

INSIDE! THE SAGA CONTINUES: THE HISTORY OF MULTIVALUE

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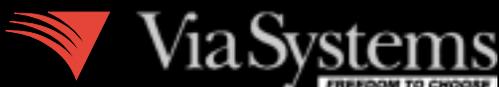
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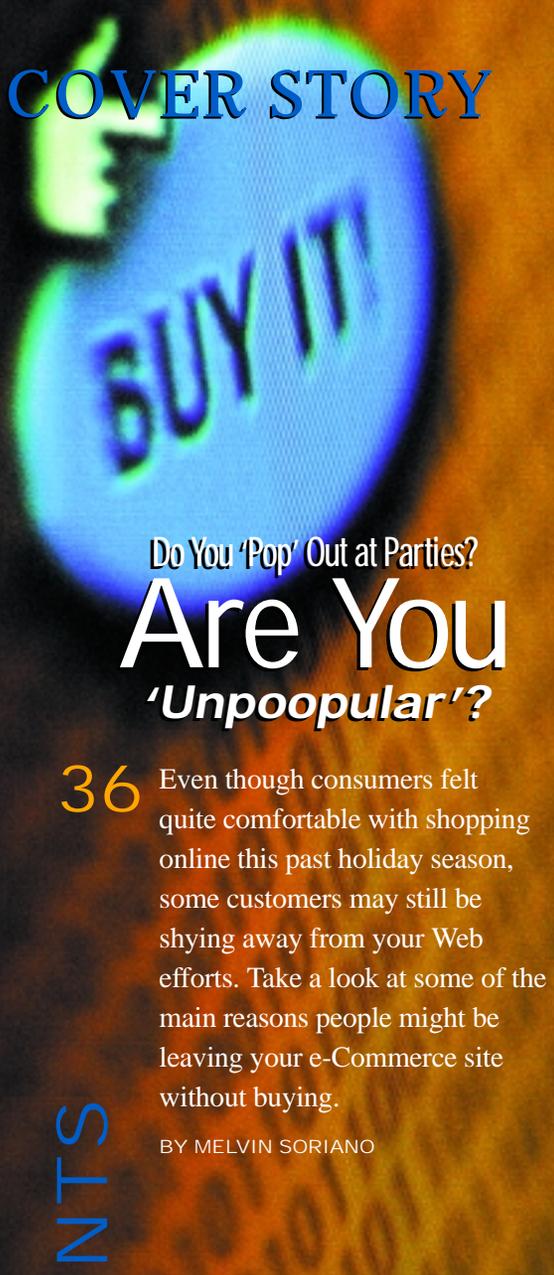
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36 Even though consumers felt quite comfortable with shopping online this past holiday season, some customers may still be shying away from your Web efforts. Take a look at some of the main reasons people might be leaving your e-Commerce site without buying.

BY MELVIN SORIANO

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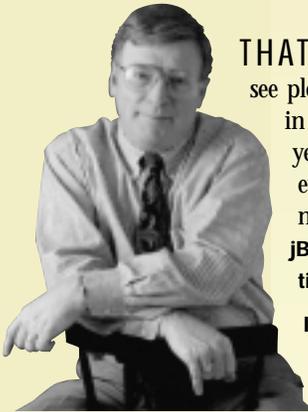
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**NEW
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[FROM THE INSIDE]

New Faces, New Products, and New Fierce Competition



GUS GIOBBI
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THAT'S WHAT RESELLERS AND END-USERS will see plenty of at the **21st annual International Spectrum Show** in San Diego this February. Twenty percent larger than last year, and the second longest continuously running computer event in America, the Spectrum Show has become the international networking gathering for users and vendors of **jBASE, UniVerse, UniData, D3, UniVision, Reality, Revelation, and Native MultiValue database systems.**

IBM will head the bill of new faces to appear at the show as they roll out plans for UniVerse and UniData for the first time under the IBM banner since their acquisition of Informix earlier in the year.

Some other faces that are new to Spectrum, but long-term players in the MultiValue market, are **Northgate Information Solutions, Revelation Technologies and Intersystems.**

Northgate is the U.K. company that grew out of McDonnell Douglas Information Systems and propelled the Reality database environment to success in Europe. They are bringing "Reality" back to America at the show.

Revelation Technologies returns with its state-of-the-art Advanced Revelation MultiValue database environment after many years of absence and changes in direction.

Intersystems, a brand-new entry into the Spectrum show, will be displaying its Cache Post-Relational database model.

jBASE Software, under the powerful umbrella of its parent company, Temenos, will be announcing a major new software release of its jBASE database environment.

VIA Systems, the USA arm of parent company EDP of England, will be unveiling new releases of WebWizard and its UniVision database environment.

Raining Data returns with a completely new game plan for D3 and its other MultiValue database environments, including mv*BASE and mv*ENTERPRISE, after another year of dramatic changes and restructuring.

Many other new and returning exhibitors will be offering deals on a myriad of new products, software and services including thin client and server systems, application hosting, data warehousing, consulting and programming, data mining, conversion, e-commerce, emulators and document imaging for MultiValue systems.

Hey! All this and San Diego in the winter! See you there!



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Problems, Solutions, and MultiValue

B Y S T E V E N B A C K M A N

An old gem of a book recently stumbled to the top of the "read me" mountain: *Are Your Lights On?* by Donald Gause and Gerald Weinberg. You may know Weinberg, one of the most prolific writers about computer software design and analysis. Like the tone of his irreplaceable *The Secrets of Consulting*, this short work offers a series of whimsical challenges to the consultant and MIS manager. In this case, the authors tackle "How to Figure Out What the Problem REALLY Is," the book's subtitle. Superficially whimsical, because real world experience with large-scale computer systems disasters or near misses writhes beneath the surface of their everyday examples.

Of course, we always need to know how to figure out what the problem really is. But recent experiences meeting new people in the MultiValue sector and chatting about their systems problems brought this familiar consulting challenge into sharper focus.

Many of us in the MultiValue community have problems with our software. Well, every database administrator and user has problems, large and small. Here, we mean big, lay-awake-at-night type problems. And, maybe we should say, still have problems with our software, because it's been years now since valiant (if notoriously underfunded) bands of marketeers began to inundate us with one ultimate, total, solve-all-your-problems solution after another.

Now, a systems or business consultant whose practice includes a variety of database management systems should

find this notion of big problems with MultiValue software quite startling.

After all, walk into a new client whose history of computerization has followed a different track, and you often find, well, big problems. You might find more varieties of Windows tools and canned software than the luncheon buffet. Rampant indigestion regularly comes from absorbing too many different types of stuff all at once.

You might find software that seriously falls short or doesn't work, with no affordable vendor or responsible contract programmer anywhere in sight. It's sometimes a tribute to the indomitable human spirit to sit and learn the ingenious ways department managers and administrative staff have come up with to do their jobs when encumbered with some fantastic off-the-shelf Windows or Web package championed by some now long gone senior manager.

Walking into a new MultiValue shop, the consultant typically finds software that works, month after month. One typically finds source code for everything, easy to get at and adapt. Yeah, yeah, yeah, we have all heard this before.

But what about the Web? What about tighter, faster, easier integration with suppliers, key contacts? What about staff on the road?

Gause and Weinberg provoke the reader into thinking about how we identify and characterize problems, how we gain reasonable certainty that the problem defined is the real problem, and think about who wants what kind of solution. Their examples come both from computing and systems design and other passages through life.

Continues on page 10

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DOCUMENT MANAGEMENT

Problems, Solutions, and MultiValue

Continued from page 11

One of Gause and Weinberg's key precepts runs like this:

"Don't take their solution method for a problem definition."

Gause and Weinberg refer to the situation where someone asks a consultant or staff systems analyst to solve a problem and provides the solution as part of the problem.

Consider this client-consultant dialog probably oft-repeated in one form or another in recent years in the MultiValue world.

—Our sales representatives around the country have this ten-page form in Microsoft Word. Energetic Ed has spent three weeks inserting fill-in fields into the Word document, turning it into a template, and recording and refining a macro that gathers the fill-in answers into a summary spot at the end of the document. We now need to gather all these filled-in documents each day and import the answers into our MultiValue application, just the same as if our in house telemarketing staff had entered it into the order entry system. So our problem is, we need to know can you, and how hard is it, to import field information from Word to the database? This will save time by eliminating duplicate entry of faxed or phoned in sales orders.

—Sure, not a problem. We will refine the Visual Basic for Applications code embodied in the Word macro. Then we incorporate that into a standalone Visual Basic application that ploughs through the entire folder of new completed forms, harvests the field information into rows in a separate plain text file, processes it

Many MultiValue consultants and MIS managers feel an enormous pressure to have a "no problem" answer readily at hand.

At the end of the day, the sales reps still have an unwieldy collection of Word documents. They can't print out a summary of new orders without hitting the main system, and if they could do that directly, then maybe they didn't need the souped up Word documents anyhow. Since they didn't retype the orders into the main system, we really haven't done much for them.

And what happens in the home office with this data anyhow? If the orders get processed and fulfilled, maybe the sales reps need to see the updated orders. Maybe the whole set of Word docs go home every night for processing and updating and retransmission back to the field. But what about those dedicated sales reps, working away until late at night, perhaps refining what they had recorded? Now we have to add a feature to synchronize their edits and the home office updates, which probably won't work perfectly for a long time.

into a zip file, and ships it to the home office via email or FTP site. At the home office end, a separate VB program unzips the data, opens a connection to the MultiValue database using your connection middleware of choice and stashes the data in the appropriate files.

Sounds great, but wait.

While the company might wind up with the data flowing into the main system, at

(And how safe is the email? We probably have to add an encryption/decryption routine at the two ends. Of course, from our last column, we know that's no big deal for the intrepid MultiValue application programmer these days.)

The home office staff already enters some orders, so eliminating some, but having to keep an anxious eye every morning on the Automated Remote Sales Staff Synchronization Module, they may perceive their work growing rather than shrinking. We haven't done much to solve any problems for them. In fact, with this complex and probably fragile a system, the home office administrative staff will surely demand that the company hire additional people to keep track of everything.

After a year, it's hard to tell whether things have gotten better or worse for the staff, but yes, we can solve your problem of integrating Microsoft Word with MultiValue.

Looking back at the initial dialog, Gause and Weinberg might ask, Did we really get a problem definition? It appears we got the solution done before we knew if we understood the problem.

Or maybe we should better characterize what we got as a possible solution to some problem, but not necessarily THE problem. They state an expanded corollary of their lesson this way: Don't mistake a solution method for a problem definition—especially if it's your own solution method.

The problem might be restated as "How can the outside sales reps get orders into the production system while preparing quotes for customers?" Put that way, many solutions might work. The initial challenge of possibly having to stare down Energetic Ed and his champions and move on should get balanced against possibly spending half the development budget on a complicated solution that might not work the best.

In case you were wondering, we should consider just as dangerous a definition of the same problem that ran, "We need to get our sales force order entry system on the Web because..." Maybe jazzier, but also sliding us down the same slippery slope of mixing up solutions with problems. These days, many more solutions do require the Internet one way or an-

other, but leaping in without sufficient analysis is a good way to waste a lot of time, money, customer good will, or all of the above.

Gause and Weinberg put a lot of emphasis on getting a proper definition of the problem. They go way out on the limb: You can never be sure you have a correct definition, even after the problem is solved.

They offer various hints on how to increase the chances of getting the problem right.

They urge challenging your understanding before doing anything about it: "If you can't think of at least three things that might be wrong with your understanding of the problem, you don't understand the problem."

They plead that problem definitions should be tested against a variety of people not predisposed to accept the initial definition. (They put it more cleverly than this, but you have to read the exam-

ples.) They stress restating and simplifying the problem until everyone shares it completely.

These precepts correspond to ideas in various modern Rapid Application Design techniques, but the beauty and value of this little gem of a book lies in the authors' emphasis on everyday psychology and not grant systems design methodologies. For instance, they also put a lot of emphasis on understanding just who has the problem in order to better define what the problem is. In the example we have been playing with, you might ask yourself who in the company we described earlier has the problem as stated? The sales reps? The home office admin staff? The managers? Marketing? It's not clear who, if anyone, has exactly that problem, and yet in so many ways in the MultiValue world, this sort of problem of integration and automation appears to be THE problem.

Many MultiValue consultants and MIS managers feel an enormous pressure that if

we don't immediately have a "no problem" answer readily at hand, the gathering voices of the dark side will gain in strength. "MultiValue can't deliver what this fantastic, complete, Web-based Oracle application service provider I just saw at last month's trade show can," says Marky Marketing Director. "At my previous company, we had the Word fill-in forms right on the menu, and I understand that implementation ran on distributed SQL-Server connected through a secure Virtual Private Network," says Nancy Networking Administrator.

Here, a MultiValue consultant could refer equally well to outside resources or to the staff database developer or MIS manager. But any of these has a client or potential client thrusting the first cut at the BIG PROBLEM before her eyes.

So where does all this leave us? Some general thoughts:

◆ Gause and Weinberg have written a generally upbeat book because they sug-

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gest that solving comes easy once you understand the problem. This no doubt applies well to the very many MultiValue systems embodying rich understanding of their business sector. If making some required new turn looks hard, it's frequently because everyone has been so busy running the business; we need to take the proper time to understand exactly what new things we need to do.

◆ *Are Your Lights On?* now dates back 20 years, a long time in the computing world. Lots have changed. In terms of the matters they discuss, we might say, tools may be ever more powerful, but problems are ever more difficult to

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define. It's harder to isolate problems bound up in complex chains of communication and linkage. We have to locate business and organizational requirements in a world of intensified global exchange. Rather than dating themselves, the authors have a message more important now than ever.

◆ G&W caution, make sure the client really wants the problem solved. A good way to get mired down and never reach the end lies in the networking and inter-networking requirements. Never underestimate networking dimensions. Web software development gets less expensive by the season, but requires a lot in the way of security, technical infrastructure, networking knowledge,

and greater hours of support. Meanwhile, MultiValue shops spoiled themselves for years with simple networking and modest networking costs. It seems safe to assume managing modern programming projects comes easier than accommodating the world of distributed computing. We need to watch our step lest essential, strategically significant projects die a slow, agonizing death of inadequate networking infrastructure. *Are Your Lights On?* provides the useful push toward not just the hearty few understanding the problem, but everyone within shouting distance of the great projects we are all in the middle of. Build the team broadly and things won't fall through the cracks. *is*

STEVEN BACKMAN is president of Database Designs & Associates. You can find Steve wrestling with some problem or another at sbackman@dbdes.com

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(CONTINUED)

B Y G U S G I O B B I

As discussed in Chapter Two, Microdata's early MultiValue systems left prospective customers dazzled. Demonstrations of instantaneous ad hoc management reporting from the prospect's own data had new customers signing the dotted line by the hundreds. To the competition, it seemed clear that for less than a hundred thousand dollars, Microdata had a solution that was better than a million dollar mainframe — but hidden behind the scenes was the reality that impending disaster was always only a few steps behind the race to solve some dramatic shortcomings.

The drill was always the same; and it never failed to amaze. The Microdata salesman would ask the prospective customer the question, "What is the area of your company that you need the most help with?" Frequent answers included order entry, inventory control, invoicing, accounts receivable, accounts payable, manufacturing, etc.

The salesman would then say something like, "O.K., give me a hundred sample orders that are typical of what you receive. I'd like to have our team put the data from those orders into a file and give you a demonstration of what we can do."

A few days later, the prospect was invited to visit the Microdata dealer to have a "demo" in one of the company's famous "fishbowl" demo rooms. Using Microdata's new "English" inquiry language, the customer was challenged with the now famous MultiValue question: "Ask any question about those hundred orders you gave us, and we will answer it for you by typing an easily understandable English statement."

This was the fun part of the exercise. Customers would typically start out with simple questions like, "How many customers account for those hundred orders" or "Sort the customers in alphabetical order," or "How much money did we make on those hundred orders?" As it became clear that the operator could not only answer the questions, but answer

them instantaneously, the excitement grew as the customer gradually evolved to ridiculous challenges. "O.K., then, let's see if you can show me all of our customers from zip code 92010 with a 'z' anywhere in their company name who owe us more than two hundred dollars but less than three hundred dollars and whose last name begins with an 's' with a telephone number that starts with a '6' and sort the result in descending order by account balance due!!!!!"

Then, as it is now, it was true that someone familiar with the MultiValue query language could answer any question about data, as long as the data was in the computer.

The problem was, there was no practical way to get the data into the computer. The English query language was completed and assisted by the firmware, so it was very fast and impressive, but on the other side of the coin, Microdata had only a cryptic Job Control Language called "PROCS," a text editor, and machine language to use to do everything else.

Programmers tried to write application software for the new customers' PROCs. It was cumbersome, rigid, and resulting "programs" ran extremely slow. Horror stories abounded. One customer that had three thousand customer statements that needed to be printed report-

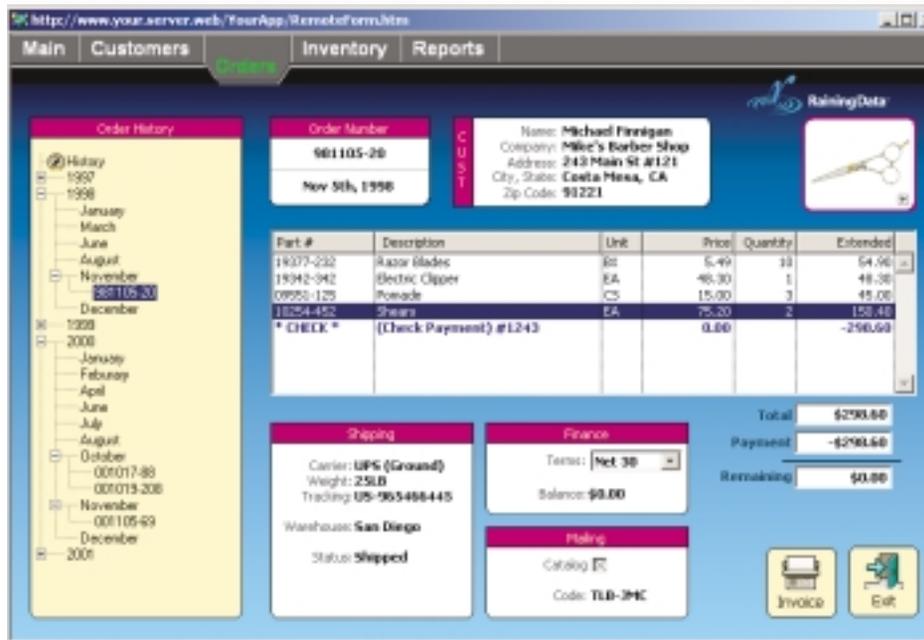
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Modular Information Systems Announces Expanded Help Desk Services

Modular Information Systems has announced expanded Help Desk services. Previously only available to existing clients, Modular Information Systems now accepts new accounts interested only in the Help Desk service. There is no charge to set up an account, and no minimum requirements for this service. Calls may be submitted by voice, fax or email, and soon via a Help Desk Web site.

"There are a number of companies looking for someone to call when they have a problem with their computer systems," said Lisa Corbett, president of Modular Information Systems. "This service allows small businesses fast access to individuals with skills developed through years of experience, training and certification."

Modular Information Systems' Help Desk is prepared to assist customers with:

- Problems with software applications • Networking breakdowns • Operating system problems
- Problems with printing, email, or Web site performance • Virus attacks • General systems failures
- Troubleshooting when unknown problems occur • Assistance to IT staff when problems occur outside their area of normal expertise. Any business interested in setting up a Help Desk account can contact Patrick

Shabram, manager of Sales & Marketing at (925) 244-5930, ext. 3.

Modular Information Systems offers a complete range of professional services and products for businesses using Microsoft, UNIX and Netware computing solutions. The company is a Microsoft Certified Solutions Provider, an IBM Business Partner and is an authorized reseller of many quality hardware and software solutions, including Caldera, Compaq, Hewlett Packard, and Cisco.

Among Modular's many offerings are Ascential's DataStage, the most comprehensive Business Intelligence (BI) Infrastructure solution available today, and the world-class winery management software suite, TSM Vintage.

VISIT ITS WEB SITE at www.miscorp.com for more information.

Luke Bucklin & Assoc. Develops Web-based Marketing and Contact Management System

Luke Bucklin & Associates, a consulting firm that focuses on Web application development and integration, has designed a Web-based marketing and Contact Management system for MultiValue systems such as D3, UniVerse, UniData, mv.Base, and other environments.

Luke Bucklin, who has been working with legacy MV systems since 1989, says this application is an "incredibly valuable tool for enterprise contact management and Internet marketing. The software is so flexible that it can be used for just about anything from sales and marketing, to debt collections, to customer support management."

Application source code is available with the product, so it can be easily suited to fit any business. Stating that there "really isn't anything else like it" available, Bucklin names a few of the CRM package's features:

- Easy query building • Import and export data • Customize your own fields
- Send an email to a list of recipients • Powerful searching functions

AN ONLINE DEMONSTRATION is available at the consultant's Web site: <http://www.lukebucklin.com/demo.htm>. ■

jBASE Gai

jBASE Software Ltd. has successfully completed ISO 9001:2000 TickIT certification. ISO 9001:2000 requires organizations to set up their quality management systems to monitor, measure and continually improve their business processes. Officially published on December 15, 2000, ISO 9001:2000 is a merger and enhancement of previous ISO standards. By achieving this certification, jBASE is among the very first organizations to meet these updated standards.

The TickIT project provides a practical framework for the management of information technolo-

ns ISO 9001:2000 TickIT Certification

gy quality and certification is an arduous process. Months of hard work were invested in documenting and refining procedures involving every department concerned with the development and testing of jBASE. Although the TickIT accreditation boards reside in the U.K. and Sweden, TickIT and, of course, ISO standardization is worldwide. jBASE Software joins companies in over 50 different countries which have been certified to ISO 9001.

TickIT approval is very often a requirement for bids in many market segments such as local government and finance. But most importantly, managing quality in a way that offers continuous improvement helps jBASE to meet its objective of enhanced customer satisfaction.

► U.S. VAR NEWS

jBASE has signed two new Value Added Resellers: Budgettext Systems, of Fayetteville, Ark., is an established leader in textbook savings, superior customer service, innovative software, and customized retail store computer systems servicing schools, colleges and universities across the country. It is also one of the largest distributors of new textbooks in the country and is committed to helping the nation's schools save thousands of dollars and utilize technology to do it.

Maverick Systems of Plano, Tex., provides custom application and database development services including Web-based application development. Maverick provides solutions featuring system integration, network installation and support, and Web site development.

► EMEA Distributor News

jBASE Software is pleased to announce the appointment of a new distributor to strengthen its growing presence in Italy. STRHOLD, a company with a solid reputation in the industry, was formed in 1983. Its headquarters are in Bologna with offices in Milan, Rome, Padua and Turin as well as a large network of partners throughout Italy. STRHOLD's previous RDBMS product — Informix — generated £2.5M in 2000. It is an ISO9000 accredited company and enjoys a market leadership position in the Italian Unix, Database Application and Internet markets.

TEMENOS has signed two new customers to its GLOBUS product. Hungarian Foreign Trade Bank Ltd (MKB) is one of the largest commercial banks in Hungary specializing in corporate and private banking services.

TEMENOS has also finalized the contract with CSPB Frankfurt (Credit Suisse Private Banking) that provides financial planning, investment counseling and portfolio management.

► JBASE Presents at International Spectrum and Holds User Conference

JBASE Software will be presenting at International Spectrum 2002, February 18-21, 2002, at the Hyatt Regency Islandia on San Diego's Mission Bay. Jim Young will discuss the new features in the latest jBASE release and Lori Sklar will present "jBASE Web Builder: Extend the Reach of Your Applications to the Web." The company will also participate in the Executive Panel, "Key Players in the MultiValue Industry Speak Out." Visit www.intl-spectrum.com for more details.

The jBASE User Conference 2002 will be held May 8-10, 2002, in New Orleans, La. The objective of this conference is to provide a forum to share ideas, learn from the experience of fellow users, and discuss products and issues within the jBASE community. The company plans on covering a wide range of topics from product direction, building real life solutions, advice from the developers, as well as plenary management sessions.

The venue for the conference is the Hotel Monteleone (www.hotelmonteleone.com) in the heart of the historic French Quarter. For more information or to register, **please call 1-877-999-5227 (in the U.S.) or (508) 598 4100, email UserConf@jbase.com or register online at www.jbase.com.**

jBASE is announcing a call for papers for jBASE User Conference 2002. jBASE believes strongly that customer-to-customer communication benefits the whole community. You are invited to join the company in making the jBASE User Conference 2002 event a better learning experience by sharing your successes — both business and technical. jBASE encourages contributions describing novel applications and practical real-life experiences with jBASE. If you have a topic that you think would be of interest and would like to speak or have an idea for a session, contact jBASE at the number below. The deadline for submission of abstracts is February 15, 2002. **Send abstracts via email to sharonc@jbase.com or contact the Boston office at (508) 598-4100.**

Nucleus Solves Missing So

PRC Software Configuration Management Tool to Celebrate 10th Anniversary

A popular niche software tool, used by IT programmers in more than 500 major installations worldwide, will celebrate a decade of configuration management in 2002.

Susan Joslyn, founder and developer of PRC, says that, although the business environment has changed significantly in 10 years, the software has remained a stalwart in companies with a need to manage change, track problems, and handle other software configuration issues.

"Today, IT shops are dealing with unprecedented levels of change, in the volume and pace they're expected to handle," Joslyn notes. "One of the reasons for the growing popularity of PRC over the years is its ability to help programmers and managers meet the challenges.

"In comparison to other software configuration management tools, PRC has taken a leadership position — in the same way that MultiValue/U2-based solutions stand apart from their competition. Often in merger situations, after the initial effort to displace solutions based on this technology, many companies end up restoring them because they just work so much better."

Early on, Joslyn says, PRC was based on SB+, which gave the tool its stable, user-friendly foundation. Today, though, the SB+ component is nearly invisible, and PRC works in any MultiValue-based environment and supports any number of corporate initiatives with other more "foreign" environments and tools.

Steve Horowitz, IT director for HCC Industries, uses PRC to support the company's ERP solution, Epicor Avante. "When we started looking at manufacturing ERP packages, we never even thought about how to monitor the necessary changes," he says. "PRC was bundled with our package, and we were pleasantly surprised at PRC's strength. Our neighbors on Tier 1 ERP solutions are suffering with tools that are not nearly as powerful."

With a decade behind it, what's ahead for PRC? Joslyn thinks recent changes in the industry point to the future longevity of the technology. "Pick going public and hitting the market with a rapid application development (RAD), graphical user interface (GUI), object-oriented programming (OOP) tool has reinforced the adaptability of the technology," she says. "And IBM's purchase of Informix and its commitment to continue marketing and supporting U2 and System Builder is very encouraging."

SJ+ Systems Associates is a Florida-based company with more than 20 years of experience in MultiValue technology and software configuration management.

Binary Star Development announced delivery of the first Nucleus/jBASE installation to the city of Belle Glade, Florida. Nucleus is an integrated jBASE software development environment that greatly reduces the time and the cost of developing, supporting and enhancing software applications.

The city of Belle Glade recently updated its computer system, from an aging McDonnell Douglas system to a newer and faster Intel based system, running jBASE as the database manager. While the city was able to convert the majority of its original applications, it was faced with the problem of not having source code for a number of programs. "We chose Nucleus," according to Fred Myers, the IT director for the city, "because it could help us to quickly re-engineer our applications without forcing us to rewrite everything from scratch."

Nucleus enables a developer to quickly create scalable, user-friendly applications that are easy to maintain, easy to modify and easy to support. It is an integrated, object-oriented,

Source Code Problem for the City of Belle Glade

event-driven software development environment enabling rapid development and supports character-based "dumb" terminals, GUI screens and interactive Web applications across a mix of platforms, terminal types and communication protocols.

"jBASE is pleased to welcome another quality software product to its ever expanding portfolio of

excellence," said Dave Bryant, president of jBASE Software Inc. "As one would expect from Binary Star's reputation for customer satisfaction and professionalism, this first cooperative effort has been a pleasure."

Nucleus/jBASE offers true independence and scalability across Linux, Unix and Windows platforms, as well as IBM mainframes.

jBASE Software is a leading supplier of database management software for developing, deploying, and maintaining business applications solutions. jBASE Software products are available worldwide through a network of value added resellers and are complemented by a suite of services including customer support, consulting, and education (www.jBASE.com).

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Must-Have PALM ACCESSORIES

PALMS continue to mature in the marketplace. With each release of the Palm OS, more functionality is available and more accessories are created. I can't always tell if the accessories prompt the advancement of the Palm OS, or if it's the Palm OS that prompts the new accessories. Regardless, there are a few accessories that you should take a look at if you are planning to integrate Palms into your company.

Cases

Now you would think this would be a no-brainer. Almost all Palms you buy at the store already come with a nice leather case, or a flip lid to help protect the Palm from scratches, but these only do so much.

If you are planning on introducing the Palms into an industrial environment, you'll need better cases than what comes with the Palm. These cases will not protect against the Palm being dropped or protect against mud and dirt.

There are a couple of cases that can help in these environments. One is the "bumper case" and another is the "aluminum case." The bumper case is a shell of rubber around the Palm to help protect against the shock of dropping or banging against hard surfaces. The aluminum case provides a hard shell around the Palm, and sometimes includes the rubber-like bumper case, which provides even better protection in outdoor weather.

The main difference between these two types of cases is the weight. The aluminum case is usually heavier than the bumper case. Either way, these cases will add extra weight to the Palm, but will protect them from getting too damaged when used in harsher environments.

Continues on page 22

Productivity Gets a Boost with Palm Accessories

From Paper to the Palm
Imagine writing anything, in any language, or drawing whatever you like with ink on paper, and instantly capturing it on your handheld organizer.

The new SmartPad2, from Seiko Instruments, allows you to instantly capture everything you write or draw using the SmartPad pen on ordinary paper. You can hand-write notes and store them in your Date Book or draw a map with directions and attach it to a contact in your Address Book.

The SmartPad2 adjustable infrared transceiver sends your notes and drawings directly to your handheld via the infrared port. Store your notes as attachments to any of the four Palm OS applications or transfer them via HotSync to your PC.

From your PC, you can print your notes and file, fax or email them. You can also email notes and drawings directly from your handheld with optional email software and a modem or phone.



© SEIKO INSTRUMENTS INC.

The SmartPad2 lets users instantly capture their writing on their handheld organizer.

WHO'S OLDER?

YOUR COMPUTER SYSTEM OR YOUR GREAT AUNT ETHEL?

Ethel

Main Memory: Not so good

Weight: 97 pounds

Mean Time Between Failure: Any Day Now

Maintenance:
Donuts & Social Security



Pick System

Main Memory: 16K

Weight: 1/2 Ton

Mean Time Between Failure: 35,000 hours

Maintenance:
\$5000/month

If your Pick system is more than two-years-old, it's time to call Zumasys for an upgrade. Zumasys specializes in providing "zero downtime" migrations to new state-of-the-art servers and industry-standard databases such as Raining Data's D3. Zumasys offers custom-built Terian, Compaq & RISC-based servers all backed by high-quality national on-site service. And regardless of whether you want to upgrade to Linux, Windows NT/2000, Citrix, AIX, SCO or UnixWare, Zumasys will provide you with a "single source" for all of your ongoing technical support.

One call to Zumasys is all you ever have to make.

So stop running your business on last decade's technology. Call Zumasys today for your free quotation at 949-369-8015 x104.

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sales@zumasys.com

Must-Have Palm Accessories *Continued from page 20*

Keyboard With Case

One of the shortcomings of the Palm, and most any other PDA, is the lack of keyboard. There are many applications where a Palm would be an excellent device if it had a 10-key of some kind. I have just recently found a device that gives you that.

The Keyboard With Case at Office Depot (this is the only place I have found this device so far) provides you with an expanded keyboard included with a case. You open the case, and on one side is the Palm and on the other is a keyboard with a 10-key.

This device also includes your normal keyboard keys as well as a few other keys that can come in useful, i.e., Undo and Hotsync.

SmartPad Notepad

The SmartPad Notepad, from Seiko, will capture handwritten notes on an ordinary pad of paper and save them on your Palm in a graphic format. When your Palm is synced, these images are saved in either BMP or GIF formats (see sidebar on page 20).

Besides always having a copy of handwritten notes and drawings, there is a function of this device that can be very useful: filling out forms and signature capture. Since the end result is an image, and you can select and cut selected portions of an image, you can use this device for "fill in the bubble" style data entry.

How many forms do you need to have a copy of the original for one reason or another, but also have to enter the same information into your system? Can these forms then be converted to "fill in the bubble" style forms? Then you can create a program that will check a specific location on a graphic image to see if it is black or white, and you now have the value you are looking for.

Continues on page 39

Productivity Gets a Boost with Palm Accessories

Pocket-sized Productivity for People on the Move



Designed by Symbol Technologies and Palm Inc., the SPT 1500 combines bar code scanning technology with Palm OS platform.

© SYMBOL TECHNOLOGIES
Symbol Technologies has combined the latest bar code scanning technology with the Palm OS platform to create the SPT 1500.

Based on the Palm III, the SPT 1500 is a productivity tool that enables users to capture and manage data with unparalleled convenience and functionality.

Equipped with the SPT 1500, mobile professionals in a host of industries are able to manage data anytime, anywhere. It was designed for operation in the office or on the road. In retail, the SPT 1500 enables single-handed asset tracking, inventory management and physical data collection with a tool that moves easily from the stock room to the sales floor. Healthcare providers can download patient information before rounds, and update records at bedside. Service technicians can track inventory while in the field. Salespeople are able to enter customer information, scan items from a bar-coded catalog and check downloaded price lists, all while at the customer's site. Additionally, the process of home shopping can be significantly improved with the SPT 1500. Instead of written shopping lists, consumers can scan items as they are depleted, creating an electronic shopping list. This electronic list can be used on the next shopping trip or uploaded over the phone lines to the local store for home delivery.

Any business can tailor the adaptable SPT 1500 for its mobile professionals. Because the device uses the Palm OS platform, programmers can build solutions using a wide selection of scan-enabled graphical development tools.

The SPT 1500 uses Symbol's SE 900 scan engine, the smallest, lightest, brightest available today, for premium performance, the company said. A touch-based graphical interface, push-button controls and backlit 160 x 160-pixel display make it easy on the eyes, even outdoors or in dimly lit spaces.

The SPT 1700 Combines Ruggedness With LAN Capabilities



© SYMBOL TECHNOLOGIES
The SPT 1700 is tough enough for use in manufacturing and industrial environments.

© SYMBOL TECHNOLOGIES
The SPT 1700 family combines integrated scanning, sophisticated connectivity and ruggedness with the popular Palm platform. The SPT 1700

offers ruggedized data communications capabilities with its built-in link to the open architecture of Spectrum24. This wireless LAN from Symbol Technologies enables up-to-the-minute information flow between the point of activity and your remote host systems.

The newest addition to the Symbol SPT 1700 family, the SPT 1700-2D, offers flexible 1D and entry-level PDF417 bar code data capture. It's available in both batch and wireless configurations.

The SPT 1700 family was designed to be tough enough for use in manufacturing and industrial environments. The rugged housing withstands drops of up to four feet to concrete. Tested to IP54 standards for protection against rain and dust, these computers can be used outdoors on loading docks and yards and, because they use a 650 mm laser diode, you will still see the scan beam even in bright sunlight.

What MultiValue needs is a REAL solution for GUI.

No screen scrapes.

No half-baked emulation workarounds.

Certainly not VB.

A full-blown GUI. Driven by MultiValue.

Raining Data got it right when they built **mvDesigner** on the incredibly powerful **Omnis Studio** engine. The only trouble is, the event-driven programming required is so foreign to most MultiValue programmers, it can take years to port an application - and even then, you can end up in the client/server conundrum that's swallowed up thousands of software projects over the last 10 years.

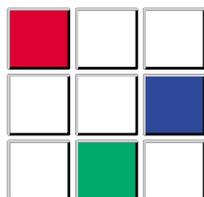
The solution? **AVRAD** (Advanced multiValue Rapid Application Developer), a RAD tool that is fully integrated with mvDesigner, allows the MultiValue developer to build applications as they always have (or should have!!), while taking full advantage of mvDesigner's powerful GUI delivery mechanism.

AND ... the resulting applications STILL run in character mode, in ANY screen resolution. That's right, character apps, in resolutions like 127x40 or 150x36. AND ... still supporting the good old 80x24.

AVRAD contains a wide array of tools to assist in the porting process, including a fully automated PROC converter, and a tool to allow existing character screens to be easily marked and linked to dictionaries, with GUI screens the result.

AVRAD leverages 20 years of continual refinement in building flexible, fully customizable MultiValue applications, and comes complete with all of the tools you'd expect from a complete development environment. AND ... a full library of existing applications built in **AVRAD** are made available, either for use in your application, or as a huge library of working examples.

Take a look at www.avexxis.com and you'll see what you've been looking for ... for a long time.



Avexxis

TO SOME, jBASE IS A UFO.

(an Ultra Flexible Option)

Open your own j-File. Delve in and find out what you've been missing.

Once you do, we think you're going to marvel at how incredibly far jBASE can take you.



THE  FILES

Web-ify

"Clearly, the Web was the way to go. Today, our completely Web-enabled application has streamlined work processes and reduced errors. Thanks to our using jBASE, OBJEX and Active Server pages, which all interface nicely with BASIC subroutines, we now have a state-of-the-art application."

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



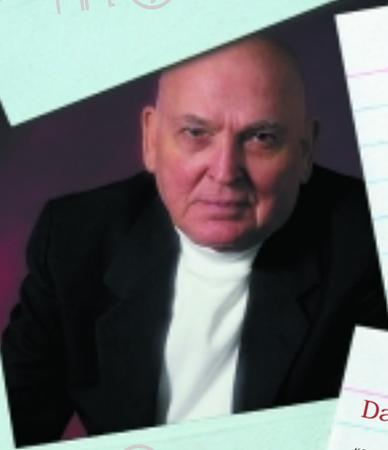
Desktop and Development

"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.



THE  FILES

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.



THE  FILES

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THE  FILES

THE SECRET IS OUT.

It seems that more and more developers are exposing jBASE for what it is: an Ultra Flexible Option that is truly a Jack-of-all-trades and Master of them all!

WEB-IFY APPLICATIONS WITH EASE.

Face it, developers love exploring the limitless possibilities of the Web. Why not? Web-enabled applications are more competitive. And they take advantage of the newest technology. So don't let other development products ground you, reach new heights with jBASE. We provide you with an array of products and tools that make Web-ifying applications a blast. They include jBASE Web Builder, Java OBJEX, JDBC, and OBJEX. Each is designed to work hand-in-hand with many of today's leading industry Web tools such as Active Server Pages, Java Applets, Browsers, and lots more. Now that the truth has been uncovered, put jBASE to work creating Web-enabled applications that are worlds apart.

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 (Main) MultiValue Role in Data Warehousing

SECTION 6 MultiValue ETL Examined

Previously, we discussed the significant value of multi-valued databases in data warehouse projects. This is an important application of MultiValue; perhaps a valid claim to the rank of a perfect solution to a real-world problem. The response has been, in a word, underwhelming. While the concept of multi-values in a data warehouse is simple, the practical aspect of proposing it to entrenched warehouse professionals and inside-the-box management is a challenge ... if not impossible. So it is time to roll out the Big Gun: A no-cost, world-class tool for a large-scale data warehouse that saves real money ... from a few thousand dollars to hundreds of thousands. Check it out.

The big step in all data warehouse projects is called "ETL," for "extract-transform-load." It is often considered the most important step. For example, it's not unusual that the data warehouse design work is abandoned and done again in a large-scale project, sometimes more than once. Yet repeating the ETL process would be considered a major setback, if not an outright mistake. (In fact, re-designing is usually done *specifically* to avoid repeating the ETL.)

Software developers rushed to fulfill the need for such a critical data processing task. Expensive software is sold and pur-

chased to perform the extract-transform-load. An entire industry sprang up to provide software for ETL in a data warehouse project, with each offering programmed in its own costly way. According to the gentleman considered the father of data warehousing, Ralph Kimball: "...The leading ETL vendors, including Informatica, Sagent, Ardent (now owned by Informix), and ETI have long since abandoned the straight-line code approach in favor of proprietary graphical objects... The bottom line on the ETL tools is that the object-oriented approach the ETL vendors take is very successful, but each is proprietary..."

(www.intelligententerprise.com/000908/w-ebhouse.shtml?busintel, ref: *September 8, 2000, Volume 3 Number 14, article on data warehouse software tools*).

Mr. Kimball's insightful article observes that data warehousing work is not new. And old-fashioned ETL is not the purpose of data warehousing. "Business Intelligence" is the purpose, and BI is about what is done *with* the data. The new data mining tools are the legitimate big-ticket value-adds in this niche. "Data warehousing" is about what is done to the data, and is mostly long-established technique. Only the high-cost graphical transformation software tools are new.

If one is to believe the father of data warehousing, Mr. Kimball says that fundamental data warehousing work is fundamental database work. So professionals will seek ways to do their defined tasks with cost-effective tools. And multi-valued database systems offer such tools, at little or no cost. Since the multi-valued database pre-dates data warehousing, it is not surprising that today's MultiValue systems incorporate extract and transform as fundamental database processes (see "Transformations" sidebar). Now, with a fresh perspective, and a little free knowledge, these same attribute definition items can be a sophisticated ETL mechanism for data warehousing. Today's MultiValue dbms provides ETL capabilities for **free**. That's considered cost-effective by most people.

And ETL is the third aspect in this article series of the value of MultiValue in modern data warehouse projects. The first was the extraordinary efficiency of multi-valued fact tables. The second was multi-valued dictionary items as relational metadata. It's time to look at attribute-defining items a little more closely.

Transformations

A "transformation" is often thought to be the fundamental core of data processing.

It is the "Process" in IBM's "Input-Process-Output" (tm).

Transformation is central to Structure, as in Structured Analysis and Design, and Structured Programming, as well as their successor, OOPs (*The rather unfortunate acronym for Object Oriented Programming, eh?*).

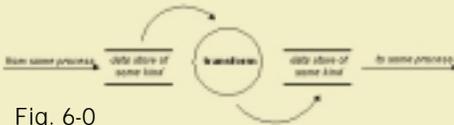


Fig. 6-0

What these techniques all teach us is that in any sense, all data processes can be considered transforms of one sort or another. Any process that is not a transformation can be developed as either an input process, or an output process. This appears to have been the perception of the inventors of the multi-valued database in the late '60s, about the time that Structure was being developed. In any case, transformation is still central to the multi-valued data model. The correlative rules in the relational data dictionaries are actually today's transformations. =/srv

We discussed the core of the multivalued database, the dictionary items, calling them by their true name, "metadata." Dictionary metadata is shared by nearly all multi-valued database processes. For the most part, dictionary metadata items were developed for outbound queries, so

Continues on page 28

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that users could refer to database elements by familiar names. Occasionally the dictionary metadata are used for input as well, such as application generator software that utilizes the dictionary items. In the advanced versions of Multi-Value systems like D3 and Reality, dictionary metadata is used for SQL queries, and distributed real-time to ODBC clients. MultiValue metadata items are actually transformations. With that new perspective and a little bit of experience, a world-class ETL process can be assembled from a standard MultiValue system at little or no cost. Plain old-fashioned multi-value database structure is actually State-Of-The-Art Stuff.

For example: the primitive metadata records called attribute-defining-items in the dictionary of each data file are actually simple Objects.

That's right: well-formed objects, fully conforming to the classic definition ... simple, small, reusable code classes capable of transforming passed data into new formats, new contents, even whole new facts. These objects are reusable, and always accessible, actually part of the path to the data. They are universal objects, shared by any and all multi-valued program processes and system utilities alike with access to the data file. Furthermore, these objects are stored with the data, and are subject to the same powerful processing as the data itself (see the last article on the metadata repository).

Moreover, these are standardized objects, specifically for transformations. They have a standardized structure and simple encoding scheme, with a known data store going in, and a rigorously defined data result coming out. A good name for them might be Transformation Objects. They can make ETL a simple utility in a multi-valued database environment.

Like pearls on a string...

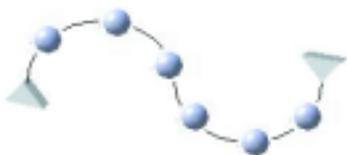


Fig.6.1
...using attribute definition items as tuned, reusable Objects.

Imagine the dictionary attribute definitions as a series of small, simple, elegant little machines, organized and applied in sequence. The "string" is an object manager, or a process that reads and uses the dictionary metadata attribute-defining items as transformation objects. Multi-Value systems all have a unique real-time command that does the task quite well.

MV's Data Warehousing "Freebie": REFORMAT

Since the earliest days of the commercial multi-valued database, there has always

been a user's command language known as TCL. There are two categories of commands: simple TCL-1 commands, which have the general syntax of command, and the more powerful TCL-2 commands, which are now often called AQL or ACCESS Query Language commands.

What makes AQL so easy to use also makes REFORMAT into an ETL utility.

The most common use for AQL commands, like LIST and SORT, is to query the database, much like SQL "SELECT". The metadata for AQL, or

All the TCL-2 commands have a similar syntax, beginning the command or "verb":

verb filename {selection-criteria} {sort-criteria} {item-list} {attribute-list} {options}

A complete tutorial can be found in several of the fine books available on the multi-value databases. For our purposes here, it is sufficient to simply define each component as:

verb such as LIST, SORT, SELECT, or perhaps the subject of our discussion, REFORMAT

filename is the name, or the path, or "q-pointer" (alias) to a database file

selection-criteria is optional phrase(s) WITH, including operators like =, #, >, <, etc.

sort-criteria is one or more optional phrases beginning with BY

item-list is an optional list of record keys, specifying records or items to be included

attribute-list is an optional list of the metadata names of database elements that are to be assembled and presented as the results of the query

options are the modifiers to control the presentation, such as LPTR to send the results to the print spooler

Note that AQL is the multi-valued database equivalent of SQL, and MultiValue environments such as D3 from Raining Data will support both. However, a few years ago it was observed by the American National Standards Committee (ANSI) that although standardized SQL will be quite comprehensive when the committee is finished, its complexity is such that SQL is more likely to be used by programs than by people. In contrast, the multi-valued database query tool AQL was designed for use by people first, and retains its user-oriented syntax and simplicity. For example, the SQL query will be laboriously written like this:

```
SELECT CUSTOMER.ITEMID, CUSTOMER.STREET, CUSTOMER.ZIP, ZIPCODES.CITY FROM
CUSTOMER, ZIPCODES WHERE CUSTOMER.ZIP = ZIPCODES.ITEMID ORDER BY ZIPCODES.CITY
```

...while the multi-valued database AQL query can simply be:

```
SORT THE CUSTOMER FILE WITH LASTNAME SMITH BY THE CITY DISPLAYING THE ADDRESS
```

attribute-defining items in the file data's dictionary, contain relational rules called correlatives that play an integral role in the process.

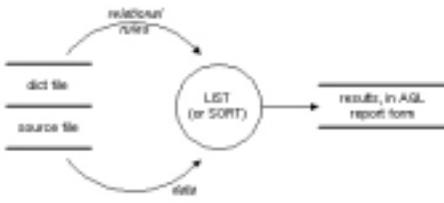


Fig. 6-2

One of the more powerful commands is REFORMAT (see the previous article). This utility command is primarily used to create new files, usually for exporting data. It conforms to the simple AQL syntax and appears equally simple in its operation. (Fig. 6-3)

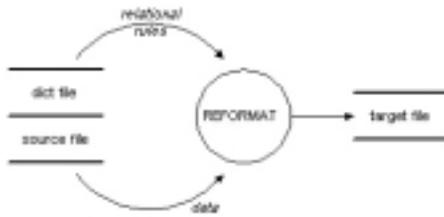


Fig. 6-3

Yet there are other ways to use the metadata dictionary files. For example, it is common to have two or more definitions and correlative relational rules for the same data element attribute. Consequently a user can build a second set of alternate or "synonym" attribute definitions in the same dictionary. (Fig. 6-4)



Fig. 6-4

Obviously, multiple definitions in the same dictionary for the same database element in the same file can be confusing. And keeping track of different definitions to be used in different procedures is an administrative burden. Sometimes the preferable approach is a separate dictionary. (Fig. 6-5)



Fig. 6-5

This is an especially powerful and flexible configuration for ETL. Extract-transform-load is essentially an "iterative" process ... that is, the project team repeats it until they get it the way they want it to work. Hopefully the method is to repeat the process on a small representative sample, as quickly and simply as possible. A tool that would allow rapid set-up, execution, analysis, tuning, and repetition would be best. The MultiValue system REFORMAT process USING an alternate dictionary is exactly what the method requires.

MultiValue dictionary items can be created and modified in a few seconds. Each is stored in a database itself, easing access, editing, and documentation. The REFORMAT command uses the definitions as arguments. Like a string of pearls, a series of the attribute definitions can be strung together in a stored procedure. Each dictionary item can be a complete transformation object, containing:

- ◆ reformatting, and/or
- ◆ one or more conversions,
- ◆ correlations, internal to the data item,
- ◆ translations, acting as dynamic joins,
- ◆ complex relational rules, in the form of correlatives, or even
- ◆ very complex relational logic, in the form of program subroutines

The REFORMAT command performs as the object manager. A transformation operation then is:

- ◆ an interactive command that: a) selects a representative sample and b) creates a file, or
- ◆ a stored procedure that repeats that process precisely and creates a representative results file each time.

The project team can easily repeat the process as often as necessary, adjusting the transformation objects (dictionary metadata) until the results are acceptable.

Our "Transformation" in Extract-Transform-Load is ready. It's time to set up the Extract.

Surprise! Most of the work is already done. The "extract" step is simply the filename and selection criteria within the REFORMAT command itself.

REFORMAT *filename* WITH *selection-criteria itemid {output-attribute / output-attribute}*

The REFORMAT process *automatically* performs most extractions with relative ease. The extraction processing that would ordinarily involve complex join operations in any other relational database are reduced to simple translations in the MultiValue metadata attribute definitions. For example, a zip code attribute can generate a city, state, region, country, mail route, delivery method, sales territory, or any other geographic dimension, regardless of the number of files involved, by means of a simple translate specification in the metadata dictionary definition items for the "transformation object" names in the attribute list of the REFORMAT command.

Moreover, "normalization" is also performed automatically by the REFORMAT process. Multi-valued data is, by definition, stored in a highly-efficient "fifth-normal form." (See William Kent, "A Simple Guide to Five Normal Forms in Relational Database Theory," Communications of the Association of Computing Machinery 26(2), Feb. 1983, 120-125; www.home.earthlink.net/~bilkent/Doc/simple5.htm). "Fifth-normal-form" multi-valued fields are automatically converted into "first-normal" records (rows), by duplicating the non-multi-valued attributes (columns). The process is real-time, dynamic, and relatively fast (*1000 items converted to 10000 rows in 5 seconds, and 100,000 rows in less than 60 seconds*). Furthermore, associative sets of multi-valued attributes, like line item quantity and price on an invoice item, are automatically normalized into separate rows, with quantities and prices correctly set into each new row. (Fig. 6-6)

Continues on page 31

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```

INVOICE.NO1 ^ DATE ^ CUST.NO1 ^ SKU ^ QTY1 ^ PRICE1 ^ BRAND1 ^ MARKET1 ^ STYLE1
] QTY2 ] PRICE2
] QTY3 ] PRICE3
INVOICE.NO2 ^ DATE ^ CUST.NO2 ^ SKU ^ QTY4 ^ PRICE4 ^ BRAND2 ^ MARKET2 ^ STYLE2
] QTY5 ] PRICE5
    
```

REFORMAT results set

```

INVOICE.NO1 ^ DATE ^ CUST.NO1 ^ SKU ^ QTY1 ^ PRICE1 ^ BRAND1 ^ MARKET1 ^ STYLE1
INVOICE.NO1 ^ DATE ^ CUST.NO1 ^ SKU ^ QTY2 ^ PRICE2 ^ BRAND1 ^ MARKET1 ^ STYLE1
INVOICE.NO1 ^ DATE ^ CUST.NO1 ^ SKU ^ QTY3 ^ PRICE3 ^ BRAND1 ^ MARKET1 ^ STYLE1
INVOICE.NO2 ^ DATE ^ CUST.NO2 ^ SKU ^ QTY4 ^ PRICE4 ^ BRAND2 ^ MARKET2 ^ STYLE2
INVOICE.NO2 ^ DATE ^ CUST.NO2 ^ SKU ^ QTY5 ^ PRICE5 ^ BRAND2 ^ MARKET2 ^ STYLE2
    
```

Fig. 6-6 multi-valued items

As any data warehouse project manager will agree, this is a huge time-savings in the programming of an extraction process. As long as the associations between multi-valued fields are defined in the dictionary definitions of attribute names, then the complex manipulations for a correct results set are automatically applied.

So: Our Transform is in the metadata attribute definitions, and the Extract is in the REFORMAT command. Now for Load. The "load" step is deceptively simple. Ordinarily, the final argument for the MultiValue REFORMAT command is a temporary file name. (Traditionally, data is REFORMATed from a legacy multi-value application file to a temporary file, and then exported with a COPY command, then moved to the data warehouse database server, and periodically imported or merged with the data warehouse database.) With the advent of the Open Systems File Interface or OSFI, the target filename can now be a path to a file within the data warehouse. No fuss, no batch jobs; data is read directly from the multi-value application server and written directly to the data warehouse repository. This is the architecture my project team uses for Oracle, and it can be used for other SQL-compliant data warehouses. *(BTW: Naturally, it's even easier, and up to ten times faster, when the data warehouse is another MultiValue system. Just so you know. ;-)*

Curiouser and curiouser. Let's review:

- MultiValue non-normalized form is recognized as faster and more efficient for fact tables.

- MultiValue dictionaries are exceptionally well-integrated, relational metadata repositories.

= A low- or no-cost ETL, integrated with the multi-valued database, fine-tuned by simple adjustments to the dictionary attribute metadata definitions.

With the added benefit that this ETL tool is easily adjusted for revisions in either the source transactions or the target fact tables ... without any hard code changes.

Now let's turbo-charge it. What we've described here is tailor-made for a powerful real-time Extract-Transform-Load process to be described in the next section, "Diamond in the (Main)Stream: The Transform Engine." As discussed in the last issue, there are simple utilities called "file triggers" that can be put into place in metadata dictionaries to maintain documentation in the metadata items themselves, and in a global repository. The use of file trigger mechanisms makes this process fail-proof and inescapable. Those same trigger mechanisms can be applied in a real-time extract-transform-load process, resulting in a subtle background process with capabilities that surpass most of the sophisticated ETL software in the data warehousing marketplace today. All for the nice, round cost of approximately zero.

Surely this is the beginning of a good "business intelligence" system. =/STV

THE AUTHOR IS LOOKING for a few good men, and women, with an interest in multi-valued data warehousing to start a usenet discussion group. Persons who believe that programming has to be mysterious, expensive, and no fun, need not apply. Send your email address to steve@vanarsdale.com or visit the Web sites www.mvconsultants.com or www.pick-sap.com.

Continues on page 32



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Diamond *in the* (Main) Stream

The (Main) MultiValue Role in Data Warehousing

SECTION 7 The Transform Engine

Perhaps much of the computer software that we buy today is simply an enhanced way of doing something that we could do, or used to do, ourselves. It's usually smarter to buy commercial code for a few cents per line and adjust to it, rather than write customized software for dollars per line. But if working smart means spending a few cents per line to buy code, then it makes sense to consider spending even less ... by simply figuring out how to use the free capabilities inherent in the database environment. Here's an example.

The third reason that a multi-valued database is an extraordinary tool for a data warehouse project is ETL.

- ◆ The first was the natural fifth-normal-form, or “multi-values,” for faster and more efficient fact tables,
- ◆ The second was the multi-valued dictionary “repository” for metadata, and
- ◆ The third is integral ETL, or extract-

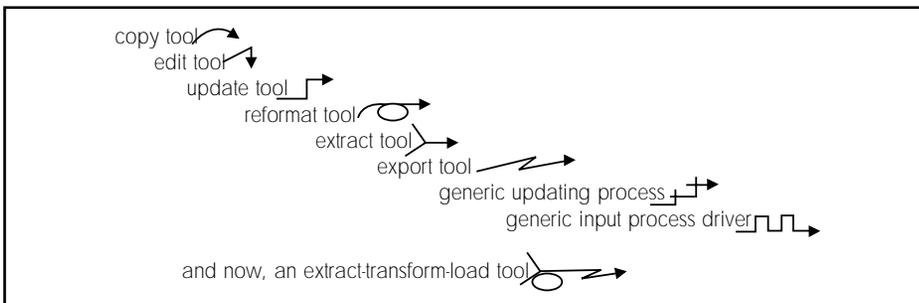
transform-load, stringing MultiValue metadata into a fast and simple process that can be easily repeated over and over.

In the last article we discussed the MultiValue system's unique REFORMAT utility command. REFORMAT is a classic, the “Swiss Army knife” of data processing. This utility can replace thousands of lines of program code, acting as:

In many ways, the REFORMAT command is representative of the value of a MultiValue system in a data warehouse project ... or any project where time and cost count. And that's the point of this article, and all the preceding ones. In nearly any data warehouse project, a multi-valued database can be a useful tool as well as a powerful environment. MultiValue database systems add a unique value proposition; a sort of unsung hero often discovered at the crux of the work.

The Intrinsic ETL Engine Scenario

Let's assume that we are a profitable, mid-sized manufacturing firm. Perhaps we have a MultiValue application system, probably because it was easy to get it up and running, and then it never seemed convenient or wise to replace it. Assume that it has (or can easily be made to have) a file of sales transactions suitable for building a data warehouse. Let's further assume that higher powers have selected the data mining “business intelligence” software, and mandated a fashionable database for the data warehouse itself. Then those higher powers engaged the services of a suitably high-powered consulting firm, at an astonishing fee.



Continues on page 34

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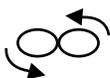
Now in the normal course of events, the consulting firm (or two) will overrun their budget, fall short on their promises, and get the boot. Eventually one of these highly intelligent consultants will notice that the legacy application has all the data about the sales, and is working reasonably well. After a glimpse of multi-values, he decides to avoid the ill-fated adventure of trying to extract multi-valued data with conventional tools. So you are asked to Extract the data to the data warehouse, so that the consulting team can perform the Transform-Load with vastly overrated ETL software.

Golden opportunity. Now how can we show 'em our stuff?

You “over-achieve” on the request. We quietly offer to do the transformations on the MultiValue side... just to accommodate everyone’s busy schedules, of course. The expensive consultants, long on promises and short on budget, quietly agree. To simplify the process, we offer to load the transformed data directly to the data warehouse fact tables and dimension tables. The consultants, by now busy implementing the database they designed and firmly nestled in alligators of their own making, quietly open the way for you.

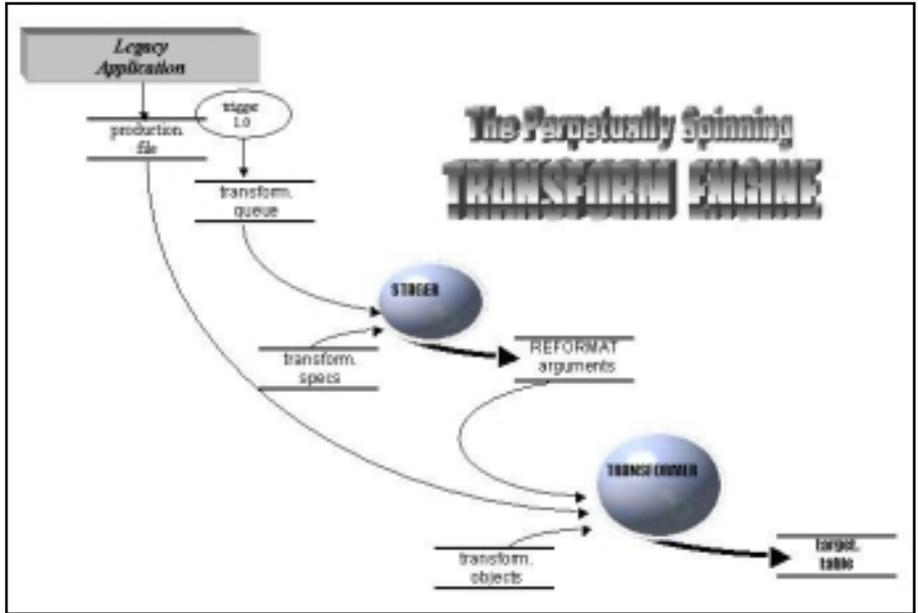
Then you *exceed* expectations. Instead of the traditional time-consuming and error-prone ETL batch job to keep the data warehouse up-to-date, we provide a real-time, continuous link that extracts, transforms, and loads the sales data to the data warehouse at the moment it is available. In other words:

A Perpetually Spinning Transform Engine:



It’s just about as simple as it looks. First, we write a small, program known as a file trigger or CALLX routine which automatically executes whenever a multi-valued

Fig. 7-0



database item is updated and filed. This simple subroutine records the name of the file and the key to the item in a transaction file known generically as the “transform queue.” (Fig. 7-1 below)

Next, we create a simple background process generically referred to as STAGING

that periodically examines entries in this queue. Based upon the file name, the staging process determines the appropriate transformation rule for the item, and passes the file name(s) and item key(s) to one or more pre-established TRANSFORMER routines. (Fig. 7-2 below)

Fig. 7-1

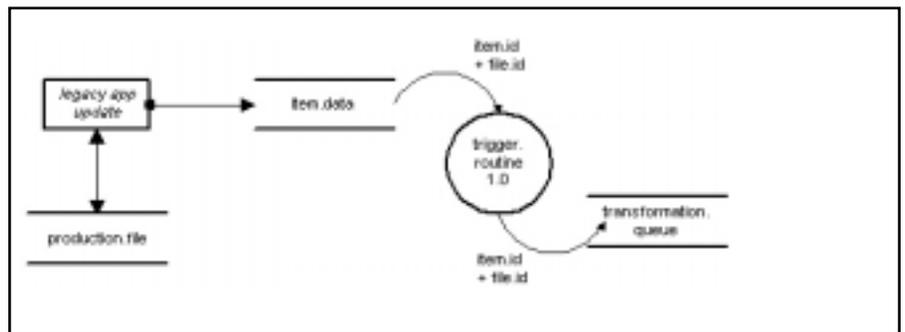


Fig. 7-2

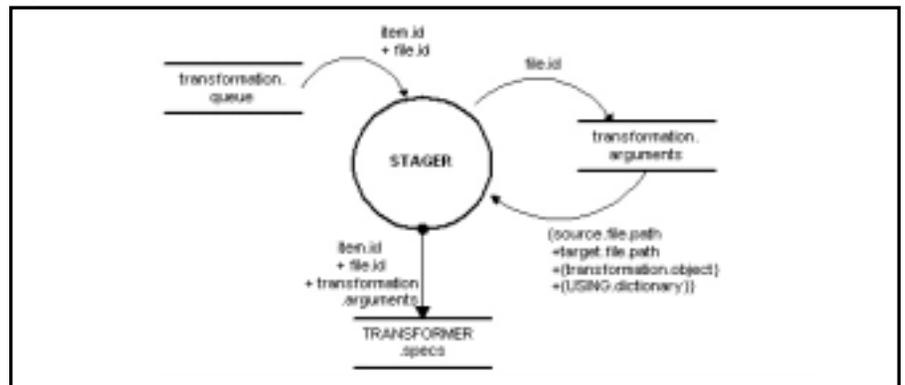


Fig. 7-3

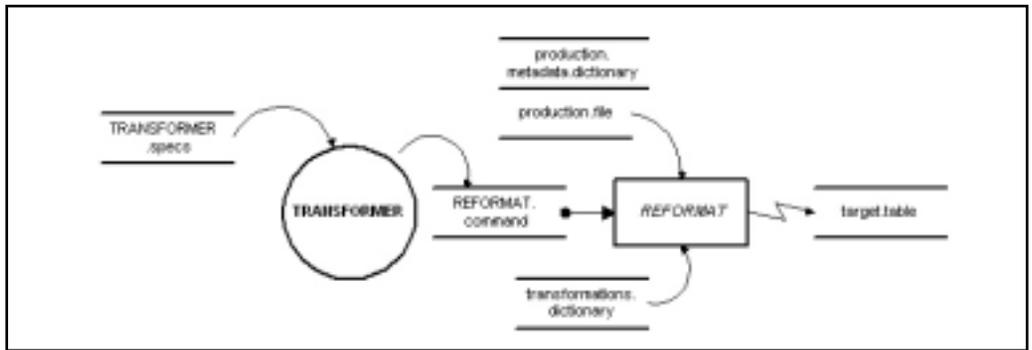
The TRANSFORMER routine assembles and executes the appropriate REFORMAT command to extract, transform, and load the data warehouse table(s). (Fig. 7-3)

Wow: For interesting extension of the process, suppose that an update of a remote data warehouse table demands an update of one or more dimension tables. Ordinarily these updates are performed by ponderous batch processes in the data warehouse database, or by redundant stored procedures, which can lag behind the ETL by as much as a week. Since these tables are accessed from the multi-valued system by means of a remote file pointer, and that pointer can contain a trigger routine, it is feasible for the REFORMAT command to trigger one or more subsequent additional entries in the transaction queue.

These subsequent entries will be staged, and result in one or more TRANSFORMER operations that will REFORMAT data from the **remote** fact table into **remote** dimension tables, on a real-time basis! All managed by the MultiValue ETL, and administered by simply editing the MultiValue dictionary meta-data attribute-defining items.

*No one would suppose this technique is trivial, but it isn't too difficult and can be a lot of fun. The real trick is how to get from here to there. Or how to get approval. Much of this article is simple to most readers, but the article was written to give to those professionals that have never encountered MultiValue themselves. And in the next article we discuss the cost-effective and politically-correct method to get them there: **The Transition Architecture.** Thanks for listening. =/srv*

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But many people remain interested in shopping online. Your site may just not offer them enough features that will convince them to stay online with you. Let's look at some of the main reasons people might be leaving your e-Commerce site without buying.

Security

Without a doubt, security is the primary reason customers abandon a site. If you don't have your SSL certificate to encrypt the sales transactions and passwords, then you'll have customers who fear credit card fraud.

This isn't exactly rational in many cases, as most Web sites now offer good security. I personally think that Web sites can be safer than in person, phone, or faxed purchases. Ever place an order by cell phone or cordless phones? They can be tapped more easily than most e-Commerce sites. Credit card information can be copied, receipts can be stolen — it's a scary world out there!

Your site needs to convince customers that you are dead serious about security. Encrypt information and tell them that you're doing so. Keep no credit card numbers exposed on the Web server. Some companies actually have so-called *no risk* guarantees. For example, at Land's End, if a consumer can demonstrate a fraudulent act was facilitated or caused by their Web site, then Land's End pays the first \$50 that credit card companies aren't required to cover.

And don't forget, take a look at your main page. If it doesn't have it already, add a privacy or security link and explain your policies.

Personal Privacy

People are currently particularly concerned about identity theft. This goes far beyond mere credit card fraud. Many fear that personal details about their behaviors can be tracked and then used against them.

When explaining your security policies, be sure to address concerns regarding customer behavior, sale of consumer information, HTML cookies, and customer profiling.

Shipping Expenses

How much will it cost to ship from your site? Customers despise guessing the cost of shipping. Most sites can't calculate the true cost of shipping until the very end of the transaction, so there will always be some mystery.

Ease the concerns that your customers might have. Give shipping estimate costs whenever possible. And don't forget to remind them that many shipping costs are frequently offset by savings in sales tax.

Shipping Times

Customers who purchase items in person know they have the desired goods right when they need it. Online purchases don't satisfy the need to know that the item will be in their hands. You need to convince them through assurances or guarantees that shipping will be expeditiously handled.

At the very least offer various shipping options. Perhaps allow them to do ground shipping by default. But don't impede consumers from ordering items overnight or from receiving partial shipments if they are interested.

Physicality

Are you selling things that people want to touch or examine? You have an extra problem then. People visit your physical locations and touch and examine the goods. They're not going to get that benefit from an online store.

Try something different. Offer liberal return policies or reduced return shipping

rates. And if you do, make sure they know this right away.

Speaking of Returns

Make it easy to do returns in general. Offer return shipping labels, possibly prepaid postage, along with the deliveries. Or, if you have brick-and-mortar stores, allow customers to easily return or exchange goods in person.

Just remember, though, that all is not lost. Most customers detest standing in line with dozens of other shoppers as they return that sweater in the wrong size or color. Postal returns can be far easier and better as far as services go.

Range of Products

Do you have many items available for purchase? Do your online customers know this? Your e-Commerce site should convince customers that you have vast numbers of products in various configurations, colors and sizes. And that you have 35,000 of them onhand.

Continues on page 39



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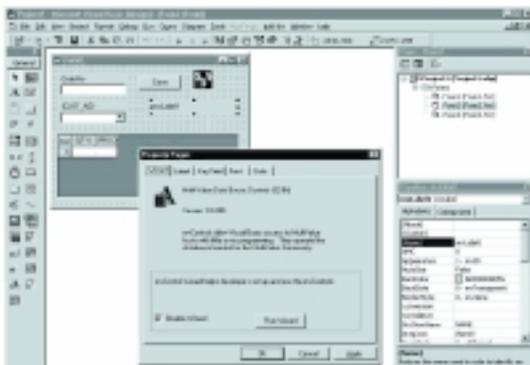
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Webonomics 101

Continued from page 37

Okay, so that might be an exaggeration, but you will have far better odds of success if your customers think that they will have the elusive item that they are seeking. After all, in a physical store, they could always walk up to a clerk, ask about an item, and within minutes walk away with an answer. Your site should be just as easy to use.

Searches

It's thoroughly frustrating walking around and around large warehouses filled with every conceivable variation of a contraption. Fortunately, many online sites offer simple search programs. At the very least, the product lines should be clear.

Regardless of the manner in which your links are organized, you must offer keyword searching. Don't allow pride to convince yourself that your navigation links are so sensible that nobody should need a search field. We simply cannot fathom the odd needs customers might have, so why not just make it as easy as possible for them to do their own bit of discovery.

That should cover most of the impediments to e-Commerce. Of course, you might never overcome that nagging need people have to get out of the house or office. Or talk to people. Or avoid their telephone. At least you'll know, though, that your site is as inviting and serviceable as any brick-and-mortar effort. All you have to do then is hope that it's too rainy and windy outside to venture to a real store.

But, if you're in Southern California, I can't help you there; your site will just have to try harder. 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@eriscorp.com and visited at <http://www.eriscorp.com/>. You can always call him directly at ERIS's Pasadena offices: (626) 535-9658.

Must-Have Palm Accessories *Continued from page 22*

Symbol SPT 1500

The Symbol SPT 1500 is a Palm device that has a built-in bar code scanner (see sidebar on page 22). This device is very useful on retail floors and some warehouses. They are in the same price range of \$500 as other Palms, but since the bar code scanner is already included, you don't have to purchase a second \$300 device.

You also get Symbol Technologies' years of knowledge of warehouse bar coding devices. For those people that would prefer a WindowsCE device, Symbol also has a version that runs WindowsCE instead of the Palm OS.

Symbol SPT 1700

The Symbol SPT 1700 is similar to the 1500 in that it includes a bar code scanner, but it has been designed for harsh environments. The device is heavier than the 1500, but Symbol has designed the 1700 to withstand a drop of up to four feet. It also includes a brighter laser, so scanning bar codes outside in bright sunlight is more accurate.

This device is also about three times the cost of the 1500, but if you need a device that can withstand hard use, paying \$1,300 once instead of \$500 several times within a year because the Palm was dropped off a forklift or ladder, is much cheaper.

There are tons more accessories that you probably can find of use in your company, like GPS or cameras. Take a close look at what's available, and be on the lookout for new devices that are showing up monthly. is

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New Software Developer Brings High-Speed Graphical Access to MultiValue Data

Sunergos Software

Satisfies the Need for Speed

Just outside Salt Lake City lies an interesting phenomenon, a new growing entrant into a decidedly consolidating industry. Originally founded in 1998, Sunergos Software is bringing high-speed graphical access to MultiValue data. Happily married to the UniObjects API, the company with the funny name is the brain-child of CEO James Muir and CIO Bryan Thorell.



James Muir, CEO of Sunergos, says the company launched the MV Central Web site, a comprehensive resource for the MultiValue market, to facilitate growth and interaction within the MultiValue community.

Realizing the demand for graphical applications in the MultiValue environment, the dynamic duo set out to build an application that would broaden the MultiValue market by lowering the steep learning curve of the MultiValue model.

"We first started looking at ODBC as our connection and transfer methodology," Thorell says. "But we discovered right away that the performance was not good enough." Muir adds: "Thank goodness for UniObjects. Bryan discovered version one when it was called UV-Objects and never looked back. We started testing speed early on, and in one case found 'objects to be 47 times faster than ODBC."

Ironically during this time, Thorell became frustrated with the development tools they were using and took a tangent to create HyperEDIT, Sunergos's continually evolving development environment. "I use it every day," Thorell says, "so I feel very connected to our clients that use it."

Sunergos has been progressively building a collection of database administration and development tools for UniVerse and UniData. Sunergos' current offering includes five applications.

HyperEDIT

UniVerse File Manager

UniFind

UniRepeat

And the as-yet-unnamed Subroutine Tester

When asked about the "Uni" prefix on product names, Thorell comments: "We didn't want to become the McDonalds of the MultiValue world by having the Mc-File Manager or Mc-Editor, but as you know, we are very big advocates of UniObjects and we feel that the 'Uni' prefix helps communicate our commitment."

HyperEDIT is an integrated development environment for UniVerse and UniData programmers who are dissatisfied with programming with line- and text-based editors. Unlike other line- and text-based editors, HyperEDIT is a completely graphical environment that (like all Sunergos products) leverages the high-speed UniObjects API common to both UniVerse and UniData.

The UniVerse File Manager is a graphical database administration tool for UniVerse database users who are dissatisfied with traditional command line tools for database administration. Unlike traditional command line tools, the UniVerse File Manager offers an impressive array of functionality that not only makes the MultiValue model more understandable, but also allows virtually all database operations to be performed with the mouse.

UniFind is a nifty search and maintenance tool for both UniVerse and UniData that helps you find a particular string of data within accounts, files, or items. It can search both the DATA and the DICT parts of tables and supports drag and drop to HyperEDIT as well as offering its own grid and text editors.

UniRepeat is another handy utility that provides an easy way to execute repetitive commands in an account or across multiple accounts. Its four-step setup wizard alleviates having to log to each account and perform the same action over and over.

The as-yet-unnamed Subroutine Tester is a clever tool for quickly testing a wide range of input options to a subroutine and the results they produce. Subroutine input parameters can be pulled from a variety of sources including tables, select lists, etc. or randomized.

While Sunergos Software's applications seem to have the developer in mind, Muir notes that while the UniVerse File Manager is primarily used by software engineers, it was originally intended to make things easier for the end user.

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2. Is your company a (check one):

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|---|---|---|
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| <input type="checkbox"/> Consultant | <input type="checkbox"/> End User | <input type="checkbox"/> Other _____ |

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

- | | | | |
|--------------------------------|--|-----------------------------------|--------------------------------------|
| <input type="checkbox"/> D3 | <input type="checkbox"/> Native MultiValue | <input type="checkbox"/> Reality | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> jBASE | <input type="checkbox"/> uniData | <input type="checkbox"/> uniVerse | <input type="checkbox"/> uniVision |

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

- | | | | |
|--|------------------------------------|---|---------------------------------|
| <input type="checkbox"/> Accounting | <input type="checkbox"/> Medical | <input type="checkbox"/> Direct Marketing | <input type="checkbox"/> Legal |
| <input type="checkbox"/> Banking/Finance | <input type="checkbox"/> Dental | <input type="checkbox"/> Construction | <input type="checkbox"/> Retail |
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6. What are your firm's approximate gross annual sales?

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|---|--|
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| <input type="checkbox"/> Over \$1 million - \$5 million | <input type="checkbox"/> Over \$5 million - \$10 million |
| <input type="checkbox"/> Over \$10 million - \$25 million | <input type="checkbox"/> Over \$25 million - \$100 million |
| <input type="checkbox"/> Over \$100 million - \$500 million | <input type="checkbox"/> Over \$500 million |

IS 1/02

The History of MultiValue

Continued from page 14

ed that the print job took eleven hours to spool the output before the printer began to print. Worse yet, while the statements were spooling, no one else could use the system.

In desperation, some dealers sought out rare experts who could program in labor intensive and unmaintainable "machine" language. In the case of the customer with the three thousand statements, for example, the same program written in machine language (assembler) dropped the time to spool the customers statements from eleven hours to three minutes!

So the power was there — but how to unleash it in a practical way was not!

Just in the nick of time to avoid hundreds of lawsuits and "thrown out" systems, a prince of a guy named Ken Simms adapted the Dartmouth version of the BASIC programming language to the Microdata system. Called "DATA BASIC," Simms' invention literally saved the day, and he is the hero of the MultiValue system in many people's minds who pioneered with the system.

From then on, the Microdata programmers had the tools necessary to build maintainable application software to handshake with the incredible Reality English query language. is

NEXT ISSUE: Another Microdata innovation, the "Computer Dealer" distribution channel, continues the dramatic rise of the MultiValue solution.

How Document Imaging

Delivers *the* Goods

for the Transportation Industry

Part 1

Information technology is expanding the role of the transportation and logistics industry beyond basic freight handling, and document imaging and management is proving to be a key component in the drive to address rapidly changing customer expectations

The companies most profoundly affected by the rise of e-commerce and the emergence of the Internet as the primary business and communications tool aren't the ones selling merchandise online, but those that deliver the goods. Forcing a fundamental shift in their industry and the services they are expected to provide, the Net is driving transportation and logistics enterprises of all sizes to develop innovative ways to deliver critical information to customers, accelerating the need for key component technologies like document imaging and management.

As they become an ever more critical link in the supply chain, the focus is on gathering and distributing logistics data that their customers — manufacturers, importers and retailers in every industry — can use to improve the operational efficiency of their enterprise and the fiscal reality at the bottom line.

"Real-time logistics data allows a business to operate more precisely against demand, and sophisticated information architectures where the shipper and the customer systems are highly integrated, that's where the future is headed," explains David DeYoung, president and CEO of Englewood, Colo.-based 1Image Software, a document imaging and management company that grew up in the transportation business.

His customers are backing up their statements about the value of logistics data to their growth and productivity by pouring money into technologies, like imaging, that support increased internal efficiency, data sharing and transparent customer service functions like online package tracking.

"It's ironic, but the net result of e-commerce will eventually be a shrinking of shipping volumes, at least on the business-to-business side," 1Image's DeYoung asserts. "There will be a relative reduction in the need for transportation because, with ERP and supply-chain technology, forecast errors will be reduced."

As a result, package delivery companies are moving at breakneck speed to reshape themselves as masters of logistics, supply-chain management, and warehousing.

"In order to succeed, they must deploy technology and information at a speed that allows them to stay ahead of the decline in traditional package delivery revenue," he says.

While executives in the transport and logistics industry aren't ready to concede any drop-off in volume, they acknowledge the need to go

beyond simply shipping goods from Point A to Point B.

According to DeYoung's customers, sharing logistics data via Web and WAN, offering extended services, and being able to access digital versions of crucial documents like signed proof of delivery forms or bills of lading is no longer just a good idea. Increasing demand for data from internal and external customers in today's wired 24/7 business environment make it a necessity.

"A couple years ago new and old customers were beginning to tell us that if they couldn't track shipments on the Internet they weren't going to do business with us," explains Mark Headrick, director of Information Technology at Atlanta, Ga.-based Benton Express, a regional LTL carrier serving Georgia, Florida, North and South Carolina, Tennessee and Alabama.

Faced with these accelerating customer demands for information immediately upon his arrival in mid-1999, he took up the challenge of improving the company's entire information technology infrastructure, and one of his first major IT initiatives was to take charge of a document imaging and management implementation that had languished for about four years.

Evaluating a large dossier on document imaging and management the company had compiled since 1995, Headrick outlined system requirements based on the guidelines of a network hardware and configuration improvement project underway at the same time, interviewed the top three vendors, and quickly chose DeYoung's 1IMAGE system.

Document Imaging

Continued from page 44

"As part of the larger IT initiative, we were working to improve the intellectual assets of the entire company through the deployment of additional PCs and decreasing network load with more efficient file and print sharing. I knew I needed a document imaging system that would integrate easily with our existing hardware and software and work well across a widely distributed network topology," he emphasizes.

Integrating a SCO-UNIX version of 1IMAGE running on a separate server with enterprise software on a HP-UX box, a half-terabyte RAID 5 disk array stores active data, while

backups are done on a DLT tape drive. However, one of the primary reasons Headrick went with 1IMAGE was the native MultiValue database.

Headrick discovered how painless integration would be when 1image engineer LaQuita Mullins paid a visit. As Headrick did the programming himself, Mullins guided him through the process of inserting the appropriate API from 1image's large library into the application code, and in less than half a day he was serving images to every PC in the company network.

"LaQuita was the another big reason I went with 1image," Headrick says. "After her first visit, I decided she needed to be onsite to

handle the implementation. I told them it wouldn't begin until she was here," he adds.

With 1IMAGE up and running in short order, Headrick had placed the key component necessary to begin offering his customers instant online access to important shipping documents, and began addressing the company's fairly traditional internal goals for document imaging and management.

Their first goals were to make the best possible use of manpower and track critical documents. Since the shipping process generates a steady flow of legally binding documents that must be archived for up to three years to handle potential customer claims, and their customers also require proof of delivery and bills

Trucking Company Benton Express Implements Wireless Solution from Strategy 7 Corp. and Brience

FOR BENTON EXPRESS, a Less-Than-Load (LTL) regional trucking company from Atlanta, Ga., keeping track of its tractors, trailers, drivers, loads and customers is central to its business success. Benton depends on technology to help them manage these complex and rapidly changing dependencies. Its custom-written UniVerse-based transportation system has been refined for nearly two decades and is used by Benton's dispatchers, customer service representatives, drivers and customers to track key data points related to shipments.

Benton had evaluated truck-based communications such as Qualcomm's satellite-based system that relays messages to and from the trucks including GPS positional data. The Qualcomm system, while effective, was also very expensive to support and maintain and required expensive truck-based satellite transceivers.

Mark Headrick, IT director for Benton, recognized that Benton's drivers carried Nextel cellular radios with them while on the road. These devices were selected for their ability to provide inexpensive voice communication for the drivers, but Headrick recognized that for a \$10.00 additional service charge per month, these devices could be used for truck-based data communication as well.

The challenge lay in building the wireless application that would run on the Nextel phone and connect directly with the UniVerse-based applications running at HQ. The applications would need to be very simple and easy to operate.



© 2001 Benton Express Inc.

Trucking company Benton Express stays competitive by incorporating up-to-the-minute document imaging and wireless technology.

Benton turned to Strategy 7 Corporation for the answer. Strategy 7 is a seasoned and successful provider of UniVerse products support, with expertise in middleware and Internet strategies. In addition, Strategy 7 is a pioneer in the area of wireless application development.

Based on the analysis of Benton's present and future needs, Strategy 7 Corporation recommended the Brience (www.brience.com) wireless application platform. With Brience, Benton was able to re-use and leverage the Java-based code it had already written for its Web-based E-tracking system. This significantly reduced the development time required to create a working wireless application. In addition, Brience's ability to support over 350 devices including the Nextel phone was key in the decision.

Benton's first application is for delivery confirmation. As the truck driver departs the terminal with his load, he is given a Nextel phone to carry. The URL to the wireless delivery application is a bookmark on the phone so that

the driver need only press one button to view the shipments for the day. He can then scroll up or down to select the shipments.

From the next menu, the driver can select the order number and a list of recent receivers (signatures) is displayed for that shipment. The trucker can then select the correct receiver and the system back at HQ is updated with the delivery confirmation complete with date, time, signature, etc. This information is updated to the dispatch system in real time, which also updates the Internet immediately.

The application itself is simple and the engine used, Brience, allows it to be easily customized to fit the unique needs of nearly any delivery company. While Benton chose to use the Nextel telephones, the application can also support other devices including handheld computers with bar code scanning and magnetic stripe readers for extended function and convenience.

Another interesting feature is that this application can interface with Voice gateway products that allow navigation of the application with pre-recorded or synthesized voice prompts and voice recognition or touch-tone input. Benton Express projects costs savings due to avoidance of Qualcomm infrastructure costs as well as internal process cost reductions to be well in excess of \$250,000 in the first six months. Delivery confirmation is but the first of many applications slated for Benton Express as it seeks ways to cut costs, improve service and run a leaner business in these challenging economic times. **is**

of lading for their invoices, they desperately needed to eliminate the many hours wasted requesting and re-requesting documents, retrieving and faxing them back and forth across the country.

"It was an absolute nightmare," Headrick says. "Now, not only can they view the important forms and signatures on our network, but when we print the invoices, all of the necessary documentation prints right behind the invoice, we slip it an envelope, and we're done."

He also discovered that Benton Express' partner Muir Cartage, a national Canadian LTL carrier, was hearing similar rumblings from their customers and wanted to piggyback onto the new system.

"Some of our partners, like Muir Cartage, have added a link to search documents on our system on their Web site and we've added a link to their system on ours," he says. "They're becoming partners in technology as well as business."

With employee productivity on the rise and expanded use of the system to improve other processes in the offing, Headrick's opinion of document imaging and management technology couldn't be any clearer: "I think our company would be completely lost if we took the imaging system away from them now."

To Image's DeYoung, this is a clear indication that transport and logistics companies are subordinating their individual business plans and identities to become not just integrated service partners, but by extension a more integral part of their various customers' supply chains.

"They are really all part of a big chain — customers, warehouses, suppliers — that allows all the trading partners, independent of their internal resources, efficient interaction with the supply chain," he states. "This is a dramatic change, and we are only in the infancy of understanding how to do it really well."

As a direct result, carriers are becoming full-blown partners in the success or failure of businesses whose supply chains have become almost entirely digital.

"A couple of years ago, Web-based tracking of shipments was a big deal, but now everybody has to do it, or else," DeYoung says. "Shipping companies are being called on to do much more. Not just shipping and tracking,

but sourcing products and rerouting loads. They are learning that they need to help companies manage their inventory in motion and the warehouse as well."

Such broad offerings have meant swift deployment of Internet technology in the shipping market, not only by carriers, but also by their business customers. The growing variety of logistics offerings from companies that once focused solely on shipping are also driving their customers to make crucial decisions about the role that each carrier will play in their supply chains.

The problem with logistics outsourcing for manufacturers and retailers is that they no longer reap the tiny profit margins made in each part of the shipping process. Since an efficient retailer makes a tiny profit at each step, from processing orders and warehousing stock to shipping and delivery, carriers offering logistical functions as part of their larger portfolio of services must demonstrate value through cost savings equal to or greater than the small margins their customer is surrendering.

"Despite the loss of incremental profits due to outsourcing, most of the world's largest companies, and plenty of small-to-medium businesses as well, are outsourcing most if not all of their logistics process," DeYoung says. "This is happening because the key technologies that make it possible, like document imaging and management, are finally mature and affordable enough to deliver the goods."

N E X T I S S U E : How transportation and logistics company Gilbert West went from "virtually nothing" in the way of IT, to a large WAN infrastructure involving all of its facilities and a number of its customers. Today, using up-to-the-minute data from Gilbert's network, customers can check invoices, obtain proof of delivery, receive rate quotes, and view other critical shipping documents. is

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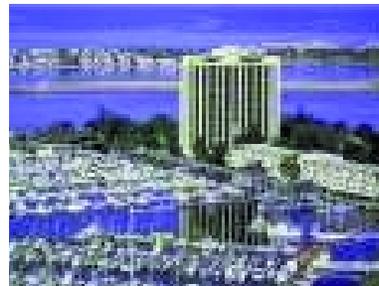
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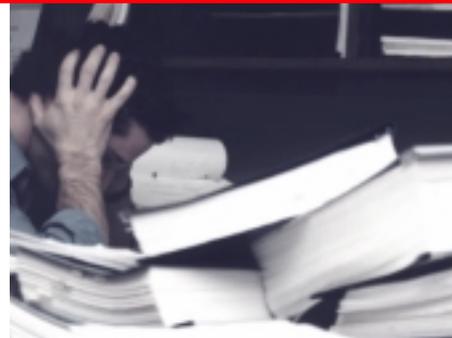
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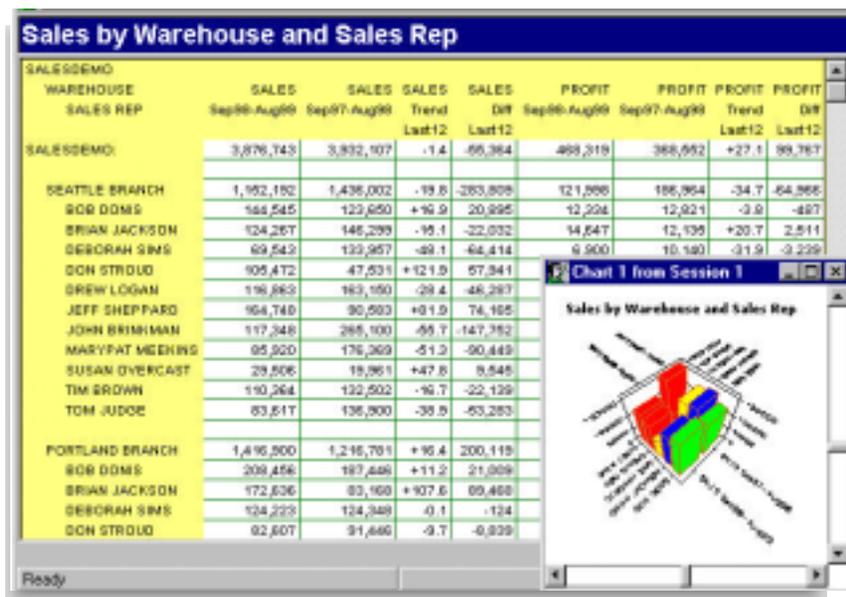
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