the outset
- ◆ further explanations or rules about the data element, or a link to the documentation

Most importantly, the global repository becomes a cross-reference about any data element, by its file, account, system, and processes. This kind of metadata aids the database administrative function, as well as opens up new capabilities for system design, development, and maintenance.

Here is another example. At more than one site in the United States, entries for a global data dictionary in a multi-valued database are used to create object-oriented programming aids.

In various MV application systems used in the U.S., there is a user program for creating metadata attribute definitions that does most or all of the functions just described. In addition, after the metadata record is written to the global repository and the data element defining item is written to the data dictionary, the entire dictionary itself is analyzed. The program determines all of the real data elements, and creates a program source code segment that equates the name of each data element with its location in the data file records. Additional metadata, such as format, can be incorporated as well. The source code segment can then be included in application programs, and the name of the data element becomes an object, greatly simplifying programming and program maintenance. When the format of a database file is changed, instead of the painstaking task of examining all programs to make the necessary changes, the programmer simply re-compiles the entire program library, and the data element references in the programs are automatically updated.

(It should be noted here that the talented D3 engineers at Pick Systems created just such a mechanism within the Multi-Value program language itself, with the FILE statement. Good ideas do usually make their way into the kernels of good systems.)

There is another new wrinkle available to technically savvy D3 users. Instead of creating a program to edit dictionaries, and attempting to mandate that all users and technicians use it, they establish consistency an easier way. They use a "trigger" (a CALLX subroutine) in the database record that points to the dictionary being updated.

Continues on page 44



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Using *the New* CallHTTP *Interface*

BY JON KRISTOFFERSON

I always enjoy learning new things about UniVerse. The latest revision of UniVerse and UniData include among other new features, a feature that allows you to make HTTP calls from within a BASIC program. To better understand the CallHTTP interface, we need to first determine what you can accomplish with this new functionality.

With the new CallHTTP interface, a BASIC programmer can now access Web sites and extract information from them. I happened upon a need to take mailing addresses from a customer database, standardize and verify them using the United States Post Office standards. The problem looked pretty daunting at first. To better understand the process I went to the <http://www.usps.com> Web site and selected the 9-digit zip code page, http://www.usps.com/ncsc/lookups/lookup_zip+4.html.

While there, I proceeded to check my personal address out and got the 9-digit zip code for myself. Then I repeated the procedure for each member of my family and my close friends. Not only did it give me the correct 9-digit zip code, but it also gave my standardized and verified mailing address which conformed to the Post Office addressing standards. I know what you're saying—boy, this guy needs a life. Most of my friends would agree with that.

I was recently in California, working for a client, doing UniData and HTML programming. I learned a lot from them about HTML and Web interfacing. I found out that you could create a form in HTML that would prompt for input data. Each input field in the HTML form could have a variable name assigned to it. The form would invoke an action (program) on the Web site when the submit button was clicked.

The result of clicking the submit button was that the data was passed from the Web browser to the Web server, and the form action (program) on the Web server was invoked. That program read the information, both variable names and variable values and returned an HTML document back to the browser. In my case the returned HTML document had both my 9-digit zip code and my corrected mailing address!

This type of Web browser/server interaction was called a POST method. It is

part of the HTTP protocol used by browsers and servers to communicate. There are many other types of methods defined in the HTTP protocol.

Now I thought to myself, if only there was a way to access this Web site and have a BASIC program input the text fields and click the submit button. I would be home free...

I received the new version of UniVerse and was pleased to see the many new features in the product. I was concerned that, with the recent and plentiful acquisitions, the U2 products might fall on hard times. I was pleased to see this was not so.

The new CallHTTP interface was described in the BASIC Programming Reference manual. But like all reference manuals, it left a lot to the reader to figure out. I called the technical support line to see if there were any application notes on using the new CallHTTP interface, but at the time I called, there wasn't. So I ventured off, by trial and error, to learn about the CallHTTP interface calls.

The first thing that I needed to do was to see if I could get the source code for the HTML page that had the form variable names and URL (Uniform Resource Locator) for the form action (program). By right clicking on my mouse, while in my browser, on the Zip+4 locator page I got the source code to the HTML page. In the HTML source code are the HTML tags for both the form and the input fields.

The form action had a relative URL of `"/cgi-bin/zip4/zip4inq2"` which was really the URL `"http://www.usps.com/cgi-`

bin/zip4/zip4inq2". The form had six input fields: Firm, Urbanization, Delivery Address, City, State and Zip Code. There were only three CallHTTP routines that I needed to call.

The first routine to call was createRequest. This routine makes the network connection to the Web site URL that I pass to it. The URL I used was the absolute version of the form action attribute. I also needed to pass the routine the method I wanted to use. Since the form action was defined as a post method, I needed to use a post method in my createRequest call. With the proper URL and method ready to go, I could make my createRequest call and check for errors. The createRequest routine will return a non-zero result on an error.

Next I created two dynamic arrays VARS and VALS. VARS contained the names of the input variables. The VALS dynamic array contained the values of the variables. The arrays are multi-valued and associated. With the dynamic arrays loaded with data, I created a loop that would make a call to addRequestParameter for each pair of variable names and their associated data values.

After all of the variable pairs are loaded into the request handle I finally needed to call the submitRequest routine. This routine passed the variable data in the proper format to the URL I had defined earlier with the proper method. This had the same effect as if I had clicked on the submit button. The URL invoked a program on the United States Postal Service Web server and took as input the VARS and VALS data, processed it, and returned to the submitRequest call the resultant HTML from the form action (program).

Once the HTML results were returned I simply printed them out to inspect it. I've been doing a lot of HTML lately and have adapted to reading it quite readily. I would imagine that a simple HTML parsing routine would be able to extract the desired data from the resultant HTML without much problem. I have found the O'Reilly Nutshell series of books most helpful, especially the books on HTML and Web applications.

I did run into a few problems that I would like to share with you. The first

Continues on page 35

```

<HTML>
<HEAD>
<TITLE>United States Postal Service - ZIP + 4 Lookup</TITLE>

</HEAD>
<BODY BGCOLOR="#FFFFFF">

<TABLE CELLPADDING="0" CELLSPACING="0" BORDER="0" SUMMARY="Table used for
formatting">
  <TR>
    <TD VALIGN="TOP">
      <A HREF="/maps/headnav.map" TARGET="_top"><IMG
SRC="/images/headnav.gif" BORDER="0" ALT="United States Postal Service" ISMAP
ALIGN="top"></A><BR><BR>
    </TD>
  </TR>
</TABLE>

<TABLE CELLPADDING="0" CELLSPACING="0" BORDER="0" SUMMARY="Table used for
formatting">
  <TR>
    <TD COLSPAN=3><FONT SIZE=5 COLOR="Blue"><B>ZIP+4 Code
Look-up</B></FONT>
      <P>Enter an address. If found, the standardized address and
ZIP+4 Code will be returned.<BR></P>
    </TD>
  </TR>
</TABLE>
<FORM NAME="Table1FORM" ACTION="/cgi-bin/zip4/zip4inq2" METHOD=POST>
<TABLE CELLPADDING="0" CELLSPACING="0" BORDER="0" SUMMARY="Table used for
formatting">
  <TR>
    <TD VALIGN="TOP">
      <TABLE BORDER="0" CELLSPACING="0" CELLPADDING="0"
VALIGN="TOP" SUMMARY="Table used for formatting">
        <TR VALIGN="top" ALIGN="left">
          <TD WIDTH=225><P><B><LABEL
FOR="Firm">Firm</LABEL></B><FONT SIZE=-1><I> (required for <A
HREF="..lookups/addressing_definitions.htm#FirmRecord">firm
records</A></I></FONT></TD>
          <TD WIDTH=260><INPUT TABINDEX="1"
ID="FormsEditField6" TYPE="text" NAME="Firm" VALUE="" SIZE=30 MAXLENGTH=30
>&nbsp;</TD>
        </TR>
        <TR VALIGN="top" ALIGN="left">
          <TD WIDTH=225><B><LABEL FOR="Urbanization"><A
HREF="..lookups/addressing_definitions.htm#Urbanization">Urbanization</A></LAB
EL></B> <FONT SIZE=2><I>(Puerto Rico only)</I></FONT></TD>
          <TD WIDTH=260><INPUT TABINDEX="2"
ID="FormsEditField7" TYPE="text" NAME="Urbanization" VALUE="" SIZE=30
MAXLENGTH=30></TD>
        </TR>
        <TR VALIGN="top" ALIGN="left">
          <TD WIDTH=225><B><LABEL FOR="Delivery
Address">Delivery Address</LABEL></B> <I>(required)</I></TD>

```

Code continues on page 35


```

<TR>
    <TD><FONT SIZE=4><B>Find the ZIP Codes for a city or town or the
location of a given ZIP Code<BR>
    on our <A HREF="lookup_ctystzip.html">City/State/ZIP Code
Associations page</A></B></FONT><TD>
</TR>
<P>
</TABLE>
</BODY>
</HTML>
* PROGRAM TO FIX AN ADDRESS
RESP.HEADERS = ""
RESP.DATA = ""
WEB.HANDLE = ""
URL = "http://usps.com/cgi-bin/zip4/zip4inq2"
REQUEST.STATUS = createRequest(URL,"POST",WEB.HANDLE)
IF REQUEST.STATUS THEN
PRINT "createRequest FAILED, STATUS CODE = ":REQUEST.STATUS
STOP
END
VARS = ""
VALS = ""
VARS<1,1> = "Firm"
VALS<1,1> = "Application Hosting Group, Inc."
VARS<1,2> = "Urbanization"
VALS<1,2> = ""
VARS<1,3> = "Delivery Address"
VALS<1,3> = "600 east diehl road #120"
VARS<1,4> = "City"
VALS<1,4> = "naperville"
VARS<1,5> = "State"
VALS<1,5> = "il"
VARS<1,6> = "Zip Code"
VALS<1,6> = ""
FOR I = 1 TO 6
PARAM.STATUS = addRequestParameter(WEB.HANDLE,VARS<1,I>,VALS<1,I>,"")
IF PARAM.STATUS THEN
PRINT "addRequestParameter FAILED, STATUS CODE = ":PARAM.STATUS
STOP
END
NEXT I
SUBMIT.STATUS = submitRequest(WEB.HANDLE,"", "",
RESP.HEADERS,RESP.DATA,HTTP.STATUS)
IF SUBMIT.STATUS THEN
PRINT "submitRequest FAILED, STATUS CODE = ":SUBMIT.STATUS
STOP
END
PRINT "HEADERS:"
PRINT RESP.HEADERS
PRINT "DATA:"
PRINT RESP.DATA
STOP
END

```

problem is making sure that the computer you run your U2 application on has access to the Internet if you wish to make use of the callHTTP functionality. This would be both a physical network connection and DNS (Domain Name Service). If you can get to a command prompt and "ping" www.yahoo.com successfully, you probably have sufficient access to the Internet.

The next problem is subtler. If you hard code a program to parse the results from your submitRequest call, you may find that the results change from time to time. As Web site designers continually improve their Web sites, the resulting HTML returned from a Web site may vary over time.

The last problem is one of permission and being polite. I would imagine if everyone starting processing mailing addresses through the United States Postal Service Web site, the site would experience millions of hits per hour. There are services that can provide address standardization and verification. Using someone's Web site in your application may cause problems for the Web site owner. I would ask that if you intend to use someone's Web site in a programmatic way, that you get permission from the Web site owners or at least the Webmaster.

Aside from the problems mentioned above, there are some really cool applications for this new functionality. How about automatically checking your stock portfolio when you login in the morning? What about airline schedules? How about raw material pricing? Think of those things that you do on the Internet with your browser. Are they able to be automated? is

JON KRISTOFFERSON is a principal in Application Hosting Group, a Naperville, Ill.-based firm that provides a secure, full-service data center as well as consulting services for Multi-Value applications.

Believing *in* Ourselves

Blind Faith to Our Technology



B Y M E L V I N S O R I A N O

We are a strange breed. The MultiValue community doesn't merely use the technology found in its databases. It advocates for it. Adheres to it. Keeps it central to its way of thinking. And the introduction of the Web and other exotic technologies has not really altered these sentiments.

Maybe this faith in the technology is akin to religion. We have faith where others have doubt. We evangelize when we can and convert only after careful soul-searching. If possible, we'd rather keep our existing ways and keep them central to our lives; if we must interact, then we'd rather selectively import or export only what's necessary and without threat to our core.

As a columnist for *Spectrum* magazine, I suppose that I'm just preaching to the choir. (Okay, to those who know me well, that may seem ironic, as I just *sing* in my church choir.)

But I bring up our faithfulness to our technology as a topic because I sometimes see ourselves as such strong adherents to our databases that we ignore, downplay or resist new technologies. This community often times treats developing or novel approaches as blasphemous to our core methods.

We need to note these biases.

I'm not saying that we should drop everything just because, say, MS-SQL Server is somewhat suited to the Web.

(Well, at least from Microsoft's Web.) Nor am I saying that our advocacy, my advocacy, is wrong. Our efforts aren't misdirected, either.

I just think that we've seen too many situations where some of us are so faithful to our way of doing things that we disregard opportunities for better solutions. Many of us limit and resist new ideas, different approaches, alternate solutions. These

Some of us are so faithful to our way of doing things that we disregard opportunities for better solutions.

different concepts may be better than what we do; they might be worse. But, to many they are rejected without adequate attention.

It's a basically *unchallenged* fidelity. We avoid the challenges to our ways.

By insulating ourselves from new approaches, our database world delayed its foray into Windows, the Web, and advanced networking. Are we bypassing innovation for the sake of self-preser-

vation? If so, we could accidentally ignore the range of possibilities exposed

and sustained by innovation.

I recall, back in 1995, that I gave a talk at the San Diego International Spectrum Conference about the Web and its place in the MultiValue world. I got mostly blank stares. Not surprising, really, at the conference. Microsoft itself, after all, hadn't even released Internet Explorer.

The next year, I helped release the first MultiValue product geared toward integration with the Web at the International Spectrum Conference in Anaheim. Our booths were mobbed, but we did seem to spend an inordinate amount of time explaining why this functionality should matter to the MultiValue world. All this I watched with bemusement, considering the huge press coverage

Continues on page 38



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WEBONOMICS 101

Continued from page 37

swelling around the Internet. Oh, and again I stood alone in the schedule with my presentations about the Web.

By 1997, many more speakers came forward with Web integration presentations. And if you return to San Diego in February to attend the next International Spectrum Conferences, I'd be surprised if any of the talks were able to avoid discussions regarding such integration.

The MultiValue world does not have to be insulated and should not be insulated from technological advances. Its persistent existence despite the dramatic hardware and operating system changes during the past ten years has shown us to be remarkably capable of evolving. We're adept at adaptation.

We can and have learned to integrate to other technologies. We have been able to port and migrate to different operating systems. We've connected directly to the Web and we're interacting with Palm Pilots. XML is a no brainer. It's apparent that, when push comes to shove, that we can stay current with new ways of doing things.

Well, except for one area. We in the MultiValue world have now gotten ourselves into a bind. Many of us aren't just born and bred MultiValue; we're actually feverishly denominational. We have our MultiValue database of choice and, oh didn't you know, it's the one true flavor.

It's served us well in the past. Our faithfulness has given us well-integrated, if sometimes expensive or delayed, software salvation. But the corporate events of the past year certainly makes me think that we should be ready for more changes. At

the very least, we should be ready for new technology.

Our database companies are selling themselves off or are changing. If you and your organization are committed to these database suppliers by loyalty alone, then you're forgetting an important fact. These companies are for-profit businesses. They dart like hummingbirds to meet their financial goals, dropping excess weights that slow them down. Maybe even principled beliefs in the MultiValue model.

One day your vendor is a database company and the next it's a data warehousing product. If you've hitched your wagon too closely, you might not be able to adapt your technical solutions on your own terms, but rather on some corporate timetable and marketing plan.

Blind faith in a single database vendor simply does not have to be. I'm not saying that we all become database agnostics (or Unitarians?). But there seem to be many happy middle-grounds where we can use the best solutions from our vendor and yet have greater choice in our integration and application environments. A place where we can use integration tools and solutions and consultants that aren't so closely tied to database vendors.

Many "third-party" vendors offer alternatives to sole-sourced solutions. Their software usually works on all the various MultiValue databases. We need to exercise our free will and explore the magnificent landscape of options before us, at least while we still have options. Corporate changes seem to occur rather rapidly nowadays and database options are starting to dwindle.

Maybe it's just contentment. We're content with not just the MultiValue community, but with our specific databases.

There's nothing wrong with enjoying the fruits of our productivity, but we should also set aside for when times are bad. Or if our vendors change management.

So it's not just the technical systems themselves that need to be open. We, too, must be open to change. As we look out at the odd and changing world, and as of this past September, technology and its implementation will be changing; we should have faith in what we do and what we believe. We can be comforted by what we know we can accomplish but also be attentive to the evolving world.

I think that it's the challenges to faith that keep people ever vigilant. In the MultiValue world, we certainly have had our challenges. Let's face them, both from outside our community and from within, and keep MultiValue modern and robust. is

MELVIN M. SORIANO

works at Eagle Rock Information Systems (ERIS), an Internet Application Service Provider and WebWizard/MultiValue developer. ERIS has deployed enterprise-wide solutions on most MultiValue platforms and operating systems. HTM-Mel can be contacted at mel@eaglerock-is.com and visited at <http://www.eriscorp.com/>. You can always call him directly at ERIS's Pasadena offices: (626) 535-9658.

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B Y D A V E B R Y A N T

jBASE *Release* 4.1

Represents Major Step Forward

Dave Bryant, President of jBASE Software Inc., shares with Spectrum readers key aspects of the newest release of the jBASE database environment.

Release 4.1 of jBASE is a major step forward in technology, extending the product set to encompass mainstream concepts and features. The most difficult challenge is to move the product forward toward the mythical mainstream while keeping the MultiValue virtues intact, making it comfortable for our existing and future customers in the traditional MultiValue world to move forward with us.

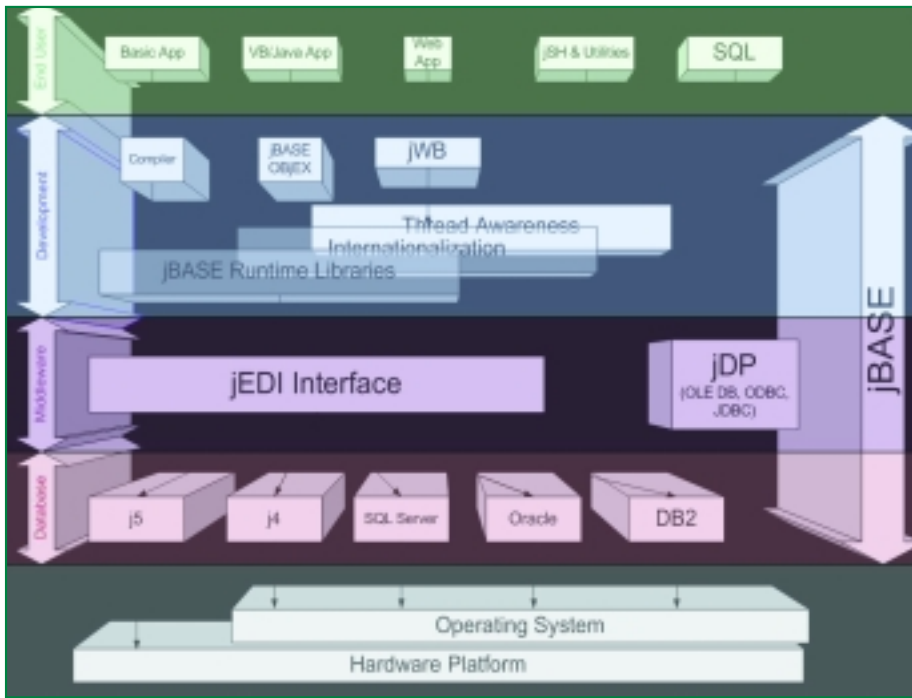
The main areas of enhancement are in performance, ease of use, and database integrity as well as several other smaller enhancements.

Performance is not just a matter of making today's applications go faster, but allowing new technologies to provide better ways of improving that performance. The first new feature in this category is that jBASE is now thread aware and allows true free threading, not just thread safety throughout the product set. End users can take advantage of threads programmatically from not only Java, where it is an inherent part of the language paradigm, but also from BASIC, which lends yet another dimension to the language and the ease of developing state-of-the-art applications. Threads,

also known in some circles as "light processes," provide a way of having many tasks going on in parallel within the same process, rather than having to start another process for each task — something that is several orders of magnitude more efficient. In addition to being able to use these constructs within your application, we make extensive use of the functionality within jBASE. As a result, the performance of many areas of jBASE will see a marked increase, for example, in the use of Perform, and in parts of the product that use sorting techniques, to name but a few. We have also completely rewritten jQL, the jBASE Query Language, not only to take advantage of the free threading model but also to leverage modern programming techniques allowing

jBASE to build up syntax trees which optimize the queries. Another benefit of the rewrite is that the jQL subsystem is modular and it is possible for the user to replace either the input side or the output side of the query with their choice of application. In addition to this, we will be providing jQL objects. The user can embed these within an application allowing the execution of a jQL statement from within a Java or Visual Basic program and have the result set immediately available to the application. This is a good example of how new functionality makes the process more efficient even if the individual components themselves are not any faster.

Ease of Use. At 4.1 we introduce a brand-new organization for jBASE. While the concepts are familiar, they have been split apart and put back together in a way that we believe will make jBASE much easier to customize. To do this we have created jExplorer, which, on its face, is a graphical system administration tool. Look beyond the initial Java based façade and you will see a new framework looking back at you. Bearing in mind that we are trying to expand into markets that do not (yet) understand the MultiValue marketplace, the challenge is to merge the concepts from different worlds. To do this we have split the jBASE administration into three separate areas (plus one for all the things



jBASE 4.1 is a major

step forward in technol-

ogy, combining main-

stream concepts with

MultiValue's benefits.

4.1's enhancements in-

clude jExplorer, a

graphical system ad-

ministration tool, and

increased data integri-

ty made possible with

the new j5 database.

consistent state.

The application

writes the data to

a series of buffers

and once the data

is safely written

there, jBASE takes

over. J5 does not

use a hashed file

system because of

the reliance of

memory resident

structures, but

rather uses a B+tree

based model. Al-

though the physi-

cal organization is

different, the logi-

that did not really fit anywhere else).

The three areas are a security context

(operating system login),

an application context,

and a database context.

jExplorer gives the ad-

ministrator the ability to

graphically, and hopefully

more intuitively, de-

fine users, accounts and

databases, as well as set

up spoolers and watch

their progress. It also al-

lows access to the new li-

censing mechanism at

4.1 and will grow even-

tually to become the cen-

tral and pivotal point for

all administrative tasks in

the system.

Database Integrity. One

of the main and age-old

problems in the Multi-

Value world is the cor-

rupt data file. Known to

many of us as the GFE, it

is the price we pay for the

hashed file system. Not

only that but the files

need to be resized regu-

larly. Other products have

come up with ways to

solve this issue, but it has

been

fraught with danger and, in fact, only

makes the problem occur less often. It

is still wise to resize dy-

namic files every now

and again. Unlike our

own previous data repos-

itories and those of our

competitors, the new j5

database, is, as the name

suggests, a database sys-

tem not a file system. It

is a journaled and logged

system, which is, we be-

lieve, the first commer-

cially available product

that uses both of these

technologies.

The bottom line is that

if you choose to put

your data in the j5 for-

mat, you don't have to—it

is completely optional—you

can be assured that you

will not get any data cor-

ruption. By means of a

carefully designed path-

way for data making its

way from the application to

the disk, we have con-

structed a system that

no matter when the ma-

chine crashes, we can

recover the file system to a

One of the main and age-old problems in the MultiValue world is the corrupt data file.

the disk, we have constructed a system

that no matter when the machine crash-

es, we can recover the file system to a

cal view remains exactly the same as it

always has, and of course applications will

work in exactly the same way as they al-

ways have. (Because of the library

changes, all existing applications will

need to be recompiled, but once that is

done you will be free to take advantage of

all the new features.)

Of course this database does not, in any

way, imply application data consistency.

To do that you need to implement the

transaction management features in your

application and the transaction logging

which have been part of the jBASE prod-

uct set for many years. jBASE is still the

only product, we believe, within the MV

marketplace to have implemented a two-

phase compliant system and this has been

extended to encompass the j5 database, so

remote transactions are fully supported.

The j5 database system is a 64-bit, self-

sizing, file system. It will grow to whate-

ver size you need by simply adding more

disk space to it — no longer that annoy-

ing 2Gb limit. In addition, we have also

taken the opportunity to enhance the j4

file system into a 64-bit system, although

this hashed file system may not be the

most efficient way of handling huge

datasets.

While these may be the major enhance-

ments to jBASE, release 4.1 has several other

important features. *Continues on page 45*

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3. What MultiValue Databases does your company use? (check all that apply)

- | | | | |
|--------------------------------|--|-----------------------------------|--------------------------------------|
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5. What major business/industry most clearly describes your company?

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IS 12/01

New Issues in Internet Security *Continued from page 13*

In addition, the legislation would only cover encryption technologies developed in the United States. Businesses, not to mention actual criminals and terrorist plotters, would then turn to other, parallel software developed in Europe and elsewhere.

The September 11 attacks have brought these issues into new focus, and Congress in fact has adopted new legislation covering security issues. So far, however, it has wisely not rushed to adopt private security restrictions that will further weaken the economy as well as erode civil liberties. Jeffrey Smith, counsel to the Washington, D.C.-based Americans for Computer Privacy and former counsel for the Central Intelligence Agency (CIA), recently commented: "Even if we're talking about a quasi-judicial body, imagine the millions or billions of keys they'd wind up holding. If somebody hacks into that repository or someone is bribed into turning it over, you've created an even greater security problem than the one you're trying to address."

The nature of a proper response to the wave of attacks the United States continues to experience lies beyond the scope of this article. We certainly need to address legitimate and illegitimate use of the public communications channels along with a whole raft of physical, public health and electronic measures not prioritized up until now. The Information Technology community has a crucial role in this discussion, and part of our role involves explaining the interconnectedness of security requirements for the continuing, exciting growth of the Internet for all of us. is

STEVE BACKMAN *has been a member of Computer Professionals for Social Responsibility (www.cpsr.org) for about as long as he has worked with MultiValue software. CPSR's volunteer research efforts have played a major part in the debate on these issues. For additional programming and end user references on these topics, please contact Steve at sbackman@dbdes.com*

The History of MultiValue

Continued from page 14

The first significant company to jump on Microdata's CPU was another Irvine company called Basic-Four. The "Four" in Basic-Four stood for the four most common minicomputer applications at the time; i.e., General Ledger, Accounts Receivable, Accounts Payable, and Payroll. With those four applications in hand, powered by the Microdata CPU, Basic-Four grew to be a dominant force in the small business minicomputer market.

While processing speed and response time were still a serious issue, Basic-Four had pretty much the only game in town, and users overlooked the fact that you couldn't really do too many Accounts Payable functions at the same time as Accounts Receivable functions without sending everybody out to lunch between terminal responses. Normal batch processes, such as printing a General Ledger report were dismally slow, and in many cases, required complete ownership of all computing resources available. In

effect, Basic-Four was really then just an excellent "batch processing" vehicle with the ability to distribute workstations around to critical company departments. The system also needed a usable data retrieval language to create ad-hoc reports for management.

But help for Basic-Four appeared to be on the way. Word spread that a young innovator named Dick Pick had approached Microdata with a new database concept that emanated from a government project he was working on. The database concept was in the public domain and Pick was aware of Microdata's firmware approach, so he explored the vision that if the functions of file management, data retrieval and data storage could be burned into a firmware board, the advantage of speed should result in a quantum leap forward for the minicomputer.

Initially dubbed "DM-512" (the "DM" stood for Data Management, and the 512 referred to the then standard 512 byte grouping of data), Pick's version of the database environment performed beyond

all expectations. A partnership between Pick and Microdata was formed, and work was begun to create what eventually became the first of many variants of MultiValue systems to come, the Microdata "Reality" System.

Finished circa 1972, Reality was an obvious winner. So good, in fact, that Microdata decided to go for the whole enchilada and keep the Reality board for itself. The dozens of minicomputer companies who once looked at Microdata as a promising supplier of emerging CPU technologies, now had to look at new competition instead.

And nowhere was that decision more tragically felt than at Basic-Four - able to still buy the Microdata CPU for its systems, but not the coveted Reality board. is

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The Powerful REFORMAT Command

Certainly the most interesting use of the MV file trigger is in a global repository that is maintained with the most powerful of the MultiValue commands, namely, REFORMAT. In this innovative mechanism, the trigger routine for the dictionary file executes the following generic command after writing the metadata "attribute-defining-item":

```
REFORMAT dictionary.file 'item-id' NEW.ITEMID A1 A2 A3 A4 A7 A8 A9 A10
```

TO: global.repository.file

This command neatly transforms the dictionary metadata item and attempts to write it on the repository.

However, the global repository file has a trigger routine of its own. This routine intercepts the inbound metadata item, and prompts the operator for all the additional data required, before allowing the item to be written on the global repository. (For more information, email me via www.pick-sap.com.) The reason that this REFORMAT mechanism is of interest is because of its special usefulness as a rapid-application-deployment technique. The REFORMAT command invokes the global repository file trigger routine. The trigger routine always intercedes, prompting item by item even when an entire file of metadata is being loaded. This is especially useful when creating a global repository from existing data dictionaries. BTW: thoughtful use of the free REFORMAT command is practically a secret of MultiValue systems; there are dozens of uses that can replace literally tens of thousands of lines of expensive program code. REFORMAT is especially effective as an "ETL" tool for high-performance data warehouses. In fact, this little gem is at the heart of the Eternally Amazing Perpetually Spinning Transform Engine ... to be revealed in the next series of articles. ■

Diamond in the (Main)Stream

Continued from page 31

A MultiValue trigger routine gets invoked when any process attempts to update the file. When filing a metadata item in a data dictionary equipped with a trigger, whether filing a real or A-type metadata attribute definition or a virtual S-type synonym, the system executes a user-programmed routine. This routine can automatically update another file acting as a global repository, with another metadata record, stored under a multi-part key composed of the original data element attribute name plus the name of the file and the account in which the file resides. The routine will automatically record the date and time that the metadata is being modified, and by whom. The routine can also prompt for any additional data that the user can provide, i.e.:

- ◆ the system process(es) that can/will create and modify the data
- ◆ the system process(es) reading the data
- ◆ the system process(es) capable of deleting the data
- ◆ edit specifications, or a list or narrative about acceptable values

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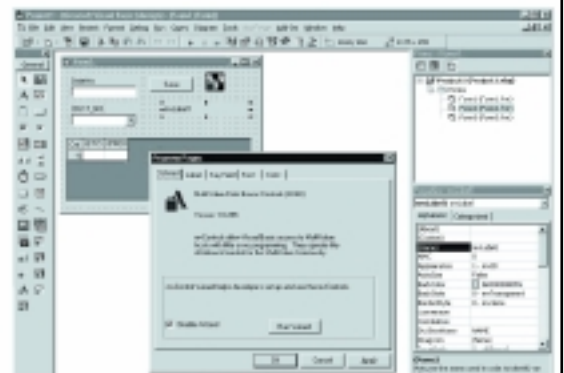
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◆ documentation about unacceptable values, and the means/methods for correcting them

Since the D3 system calls the routine whenever the file is being updated, regardless of the source or mechanism of the updating process, simultaneous updating of the global repository is inescapable.

Once the global metadata repository has been achieved, the benefit to the data warehouse project cannot be overstated. (See "The Data Warehouse Lifecycle Toolkit" by Ralph Kimball, 1998, published by John Wiley & Sons Publishing) When the repository is on the same system as the MROLAP, the repository mechanism can be used to manage all data elements in all tables in real-time. All design documents and documentation can refer to the metadata repository; interactive documents can link to it. The global repository will aid programming, even to providing data element objects in the manner previously described. Furthermore, the metadata repository is instantly accessible to all members of the development and administrative team, via the same networks used to create and access the data warehouse.

Even when the data warehouse fact tables are on another system, or even another database, the multi-valued database is a superior metadata repository. Fully relational, SQL-accessible, and compatible with Web browsers, the multi-valued data dictionary makes the metadata into another data warehouse asset. A million dollars of value in a few thousand bytes of multi-value metadata that can be carried in the project manager's notebook computer.

And when meeting with the project sponsor, it is less embarrassing than showing up with a handful of doggy 3x5 cards. is

Probably the cause of his "card-phobia," the author, Steve VanArsdale, remembers dropping two boxes of punch cards years ago ... during Life Before Pick. Today, "life after Pick" includes contract work on innovative MultiValue database and data warehouse systems, from his offices near Chicago. www.pick-sap.com

jBASE Release 4.1

Continued from page 41

Internationalization. jBASE is now able to support any language and cultural convention. By implementing a Unicode based solution in partnership with IBM, we now have functionality that will allow application developers to localize their applications in such a way that they do not need to worry about how many bytes a character takes, or what the number separator looks like, or how the calendar is represented—Gregorian, Lunar or based on the Emperor, or whether è should be sorted to appear before or after ê. We cannot fix the problem if your report does not work because the new language goes from right to left across the page, or the error messages are hard-coded within your application code, but we do make it easier.

We have also done some minor improvements to make the product neater and tidier. We have rewritten the jRFS subsystem, the remote file system. It is now a JINI service and as such is much easier to install and configure. It also allows the propagation of indices across the network.

The OBJEX products (COM and Java) have been combined to allow a VB program to execute a jBASE subroutine on a Unix host as well as on a Windows host.

In addition to supporting more modern versions of the traditional operating systems, e.g., Linux, Windows XP, AIX 5.1 (both on the Itanium based system and the Power PC platform), we have also added native support for the IBM AS400 and S390.

In addition, we have made sure that there are no daemons on the system that will cause the system to shut down. If an error occurs in any of these processes that force them to shut down, then simply start them back up (the system will do that for you in most cases) and jBASE will pick up where it left off, no interruption in service.

So, as you can see, there are many improvements in jBASE release 4.1 that once again emphasizes our commitment to the MultiValue market and our goal of moving our product, our company and our partners and customers to the mainstream market. is

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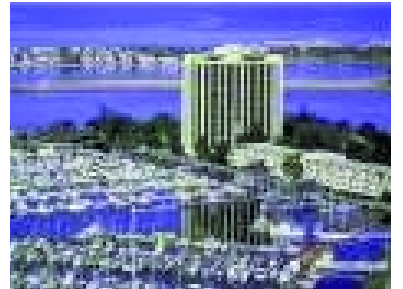
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THE BYGUS GLOBBI NIMDA Virus

Was It Part of the War on Freedom?

If you have a server with Microsoft's IIS software, and you are not the kind of person who visits Microsoft's Web site frequently for the latest security patches, chances are you were attacked by the recent "NIMDA" virus.

Standing for "ADMIN" spelled backwards, this nasty Trojan horse marched right through most anti-virus software like it wasn't there, and into Microsoft's back door on your server.

The befuddling symptoms of NIMDA were extremely confusing. All of a sudden, infected servers began launching random applications like Real Player or download-

ing Service Packs from Microsoft's Web site. Window after window opened until the infected server was reduced to the sick sound of a grid-locked popcorn machine.

Upon re-boot, random error messages like "access violation detected" would appear, and clicking on "O.K." or closing that window started the whole nasty process of launching random applications again.

After a few re-boots, users found that if they didn't click on those first messages that appeared, they could go to the desktop and click on "My Computer" and at least "see" their files. At last — a ray of encouragement!

But alas, NIMDA knew you were thinking that you could save a file to a Jaz drive or some other external media, so it disabled any ability for you to do that. Your system recognized none of your external devices and there was no way around it.

The way the virus operated was to place an .eml item in each directory on your system and install an item called ADMIN.dll on your hard drive. No problem! Just painstakingly go through thousands of items and put these things into the recycle bin, empty it, and the problem would be solved.

Sorry! NIMDA thought about that too! Your "Empty Recycle Bin" command was modified by NIMDA to put all of those things back where they came from. No virus had ever gotten the best of you yet! You had a backup from yesterday — you'll just re-install NT or whatever on your server (like that's an easy task), then restore from your backup. Well, maybe so — maybe no! Was your backup tape still in the Jaz drive when you were attacked by NIMDA? Then there's a nice little copy of ADMIN.dll on it, and as soon as you kick off the restore you'll get re-infected. In many cases, people with NIMDA infected servers lost everything. Even if you knew what you were doing, re-construction of the server required that you turn off IIS every time your system needed to reach out to a Web site for essential downloads, then load the necessary security patches from Microsoft before getting zapped again.

All in all — NIMDA claimed the dubious distinction of being the most devastating virus ever, causing many to ponder if it was somehow tied to the perpetrators of the September 11th attack on America. is



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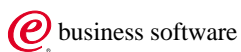


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