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THE BUSINESS COMPUTER MAGAZINE

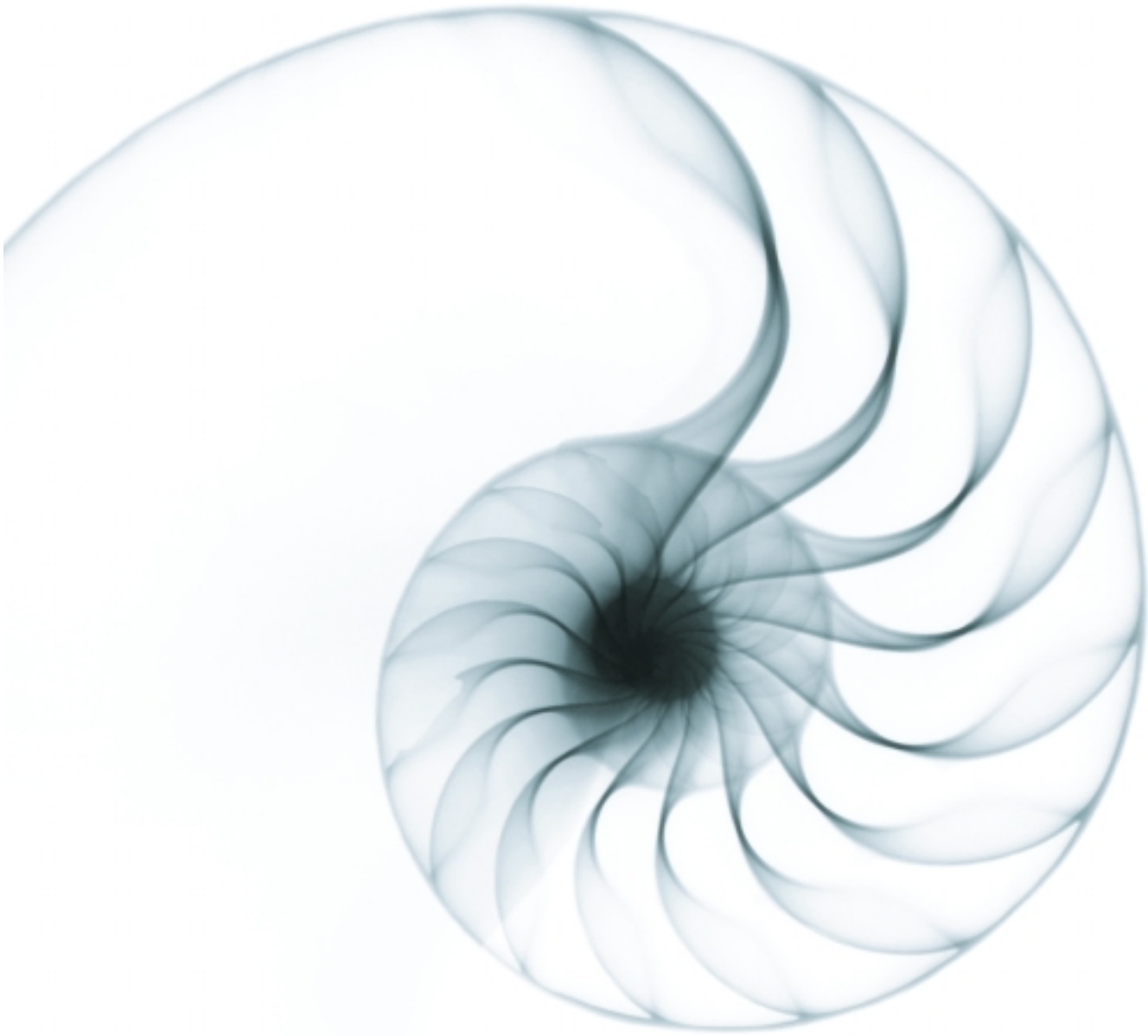
MARCH/APRIL 2004 • AN IDBMA, INC. PUBLICATION

INTERNATIONAL SPECTRUM MAGAZINE'S

20th

ANNIVERSARY

20 Years of Milestones, Hallmark Events and Highlights in the MultiValue Market



"THEY BELIEVE DESIGNBAIS WILL....SIGNIFICANTLY IMPROVE YOUR WEB DEVELOPMENT PRODUCTIVITY, SIGNIFICANTLY IMPROVE YOUR PROFITABILITY, IMMEDIATELY TURN YOUR MULTI-VALUE DEVELOPERS INTO WEB DEVELOPERS"

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Happy 20th Anniversary Spectrum Magazine!
Thank you for your continued support of the PICK market.

I Love My UniVerse, UniData or D3 Database But ...

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- **How Can I Adopt the Latest Development Tools?**
- **How Can I Access a Larger Pool of Development Resources?**
- **How Can I Meet My Company's Evolving Business Needs in a Timely Fashion?**
- **How Can I Do All This and Still Protect My Investment?**

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PickDP.NET will enable your Pick-based applications (UniVerse®, UniData® and D3®) to embrace Microsoft Visual Studio .NET Framework for the development of Client/Server, Web Applications and Web Services.

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- Simplify complex and time-consuming programming tasks for building and deploying mission-critical applications for Client/Server, mobile devices, the Web, and Web Services.

By combining PickDP.NET with Visual Studio .NET, software developers can leverage their existing application code while extending the intrinsic capabilities of the Pick data model. PickDP.NET is available today for UniVerse, UniData and D3.

Raining Data's goal is to advance the Pick market as a whole and to provide greater access to this technology. In order to allow jBase and Northgate users to take advantage of PickDP.NET and .NET development, Raining Data is currently offering free license upgrades to D3 (for a limited time only and subject to certain terms and conditions).

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Cover Story

RETROSPECTIVE: SPECTRUM MAGAZINE CELEBRATES 20 YEARS OF PUBLISHING

8 The March/April 2004 issue of *International Spectrum magazine* marks 20 years of continuous publication. A look back at memorable highlights throughout the magazine's history.

DEPARTMENTS

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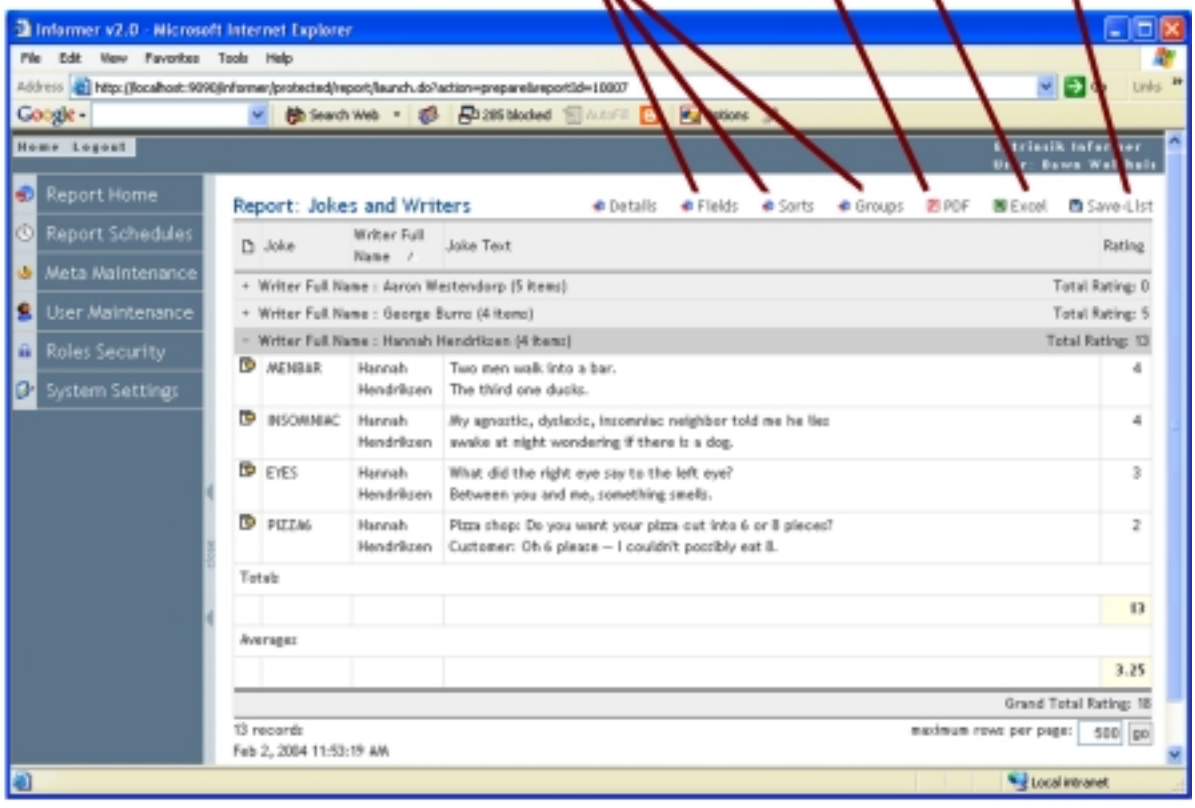

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With this issue, *International Spectrum* magazine celebrates 20 years of continuous publication. The first issue of the magazine was unveiled in March 1984 at the International Spectrum show at the MGM Grand Hotel in Reno, Nevada.

Originally, both the Spectrum Show and the magazine were going to be called Pick Spectrum, however, in 1983 Pick Systems objected to the use of "Pick" in the name. Because of that and because the Spectrum shows were broadened to include annual events in London, Sydney and Paris in 1984, the name International Spectrum was selected.

As we looked at 120 issues of the magazine spread out on every available work surface in the office to prepare for this anniversary issue, a ton of memories poured off the pages. In the beginning, the magazine was produced the old-fashioned way — using typesetting, manual page layout galleys, even some rub-on letters and tape lines of varying point sizes.

I bought an Apple Macintosh with McDraw for our design group shortly after we started the magazine, but even our own people expressed the sentiment of the times, "What are we supposed to do with that thing?" Fortunately for me, Quark came along with the ability to do rudimentary page layouts, and a glimmer of the future emerged. Hard to imagine with today's 100 percent electronic process.

Not coincidentally, the cover story of that first issue was entitled "The Computer: "Friend or Foe" — a recognition that in 1984, too many people in the workforce had to be "convinced" that the computer represented an advance over pen and paper.

You'll get a kick out of knowing about another item in that first issue of the magazine — a controversial editorial expressing the worry that the Pick-based system was in danger of becoming extinct like the dinosaur. The editorial had a now famous typo referencing the "Dick-based" computer system, which even today some people do not believe was an honest pre-spellchecker mistake.

We hope you'll enjoy the look back at "what was happening then" in the 20th anniversary review inside this issue. I'll bet that 20 years from now the editorial will be "is the MultiValue market growing or shrinking?" I know that's still the question today.

— GUS GIOBBI, CHAIRMAN, IDBMA, INC. —
gus@intl-spectrum.com

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MARCH/APRIL 2004

MISSION STATEMENT *International Spectrum* magazine's editorial mission is to be the premier independent source of useful information for users, developers, and resellers of MultiValue database management systems, open systems business database solutions, and related hardware, software, and peripherals. Published bimonthly, *International Spectrum* provides comprehensive coverage of the products, companies, and trends that shape the MultiValue marketplace as well as the computer industry at large — helping its readers get the most out of their business computer systems.

IDBMA's *International Spectrum* is published six (6) times per year at the subscription price of $40.00 U.S. in the U.S.A.; $45.00 U.S. in Canada and Mexico; $50.00 U.S. for other countries. Single copy rates are $7.00 U.S. in the U.S.A. and Canada, and $9.00 U.S. in all other countries. *International Spectrum* is published by IDBMA, Inc., 311 4th Avenue Suite #513; San Diego, CA 92101; Tel: 619/515-9930; Fax: 619/515-9933 **E-Mail:** requests@intl-spectrum.com; **Website:** http://www.intl-spectrum.com.

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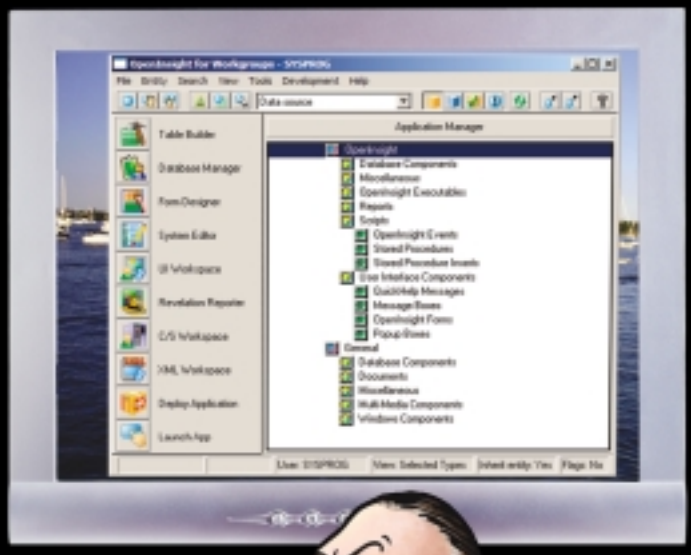
NEWS RELEASES/UNSOLICITED ARTICLES
International Spectrum is eager to print your submissions of up-to-the-minute news and feature stories complementary to the MultiValue marketplace. Black and white or color photographs are welcome. Although there is no guarantee a submitted article will be published, every article will be considered. *International Spectrum* retains all reprint rights.

HOW DO YOU REMEMBER REVELATION?



If you remember Revelation as an 80 x 25 monochrome screen, look again.

We're now a full 32-bit GUI environment. We have a Form Designer to create GUI windows, a Report Builder to create impressive reports, Table Management tools, a great Editor and Debugger, Data Warehousing tools, a User Interface tool, and lots more.

While you were away, we also developed powerful XML, Palm and Wireless tools that get your MV data out to the world easily and quickly. We also developed JOI, our Java-based product for MV data. Did we mention that we support Unicode and that EFIGS (English, French, Italian, German, Spanish) versions of all core screens were in the latest version of OpenInsight (OI)? Did you know OI also provides native connections to U2 databases? You can have "Green Screens" going against the U2 database while using OI's GUI tool set to look at the same data at the same time!!

Our software runs on any PC out there that can run Windows – no special hardware required. And we still bundle the tools and database together.

For more information on Revelation's flagship product, OpenInsight, or to put a new face on your legacy multi-valued database, visit www.revelation.com/intl-spectrum/ishome.

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Retrospective:

Spectrum Magazine Celebrates 20 Years *of Publishing*

Time flies when documenting the happenings in a market as unique as the MultiValue market. This issue marks the 20th anniversary of *International Spectrum*, a publication founded by Gus and Monica Giobbi in 1984 to chronicle the Pick (now known as MultiValue) market. Coming into existence after the International Spectrum exhibition and conference, which was inaugurated in 1982, the magazine was dedicated to spreading the word about Pick, raising its profile in the computing industry, and keeping users of Pick-based products informed of the latest products and news.

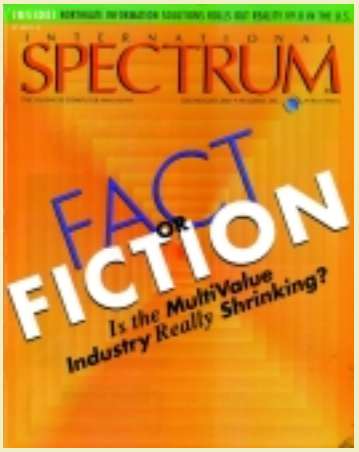
Over the years *International Spectrum* evolved into the Business Computer Magazine to highlight a major strength of the MultiValue market — its multitude of mature, seasoned

business application software—as well as the companies and colorful personalities that make up the fabric of the MultiValue market.

Akin to reminiscing through an old photo album, looking back over 20 years of magazines, one can see the changes unfolding—some gradual, some sudden—and the sheer magnitude of how much the market has changed. Many of the players one used to see on a regular basis in the magazine are long gone. The Ultimate Corp., Prime Computer Inc., Sanyo/Icon International, Stratus Computer Inc., Sequoia Systems Inc., Altos, and Microdata are among many companies that are no longer a part of our lexicon. Some companies have changed their name and their mission but have kept their MultiValue core, while others have been swallowed through acquisitions and mergers.

On a happy note, the market—like the technology itself—has grown remarkably, surviving many changes and still thriving in some of the top companies in the world. On a sad note, many of the people who graced the pages of the magazine in its early years are no longer with us, among them the man who inspired it all: Dick Pick, the originator of the Pick System.

Here, in the Spectrum Hall of Fame, we highlight major stories, hallmark events, and interesting footnotes from 20 years of publishing.



The First Issue

1984 It's very telling about the very nature of this market that the inaugural issue asked "Is Pick Dead?" 20 years later, that question is still omnipresent. In the March/April 1984 issue, the article was entitled "Pick Operating System: Dinosaur or Phoenix?" In the July/August 2001 issue, the question was again posed in the cover story "Fact or Fiction: Is the MultiValue Industry *Really* Shrinking?"

Spectrum Milestones

1985 History has a way of repeating itself. The January/February issue covered the Spectrum show's debut overseas; Spectrum Europe was held in London and Spectrum Pacific Rim was held in Sydney. In 2003, after a 15-year absence, the Spectrum shows were welcomed by an enthusiastic audience when they returned to London and Sydney.

A major event in the PICK market that year was the founding of the Spectrum Manufacturers Association (later changed to Pick Spectrum), an organization whose goal was to create a consistent and unified market image for the operating environment and add value to the operating environment thereby resulting in increased market share for member companies.

Leonard McKenzie, the founding chairman of the Directors of the Board and then chairman and president of General Automation, explained the reasons for the formation of the group:"We had to overcome the obstacle of being viewed as a 'fragmented' industry. Every manufacturer had a dif-

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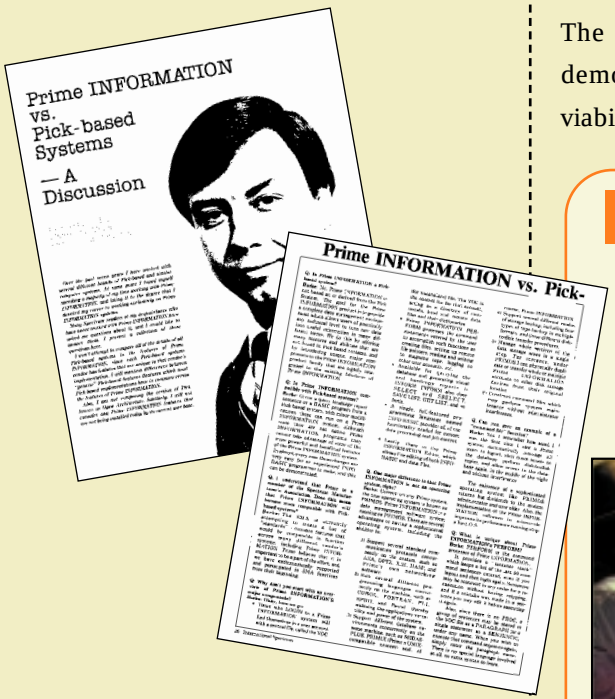
ferent name for its product line, and applications were more company and product-specific than they were transportable business solutions."

Also the debut of UniVerse from VMark Software made waves in the market and was the beginning of a whole new era. VMark Software was founded in February 1984 by six distributors in the Prime/Pick community. The intent was to take advantage of the growing UNIX marketplace by using advanced computer hardware and software to leverage sales of their applications software.



In the article "Prime INFORMATION vs. Pick-based Systems," the Pick System was pitted against Prime INFORMATION from Prime Computer Inc. Readers got a feature-by-feature comparison of the two database information systems.

SPECTRUM Hall of Fame

1987 The September/October issue celebrated "1 Million Served." The millionth user of a Pick System demonstrated the success, growth and viability of the product.

1988

Advertisements sure have changed—for the better. Shown: An ad from now defunct The Ultimate Corp.

1989 The January/February edition recognized the first Person of the Year, a feature that became the highlight of each year's January/February issue for many years. Leonard McKenzie, who was chairman and president of General Automation, was deemed the "most influential" for being the driving force behind the formation of the Spectrum Manufacturers Association.

The March/April issue also initiated the first "25 Most Influential" feature, a "who's who" in the Pick industry that recognized 25 individuals who had made an indelible imprint on the industry in some way.

Also, this was the year that UniData was introduced into the market, a relational database management system based on UNIX. Founded by Ming Yue, Unidata's goal was to create the next-generation relational database platform.

Continues on page 12

Congratulations Spectrum magazine on your 20th Anniversary!

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With a pedigree of extensive and continuous product innovations and enhancements stretching over three decades, Reality V10.0 matches this incredible track record with an impressive array of powerful new tools and features.

Many new capabilities are available as part of Reality V10.0, including:

- Graphical Administration – a graphical front end to the Reality Database enabling ease of system administration
- Rapid Recovery – an additional resilience option which significantly reduces recovery time after system failure
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- Open Integration – Reality V10.0 participates in distributed transaction processing environments

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INTERNATIONAL SPECTRUM MAGAZINE'S 20th ANNIVERSARY

SPECTRUM Hall of Fame

1990 The March/April issue took a look at how computer professionals' salaries shaped up in the Pick industry. The marriage between AT&T and Pick Systems—PICKTel—was a main feature in the November/December issue.

1991 The 25 Leading Pick Software Developers chronicled some of the best and brightest software developers the Pick market had to offer. The software developers were celebrated for their role in perpetuating Pick forward and recruiting new Pick users to the fold with their rich, functional software packages.

1992 Back then, IBM's role in the Pick industry was primarily as the manufacturer of the RISC System/6000 (RS/6000), a leading hardware platform in the Pick market. What a difference a decade makes: Today, as well as being the owner of the UniVerse and UniData database management systems, IBM is a solution partner with many companies in the MultiValue market.

The September/October issue featured "Pick on the PC," a concept that was pretty new. Some industry observers doubted that PCs would have the power to deploy Pick applications.

1993 Another salute to the best: The top 20 salespeople were chosen as representatives of an important force in the Pick market whose job it was to pitch Pick products against the competition and overcome Pick's perceived shortcomings.

In the September/October issue, *Spectrum* covers Apple Computer Inc. taking a bite of the UNIX market.

1994 The January/February edition saw the first "Woman of the Year," Honor Guiney of Stauffer Information Systems.

The "Top 10 UNIX Distributors That Sell Into Pick" identified major movers of PICK-based products. This was also the year that "client/server," now a standard technology, emerged as a new catchphrase.

1995 The World Wide Web arrived with a roar and *Spectrum* targeted its coverage to show the MultiValue segment how they could apply the technology.

The "Legacy Applications: Migrate or Integrate Debate" raged on, with Pick users weighing the pros and cons of staying with their legacy applications and integrating new technologies or moving on.

1996 The MultiValue symbol and label emerges. The MultiValue

logo was designed and unveiled with the March/April issue. The intent of the symbol and term "MultiValue" was to identify and unify under one symbol all the products and services that have the underlying Pick technology of multivalues or are compatible with it. Since its introduction, "MultiValue" has become an oft-used and accepted term and the logo graces product literature and advertisements of companies in this marketplace.

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INTERNATIONAL SPECTRUM MAGAZINE'S 20th ANNIVERSARY

SPECTRUM Hall of Fame

New technologies and how to integrate them with your MultiValue applications came to the forefront. "Data Mining: 'PICK'ing Your Way Through a Mound of Information" showed how MultiValue applications could be integrated with data mining technology and what the benefits would be.

1997 MultiValue technology continues to expand its horizons. Windows becomes a major consideration for MultiValue developers.

1998 The Top 10 MultiValue Crusaders were lauded for their unfailing support of the MultiValue cause, making the effort to keep the best database model alive, well and growing.

1999 Spectrum breaks down e-Business—informing users on how to do business on the Web, extending their enterprise into a worldwide economy. The focus shifted from on-line consumer shopping to business-to-business communication and processes on the Web.

The onset of Y2K was a topic on everyone's minds. What would happen to the world's computer systems when the new millenium dawned? What a relief that much of it was a lot of hype that never panned out.

2000 Application Service Providers (ASPs) presented a new twist on the timesharing concept, with the promise to revolutionize the industry. Application Service Providers asked the question: "Why own the hardware and the software when you can rent it on an as-used basis; get rid of the administration burden; and do it all for less money?"

No stranger to change, the MultiValue market experienced several major shifts this year. The market watched what would happen with the recently announced buyout of Pick Systems by a group of investors that included former company leaders. In 2000, Pick Systems purchased the database business of GA eXpress. General Automation departed the MultiValue database business and

refocused on e-business solutions, raising questions about the fate of GA's many MultiValue-based database products.

As a result of a new business strategy, Pick Systems also announced the termination of distribution contracts with its top three distributors. It was a radical change for some Pick customers — many of whom had depended on a distributor for years—to adjust to.

The market also continued to keep watch on the merger of Informix Corp. and Ardent Software that brought the UniData, UniVerse and DataStage products under one umbrella.

2001 PDAs began to be looked at as a way to stay connected to the home office, taking business on the road.

Big Blue made big news in this market when it acquired Informix along with the UniVerse and UniData databases in a billion-dollar deal. The MultiValue community wondered about the acquisition's effect and what it would mean to the market. In some circles, the acquisition was viewed as good news, bringing credibility to the table. Others speculated about the future of the U2 databases — would they continue to be developed and supported? Since that time, IBM has continued to support the U2 products and have played a visible and active role in the MultiValue market.

2002 Microsoft's .NET came on the scene and this article fully explained its philosophy and capabilities. It was predicted that .NET would make it easier to program with industry-standard technologies against MultiValue and other legacy systems using standard middleware techniques.

2003 A real reflection of its tried and true value, MultiValue is a natural fit for newer technologies such as XML (Extensible Markup Language]. MultiValue users found that XML handles multi-values as a matter of course, leaving them in a great position to capitalize on this technology.

Clearing the confusion surrounding Web Services and .NET, this article zeroed in on the technology from a MultiValue perspective to see how it fits with MultiValue technology.

2004 Living up to its mission as the "Business Computer Magazine," *Spectrum* covered issues that concern businesses such as the newly passed federal spam laws. Readers learned what they could and couldn't do under the CAN-SPAM act.

newsmakers

Revelation Software Welcomes Canadian Authorized Training Center

Megamation Systems is the latest in a growing number of Revelation Authorized Training Centers (ATC). Revelation Software, a leader in advanced tool suites for database application developers, announced it has authorized Megamation Systems as a new training center in Toronto, Canada.

Megamation Systems was incorporated in 1986 and has been a developer of materials and maintenance management systems using all of the Revelation products.

"The advancements in our flagship product, OpenInsight, have been monumental over the past two years," said Mike Ruane, Revelation's president and CEO. "Our clients and partners in Canada are thrilled at the opportunity to attend training in their own backyard."

"Megamation is pleased to be an authorized training center for the OpenInsight software suite and looks forward to educating clients on the many advanced features of Revelation's products," said Bob Mutch, president of Megamation Systems.

Class schedules and information can be found at www.megamationsystems.com.

There are 12 Revelation Authorized Training Centers located in the United States, the U.K., Australia and Canada. Organizations interested in becoming an Authorized Training Center should contact Revelation Software directly.

Zumasys Offers Network Security Assessments

A firewall is only as good as the data it examines and the quality of the rules it applies. Does your security plan protect you from internal attacks, social engineering or poor network administration? Zumasys offers a comprehensive Network Security Assessment to help you plan, design, implement, and operate high-demand security safeguards. Its our goal to:

- ◆ Determine your level of compliance with existing laws and security policies and procedures
- ◆ Obtain an accurate security profile of essential information systems
- ◆ Identify areas of weakness in your technology environment

Zumasys Names Joe Goebel as Chief Operating Officer

Former E*Trade Executive Joins Fast-growing Solution Provider

Zumasys Inc., a national systems integrator and a recognized leader in wireless mobility solutions, has appointed Joe Goebel as the company's chief operating officer.

Goebel, 40, a long-time advisor to Zumasys, has extensive executive management and IT experience. Goebel served as executive vice president for Loans Direct, a Huntington Beach-based financial services company, which was acquired by E*Trade Mortgage. Under his leadership, Loans Direct grew from 25 to 280 employees, built a nationally recognized Web site, and ranked #2 overall and #1 for customer satisfaction by Gomez.com. As a director at E*Trade, Goebel's division continued to add employees, growing from 280 to 620 people during 2001-2004.

"We are confident in Joe's leadership and vision for Zumasys as the company enters its next stage of development," said Paul Giobbi, president, Zumasys. "His extensive experience as an accomplished and respected operational leader makes him an excellent choice to head our technical services group."

Commenting on his new role, Goebel said, "I'm excited about the opportunity to be joining Zumasys as it starts to realize its full potential. As we move forward, I am committed to delivering value through close teamwork with our employees, customers and partners worldwide as we continue Zumasys' leadership in wireless mobility."

Goebel earned his bachelor's degree in Environmental Engineering from UCLA and played football as a four-year letterman and team captain, participating in three Rose Bowl Championships. Goebel was Academic All-Pac 10 and later was drafted 10th round by the San Diego Chargers. Joe Goebel can be reached at (949) 334-0322 or via email at joeg@zumasys.com.

◆ Make recommendations in order to mitigate risk and attempt to eliminate vulnerabilities

◆ Demonstrate due diligence and commitment for protecting critical information assets

Zumasys' security engineers offer matchless know-how in everything from risk assessments to large-scale security implementations, the company said. Trained in relating the technical aspects of security to strategic business goals and concerns, these security professionals apply specialized skills and in-depth experience to help you identify and deploy both the technologies and the management practices required to secure your networks against the threat of doing business in the 21st century. Zumasys has a proven track record with a broad cross-section of service providers and enterprise clients.

Zumasys Announces 2003 Financial Results

Orange County-based Systems Integrator Grows 702% in Four Years

Zumasys Inc. reported financial results for 2003. Revenue for the year was $5.1 million, a 22 percent increase over 2002, bringing the company's four-year growth rate to 702 percent. Founded in September 2000, Zumasys is a national systems integrator and a recognized leader in providing wireless data solutions for remote application access over cellular-based Internet connections (i.e., 3G Wireless).

Key highlights of 2003 included:

◆ Continued expansion of vendor relationships. The company more than doubled its sales with Hewlett-Packard and Citrix Systems in 2003, achieved Panasonic TP3 affiliation, and expanded its partnership with its single biggest vendor, IBM, to include its FAStT Storage Area Network (SAN) products, IBM WebSphere and IBM Lotus Notes/Domino. Additionally, Zumasys added reseller relationships with NetMotion Wireless, Synchrologic, St. Bernard Software and Symbol Technologies.

◆ Expansion of technical team. In response to growing customer demand, Zumasys hired Dale Schultz from Del Taco as Help Desk Manager and April Russo as Call Screener. In May 2003 the company implemented OnContact CRM, a call tracking software package that allows technicians to better track and respond to technical inquiries. Zumasys also promoted longtime manager Jay Otto to the position of vice president of Professional Services.

"Zumasys delivered all-time high revenue in 2003 as we leveraged our existing businesses, expanded our 3G wireless mobility initiative, and added some exceptional talent

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to our technical group," said Paul Giobbi, president of Zumasys. "Because of our constant focus on wireless mobility and execution against this vision, we are gaining recognition, closing deals and winning new clients such as Farmers Insurance, American Golf Corporation, Lindora Medical Clinics, Gardenburger and Conexant Systems."

Zumasys is a national information technology services and solutions company. Zumasys combines expertise in systems integration, outsourcing, wireless mobility, server technology and consulting execution to help more than 10,000 users across North America access their critical applications and databases on demand "any place, any time, over any connection."

jBASE Appoints Peter Loveless as CEO

jBASE International Inc. is pleased to announce, with immediate effect, the appointment of Peter Loveless to the position of Chief Executive Officer.

Loveless comes to jBASE from Financial Objects PLC where he was the executive director of a financial software company. Utilizing his vendor experiences in worldwide markets including North America, Asia, Europe and Africa, he will lead the company through its next phase of growth.

"Peter's reputation as an accomplished leader and his proven ability to build teams and relationships with both personnel and a client base were fundamental in the selection process carried out by Mpower1, jBASE International's parent company, during the past few months," said Simon Theobald, director of Mpower1. "With our leadership team now in place, we are ready for the growth that our world-class technology will drive."

Loveless is looking forward to building on the wealth of experience that has existed within jBASE for many years and the new experienced personnel recently added. "With jBASE, I have found a company with a solid business model, the right team and technology in place, and a strong opportunity for success," Loveless said. "Unquestionably, a very bright future awaits us as we aggressively pursue expanded market penetration for our portfolio of world-class products. I am proud and excited to be taking the lead for what will certainly be an important next stage in jBASE's history."

Of particular importance to Loveless is continuing to develop and enhance the relationships with jBASE Partners and Value Added Resellers. "jBASE International is committed to helping our business partners bring their products to the global marketplace."

Loveless concluded by saying, "My goal is to expand on this foundation and to find new ways to make our partners more successful."

Dave Bryant, previously the CEO at jBASE International, will continue to work for jBASE in a senior business development capacity in the Australian, Pacific Rim and other markets, recreating his successes in that role during the early years of jBASE in North America. "I look forward to working with Peter and helping jBASE achieve the potential that clearly exists," Bryant said. "Now the restructuring is complete and we will be focusing on developing new business opportunities and further strengthening our market leadership."

About jBASE International

jBASE International is a leading supplier of database management software and Web enabling tools for developing, deploying, and maintaining business applications solutions. The flagship product, jBASE, was designed from the ground up to be an open database product that would bring the strengths of MultiValue technology into the mainstream computing market. With exclusive worldwide distribution rights, jBASE International offers technologies and assistance that allow businesses to thrive into the future. **For more information, visit their Web site at www.jbase.com.**

GA Services Approved as IBM Business Partner

GA Services Can Now Offer Server Consolidation and Competitive Upgrades with Industry-leading Servers from IBM

GA Services LLC, a premier enterprise solutions and services provider for the open systems marketplace, has been approved as an IBM Business Partner. In partnership with Agilysys, a leading provider of enterprise computer solutions, GA Services delivers advanced server solutions designed to provide the small to mid-tier companies with affordable comprehensive business services.

"This agreement will enable GA Services to offer a variety of integrated solutions designed specifically to help our customers maximize their IT investment, and should be part of our customers' overall business systems plan," said George Harris, president, chief executive officer and co-founder of GA Services. "With the addition of the IBM product line to our existing products and professional services offerings, we can address our customers' growing demands for state-of-the-art business solutions. GA Services has proven expertise in open hardware environments, network integration, planning and design, remote network enterprise management services, security, network computing and storage solutions."

About GA Services

GA Services LLC is a national premier enterprise solutions and services provider for the open systems marketplace offering seamless product and service solutions to manage all aspects of information technology. From professional IT consulting and design, to integration and implementation, to services management, GA Services provides proven abilities in critical areas such as client, network, server and storage technology, and brings many years of experience in offering cost effective solutions. GA Services is headquartered in Irvine, CA, with sales and support throughout the United States. **For more information, visit www.GASLLC.com or call 1-949-752-6515.**

About Agilysys

Agilysys Inc. is one of the foremost distributors and premier resellers of leading enterprise computer technology solutions from HP, IBM and Oracle, as well as other top manufacturers. The company has a proven track record of delivering complex servers, software, storage and services to resellers and corporate end-user customers across a diverse set of industries. Headquartered in Cleveland, Ohio, Agilysys has sales offices throughout the U.S. and Canada. **For more information, visit its Web site at www.agilysys.com.**

BY TONY GRAVAGNO

WEB SERVICES AND .NET, PART 3, MULTIVALUE TOOLS

In my first article I introduced the concepts of Web Services (WS) and .NET. The second article, "Research Before Development," shifted the focus toward Web Services, with .NET being just one implementation option. In this third installment of a four-part series, I provide examples of tools available to the MultiValue (MV) market for development and deployment of Web Services. Note that asterisks* indicate more material is available at http://Nebula-RnD.com/Spectrum, where I also provide links for all tools and products mentioned here.

Those in the business of building tools should realize that there are opportunities for more end-to-end tools in this market.

Tools facilitate development and deployment. If you don't mind writing a lot of code to handle small details, you may not need to buy any. In fact many Web Services are developed with freely available tools. However, you should weigh overall development costs, including time, against the cost of tools, to ensure that development funds are spent wisely.

Currently, few tools exist for MV/WS development. Seeing the plethora of tools available in the "mainstream"* world, I believe we are missing opportunities. Web Services are huge*, and rapidly growing larger as major companies worldwide continue to invest heavily. Those who provide tools today stand to reap the rewards for anticipating demands of tomorrow. Those in the business of building tools should realize that there are opportunities for more end-to-end tools in this market. Developers shouldn't be discouraged: writing WS for MV environments isn't plug-and-play yet, but it's not rocket science either, and this article will help get you started.

The SOAP Gateway – Cromwell Business Systems (U.K.)

As a leading IT supplier to the independent electrical retail sector throughout the U.K. and Ireland, with an end-user base of over 3,500, Cromwell originally developed the SOAP Gateway in collaboration with Software AG to integrate Web sites with their own MV application, and later totally re-developed it for resale. The SOAP Gateway is primarily a toolkit for B2B integration with MV applications, but also Web sites, GUI, and intranet applications. At design time, the software uses character-based screens for designing a document schema — this is the definition of the XML tags to wrap around data. In production, updates to the database trigger the engine to assemble data according to the defined schema, and transactions are queued for transmission. The data is transmitted over HTTP(S), FTP, or SMTP (e-mail). Application developers don't need to get involved with packaging/messaging protocols* like SOAP, or transport protocols. Cromwell didn't stop at building and sending data, they also built-in load balancing and MessageQueue-like* guaranteed transaction delivery. (Capacity Planning* is a big deal these days.) Plus, the SOAP Gateway functions as both client and server. As you'll see, these features are unique in our market.

Over three years of research and development are invested in this software so far. At a time when most people are still wondering what a Web Service is, this is a testament to Cromwell's forward thinking. If you need to create a solution quickly, this option should be considered for a minimum learning curve and a minimum of coding.

Capillary – Steve Lake – Royal Liverpool Hospital (U.K.)

This server-only WS interface for D3 isn't a product per-se, but Windows-based freeware*. It uses a special Web server component* to listen for inbound requests. D3 connects as a client to this component via a socket*. (This should sound familiar to Flash-

Continues on page 22

Web Services *Continued from page 21*

CONNECT developers.) Requests run through that connection to a handler routine in D3 which passes control to BASIC business rule subroutines. The handler program also generates WSDL*, with subroutine parameters translated as arguments to WS methods. The interface uses SOAP and XML in a "black box" manner — you never need to see SOAP or XML to use it. This means you can write Pick BASIC code and let someone else deal with SOAP and XML — and that's exactly what some people want.

For freeware, this package is remarkably complete. Browser-based management pages allow for maintenance of WS methods, and for Users and Role configurations for secured access. These pages themselves use the interface to store configuration data in D3. Capillary comes with complete documentation, a tutorial, file descriptions, and samples. Since Capillary is used in real-world medical applications, its quality is not surprising.

Capillary is better suited for Intranet applications than Internet. It's great software for getting started, though it is only targeted for Windows and D3*. If you're planning to write your own solution, you can learn from Capillary by using it for some in-house applications. But if you need regularly supported and enhanced cross-platform software, more complex SOAP documents, or you need to support different variations of SOAP, then you'll need more than what Capillary currently offers.

Fusionware

Mark Schramm of Fusionware Corporation will be presenting at the Spectrum Conference in March, and demonstrating a new XML server product* supporting Web Services for MV and non-MV applications. The server parses and packages XML messages using a Java middle-tier engine, with MV connectivity via ODBC or JDBC eTools. It has been designed and developed for ease-of-use and fast implementation, and uniquely supports message routing and workflow capabilities.

Sprezzatura

Revelation Software has Web connectivity components* for OpenInsight which can be used for WS development, but no specific WS offering. The Sprezzatura Group*, a leading Revelation VAR, have been working successfully with the U.K. criminal justice system to implement Web Services with their OI application. TSG expects this to lead to a general purpose XML/Web Service enablement toolset for OI.

Other Toolkits

I was unable to find other toolkits* that provide end-to-end WS solutions for MV developers — nothing nearly as complete as The SOAP Gateway, for example. However, our market has many tools which one can use to build WS solutions....

Pick Data Provider .NET – Raining Data

U2 and D3 users now share a common method of connectivity. Raining Data's Pick Data Provider .NET (PDP) is very similar to the D3 Class Library, but it supports extensive .NET features not previously available. Using a familiar architecture, there is a middle-tier listener process which forwards requests to a MV server to execute BASIC rules. PDP does not directly create or support Web Services*, but as mentioned in my first article, you can easily create a Web Service which then invokes your PDP objects — the net result is still an end-to-end Web Service solution.

> Our market has many tools which one can use to build WS solutions.

RedBack – IBM

RedBack facilitates the creation of object-oriented classes. These classes have properties representing data in a U2 environment and methods representing U2 BASIC programs. After a class has been created, once again all you need is some WS code that instantiates from the class, creating a RedBack Business Object (RBO), and invokes the right methods. That WS code can be written in many languages, with or without .NET. As we'll see shortly, WebSphere from IBM can

be used to provide the front-end WS integration, making RedBack one tool in a very powerful toolkit.

WebSphere – IBM

IBM is firmly behind Web Services.* Among many other features, WebSphere facilitates WS development on the "front end" and it can make use of many technologies on the "back end". Of interest to us, WebSphere can connect to U2 through RedBack or UniObjects for Java, to jBASE through Java OBjEX, or to any environment which supports a Java interface*. WebSphere has technical value to any MV installation, but there are also many business benefits* to using IBM technology - It can't hurt to adopt technology that is friendly to sales and marketing, as well as to developers.

OBjEX and jRCS – jBASE

OBjEX is a library* much like UniObjects or InterCall for U2, or the Class Library for D3: it exposes the MV environment for BASIC-like development using object-oriented languages. The architecture of jRCS, the new jBASE Remote Connectivity Services, is similar to PDP.NET and RedBack, where a middle-tier component* is used as a bridge between the client code and the MV DBMS. Despite the extra tier, jRCS reportedly has performance advantages over OBjEX. Once again code must be written to "wrap" these interfaces for WS connectivity — jRCS can be used with .NET languages, making it easy to develop and deploy such a solution.

Web Tools

MV developers commonly use Web-enablement tools such as FlashCONNECT from Raining Data, jBASE Web Builder, RealWeb for Reality, Coyote from EasyCo, Viságe* from Stamina Software, or WebWizard from Eagle Rock Information Systems. While most people think of these products for generating Web pages and form processing, it's better to view them as tools that return text to a Web server* in response to a request from a Web client. The most common application is to output HTML to a Web browser, but any program can be substituted for a browser, and any text, like XML, for HTML.

As mentioned in my first article, a Web Service employs packaging and transport processes. The Web tools above handle part or all of the transport via HTTP*, so all we need to think about for WS is the SOAP packaging. A Web Service requires code to parse XML, and more code to reformat results back into XML. With the object-oriented interfaces mentioned previously, the XML will probably be handled at a middle-tier, before the data is passed to the MV application, and after it is returned. But with Web tools, you will probably handle the XML closer to the application. Since Pick BASIC is an excellent string handler, you can write your own XML handlers, or use external components for parsing: Pass inbound documents to external components to extract the content, process the data with BASIC code, then pass response data to another component for XML formatting.

MV as Web Service Client?

Most connectivity discussed here only supports MV platforms as a server, but what about making WS client requests from MV? There are many ways to get MV systems to make calls to remote systems. The middle-tier libraries mentioned above can be used but there are considerations.* Some MV platforms also support development using sockets.* For U2, the CallHTTP feature is available, and almost all MV platforms can call external utilities like cURL*, but you still need to deal with creating and parsing XML. Invoking Perl programs to initiate SOAP::Lite calls removes much of the burden of XML management. I've personally used various methods successfully and will mention them in my next article, "Examples of Web Services."

Summary

We've gone from a very end-to-end solution for WS development to building our own solutions with available components or even low-level sockets. Each option has its own considerations. I haven't mentioned the sensitive topic of product pricing and will leave that to vendors, but that may be a prime consideration for most developers. As I mentioned at the beginning, weigh your options wisely, the money you save now might cost you much more in development time later.

For follow-up information to this article, including the *references, or to send your comments/questions, please visit http://Nebula-RnD.com/Spectrum. If you're planning on implementing Web Services, or have already done so, I'd really like to hear from you for the next article! **is**

TONY GRAVAGNO is founder and chief software architect of Nebula Research and Development, specializing in software and services that help developers and resellers add more value to their own offerings. Tony has been involved with the Pick market for over 20 years and has held the titles of QA Manager at Pick Systems and DBMS Product Manager at Raining Data. His latest activities include developing B2B interfaces for customers, and serving as Technical Editor for the new book from SAMS Publishing, C#Builder Kick Start. He is often found in the Usenet forum, comp.databases.pick, and many other Pick-related discussion groups.

BY NATHAN RECTOR

Generic SmartPhones User Interface Design

Correct handling of text inputs in a SmartPhone application can make a difference between success and failure for your application.

Last issue, I talked about different types of SmartPhones, but most of what I covered were the more advanced versions of the SmartPhone; the ones that were based on Palm or Pocket PC.

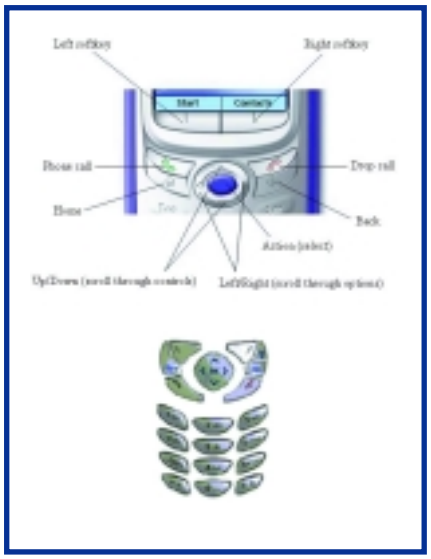
There are also the more generic SmartPhones that look and act more like a cell phone than a PDA. They have the same abilities, but the hardware designers took the cell phone approach instead of a PDA approach.

Due to this hardware design difference, there are some major software design differences to deal with. The obvious difference between a generic SmartPhone and a PDA is the screen size:

Comparing a Pocket PC and a generic SmartPhone gives you a good idea of the difference in screen size. A Pocket PC screen size is typically 240 by 320 pixels whereas a generic SmartPhone screen size is 176 x 180 pixels (minus the title and menu bar). This drastically reduces the amount of information you can place on the screen.

Another issue to deal with is how the user should enter information. Since a SmartPhone does not come with a touch-sensitive screen, the user has to use the cell phone's navigational but-

tons. Each SmartPhone looks and feels a little different, but basically follows the same design pattern.



Your application mainly interacts with the user through the two softkeys. So instead of using buttons that a user taps like on a PDA, they must use the cell phone's softkey buttons to select options or information.

The user uses the Up/Down keys to move between controls, and the Left-Right keys to scroll between options that would normally be displayed in a list or combo box. The last navigational key is the Action Key. This would be the same as a user "tap" on a PDA.

Correct handling of text inputs in a SmartPhone application can make a difference between success and failure for your application. Unlike the PDA, which has a software keyboard, the generic SmartPhones do not have one. Instead, the user has to rely on the numeric keypad to enter both text and numbers.

When designing applications that require user input, be sure to minimize the number of keys the user has to press. If you can provide an auto-complete, or use lists of information instead of the user entering text, it would make their job easier.

Handling multiscreen data entry is important as well. On a PDA, it is usually handled with a Tab style interface. On a generic SmartPhone, again you are limited to only the two softkeys. This limits you to a Next and Back button to move between multiscreens, or the use of a Menu button that displays all the screens the user can access.

As you can see, programming generic SmartPhone applications is much more challenging than programming PDA applications, given the limitations of a phone. It also becomes more important to work with your user to figure out what is needed and not needed in the application.

But once you get an application running on one of these devices, then you gain the ability to have your users carry their office in their cell phone. **is**

NATHAN RECTOR, a regular contributor to Spectrum, is owner of Natec Systems, a consulting firm specializing in D3, AP and R83 environments and custom programming. He can be reached at nrector@natecsystems.com or http://www.natecsystems.com.

Non-Procedural Reporting in OpenInsight

Part 1 of 2

'You Want That for Here or to Go?'

Note: A special thanks and congratulations from Revelation Software to *International Spectrum* magazine, which celebrates its 20th anniversary this month. They've been keeping the MultiValue torch burning for all these years through this magazine and the International Spectrum shows. We at Revelation Software want to wish them the best of luck and continued success in their endeavors.

Users love reports.

They must. They ask for new ones, they run them, and they complain that they aren't fast enough, so they care enough about them to want them to be better.

They seem to be the end result of many developers' best work — no matter how good a system, it is almost always judged by its reporting capabilities. In fact, I would argue that after the ease of data entry, a system's productivity and usefulness is directly proportional to the quality, flexibility and timeliness of its reports.

Companies seem to recognize this fact and are trying to capitalize on it. If you look at the advertisements in *International Spectrum* in any given issues lately you'll see new reporting tools for many of the MultiValue products.

OpenInsight, from Revelation Software, has its share of reporting tools. They run the gamut from simple, quick LIST type statements that developers will use to check on data and such, to

BY MIKE RUANE, REVELATION SOFTWARE

extremely elaborate reports featuring multiple fonts and colors or different paper sizes from different bins in the same printer.

And since the Web is a given in OpenInsight (our Web interface and CGI gateway are built into OpenInsight), we also have the ability to run both simple and complex reports across the Web. In fact, using some of our Web technology, users can run reports across the Web (or the LAN for that matter) directly into Microsoft Excel.

This article, the first of two parts, will cover many of the reporting tools within OpenInsight that do not require programming on the part of the user, hence the phrase "Non-Procedural" in the title. One quick note:Throughout this article we will use the terms "File" and "Table" and "Field" and "Column" interchangeably.

The System Monitor

In OpenInsight, we don't have a TCL line per se, we have a command line known as the System Monitor. (A fully functional TCL line is scheduled for inclusion in the OpenInsight 7.1 release, due in mid-2004.) The System Monitor is OpenInsight's command line, allowing the developer to type in LIST commands to view the contents of the various files used by the system.

The System Monitor can be found by choosing the menu choices Tools-Advanced-System Monitor from OpenInsight's main screen in development mode, known as the Application Manager. When the System Monitor has been launched, a screen appears with a command entry line and a results area, as seen in Figure 1.

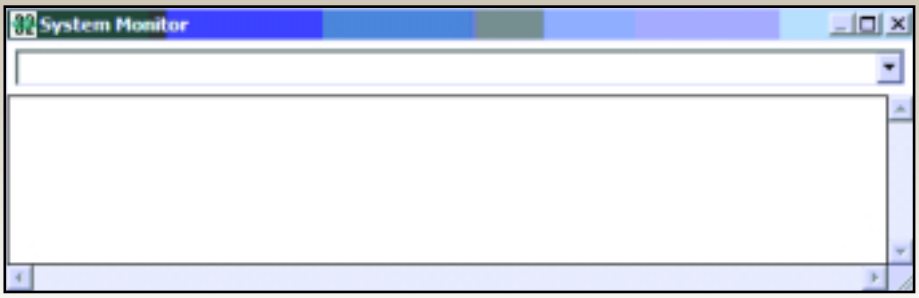


FIGURE 1. OpenInsight's System Monitor

 Continued from page 27

Using the System Monitor and R/List

As opposed to a TCL line in other multi-valued systems, one cannot start a System Monitor command with List or Select. In OpenInsight, all of the commands that are available to TCL have been turned into subroutines, so they must be run. So, for example, if I wanted to list the Author field in the Books file, I couldn't just type LIST BOOKS AUTHOR. I would need to run a subroutine, called RLIST, and pass the command in as the first parameter. I would also need to specify a second parameter, which indicates whether the report results should go directly to the default printer for my workstation or whether the report results should be displayed on the screen. In my case, I want the results displayed on the screen, so I would enter the following command on the System Monitor: RUN RLIST 'LIST BOOKS AUTHOR', 1

This will produce the results seen in Figure 2.

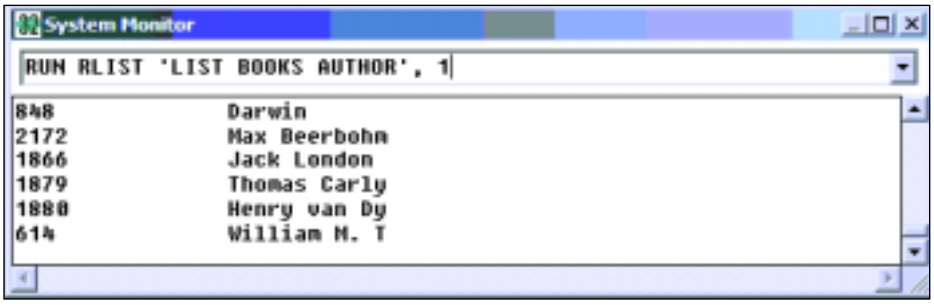


FIGURE 2. A simple LIST command and its results

OpenInsight's query language, known as R/List (a holdover from the days when every tool in a Revelation product was called R/something) is very similar to English or Access. We have all the standard commands for sorting (BY, BY_DSND), for selecting records (WITH, WITHOUT), logical Operators (>, <, =, <>, CONTAINING and mnemonic equivalents), plus Dictionary override commands, such as CONV to change a field's Output Conversion, and JUSTLEN, which lets us override the dictionary's Justification and Length settings. In Figure 2, some of the Authors' names were cut off; Figure 3 shows the same command with some modifications to let Author field be shown in its totality.

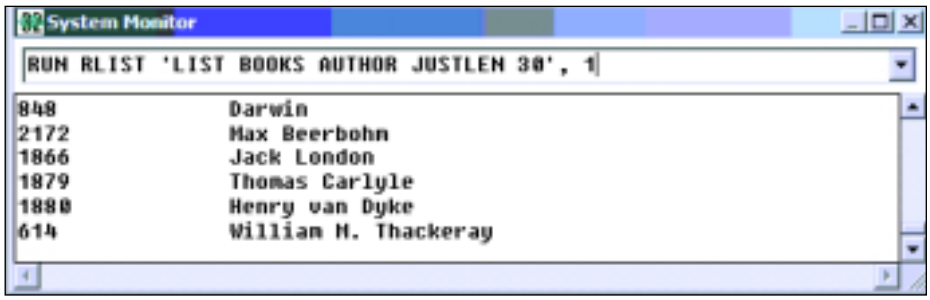


FIGURE 3. A simple LIST command modified for a field's width

There are variations on the commands, but this is the basic gist of it. The output of the report is very simple. There are no column headings displayed nor are there page breaks. The output here is quick and dirty, designed primarily for developers to check data.

One shortcoming of the System Monitor and R/List reporting is that the System Monitor does not allow for the creation of active SELECT statements to be used by subsequent commands. For example, if I run a SELECT statement to select just 10 records in a file, a subsequent LIST will process on the entire file, not just the 10 selected records. The upcoming TCL in release 7.1 overcomes this shortcoming.

The Report Builder

As of OpenInsight release 7.0, a new reporting language has been introduced to the product. Called OList (for OpenInsight Listing Language), this is a much more robust and user-oriented reporting language. It is a front end to OIPI, the OpenInsight Printer Interface, and is based upon routines developed by Sprezzatura LTD of London, one of the leading Revelation developers in the U.K.

The core syntax is similar to R/List, but has the addition of many formatting commands to control column font and color, page size and orientation, and much more. A sample command would be RUN OLIST 'LIST 30 BOOKS TITLE COLFONT "Arial,R,9,8388608" AUTHOR COLFONT "COURIER" ', which is a bit much to type in by hand. So instead we've created a new report builder in OpenInsight that will let the developer or user create these reports, execute them, and even save the report definition for future use.

The Report Builder is an OpenInsight-based tool written in OpenInsight. It

consists of a series of screens where the user chooses which file to report on, which fields from within that file, paper size and orientation, font color, shading, etc.The screens are written in OpenInsight, and the output produced is driven by OpenInsight through an OCX control that handles the actual printing. The output can go to the screen, printers, HTML, or PDF files.

Reports can be designed and saved in the Report Builder for future use. There is a subroutine named RunReport that can be run either from the System Monitor or called programmatically from Basic+, OpenInsight's programming language.

The Report Builder can be reached in a number of ways from the Application Manager, but the quickest way is to choose Tools-Report Builder from the menu. Once the user has chosen New Report from the menu and picked the file and fields, the Report Builder screen will appear, similar to that seen in Figure 4.

Reports can be designed and saved in the Report Builder for future use.

FIGURE 5. Column Settings

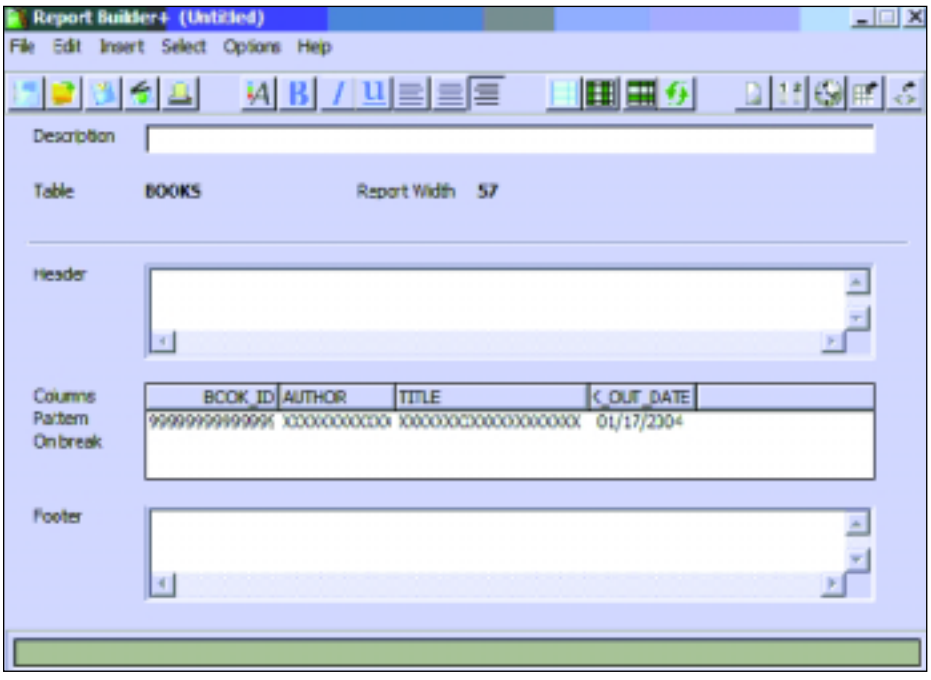


FIGURE 4

The Report Builder screen supplies a lot of information in a single glance. Looking at Figure 4, we know that we are reporting on the Books file, and that we are showing the Book ID, Author, Title and Check Out Date fields. We can discern that the Book ID field is numeric and the column is right justified. We see that the Author and Title columns are alphabetic columns, and left justified. We also see that the Check Out Date field is right justified, and will print out a date in the format MM/DD/YYYY. We also see that there is neither header nor footer defined for the report.

Users can also change the properties of each column being printed in the report by double-clicking on a column in the Columns control. In this screen, as seen in Figure 5, the user can adjust Sort settings, Break-on settings, Column heading and length, its shade and font. In this particular case, the column length was changed to 14, and the font was changed to Courier New, Regular, 10 point, Green.

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OpenInsight

Continued from page 29

To see what sort of selection criteria is used for this report, the user would choose Select and then Rows.. This will bring up the row selection screen, where the user can build either simple or complex select statements to filter out the data that the user wants on the report. Figure 6 shows a selection that will choose only those records that have a check out date.

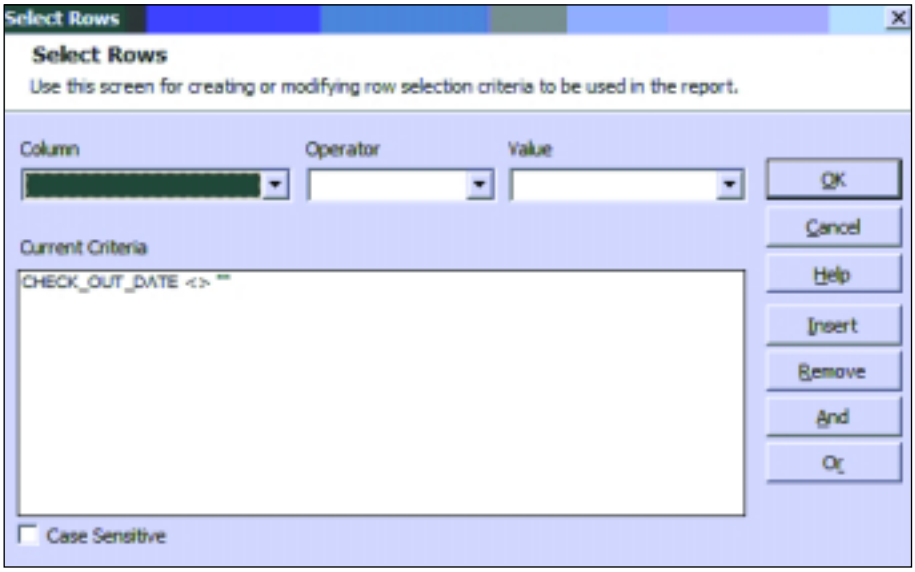


FIGURE 6. The Select Rows screen

There are many more options and settings to be explored, but that is an exercise left to the reader. An example of the output from the report is seen below in Figure 7.

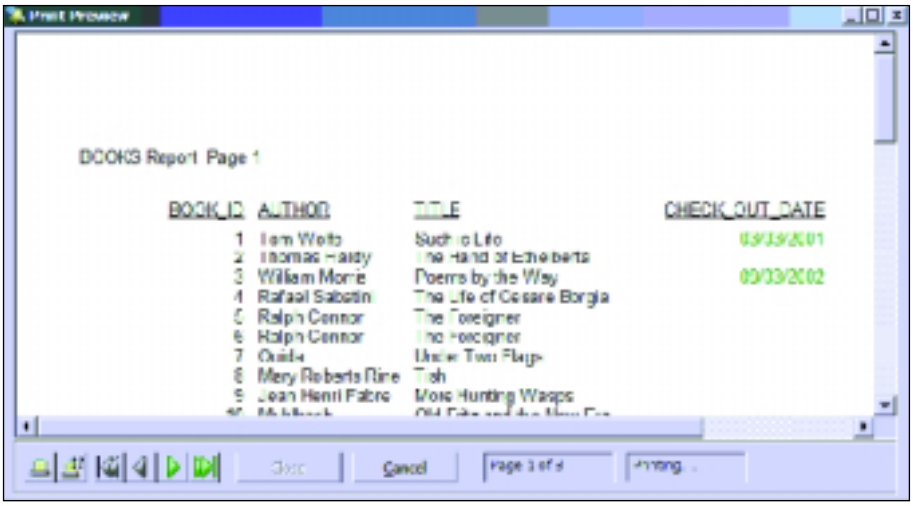
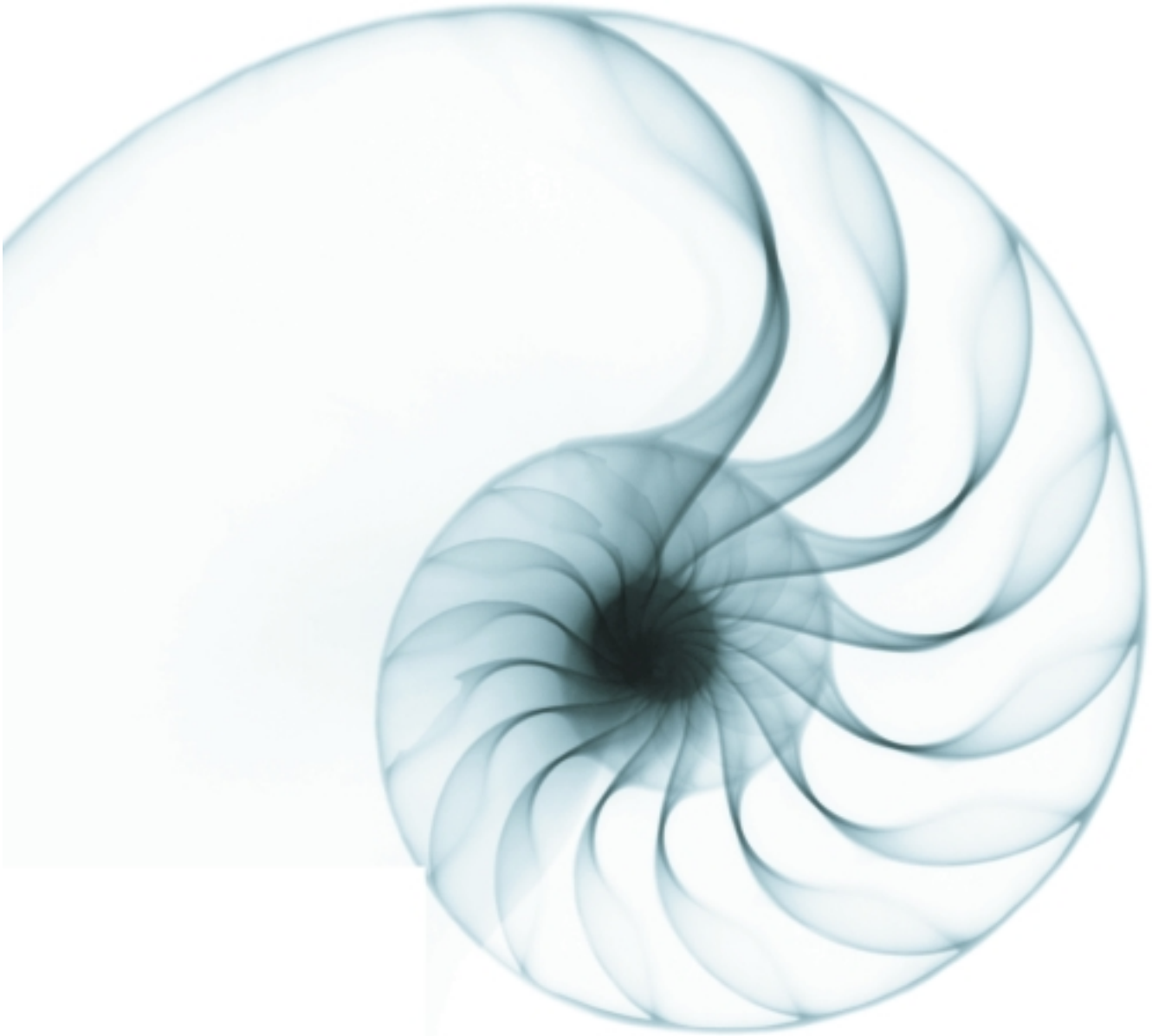


FIGURE 7. Example of the report output.

In part two of this article we will discuss how reports from this tool can be run to PDF and HTML files, how reports from this tool can be run into a browser, and how to run reports across the Web or LAN directly into an Excel spreadsheet.



YES

JOIN THE REVOLUTION

"DesignBais provides Evolve 360 with an ability to modernise the user interface of our distribution, supply chain and warehouse management application without significant costs. It is very intuitive so we will be able to secure our investment in existing technologies and leverage the knowledge of our development and consulting skills immediately."

Alan Godby - Product Director - Evolve 360 Pty Ltd

DesignBais

www.designbais.com

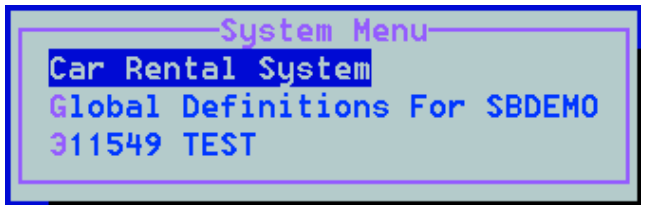
SB+ 101

BY DANNY PASSIG

In my last article, I gave you an overview of System Builder and some of its capabilities. In the future I will be providing more detailed information on the various features of SB+. This article will introduce you to some of the basics of SB+.

Menus

Menus appear as pull-down windows or full screens. Menu options can be selected by moving the selection highlight bar to the required option and pressing the ENTER key or you may type the highlighted letter in the menu.



(Menu screen shot)

In the above menu if you want to run the Car Rental System you would press the ENTER key. To run the Global Definitions for SBDEMO you could press the G key, which is a different color than the rest of the letters, or highlight the option and run it. Pressing the <ESC> key will exit the menu and return you to the previous menu or log you off the system. Depending on your security level, entering 0(zero) will take you to the Operating Environment TCL or SB+'s own TCL.

SB+ can also be command/process driven and you can call any function you wish to access within SB+ from any input by typing "/" followed by the process name. For example, typing "/MP" at any input will move you to the modify process function. A full list of processes supplied with SB+ can be viewed by entering "/T?".

(Screen shot when you enter /)

```
Name          Type  Description
CLEAN.SBSQ    >T    Clean up Smart Query Work File
FB.RUNCOMP    >T    RUN COMPUSERVE LINK
MEDIA.REW     >T    Rewind Media
ABORT         BT    Abort and Return To Menu
BBC           BT    Close Butto
```

(Screen shot of /T?)

Current edit keys

Current edit keys may be listed on the screen by entering /KEYS at any input. This list will be different depending on the terminal definition you selected to use.This works well since SB+ features a modeless text editor which allows you to edit text without invoking a separate "edit mode" and you may insert, delete or amend text.

Password

Every user with access to SB+ must have a User Id and password.This User id should not be confused with the OE user id and password. Each SB+ user id

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```
Enter chars or press any key listed below.

Action                Key
Cursor Back           Left Arrow
Cursor Forward        Right Arrow
Cursor Up             Up Arrow
Cursor Down           Down Arrow
Start Line            Home
End Line              END
Insert Toggle         Insert
Delete Char           Delete
Erase From Cursor     Ctrl-Y
Next Word             Ctrl-Right Arrow
Prev Word             Ctrl-Left Arrow
Top of Text           Ctrl-PageUp
Bottom of Text        Ctrl-PageDown
Extend Length         Ctrl-End
                                    1/2
```

(Screen shot when/KEYS is invoked)

is associated with a User group. For example: a user id might be DAN who belongs to user group ADMIN. The group determines what access the user will have to the facilities and SB+ applications.

Logging On

After you enter the account name at the log-on prompt you will be asked for your User id and password. You have three tries to enter a correct User id and password. If you fail to enter a valid User id and password, you will be logged off the system.

Logging Off

There are four ways you may log off the system.

1. If at the Top menu, enter OFF
2. From any input prompt, type "/OFF". If you use this option, details on the current screen will not be saved. If you wish to save the details, press F2, then log off from a menu.
3. Press the <ESC> key repeatedly to move backward through the menus until you are logged off.
4. If the top menu is available choose the TCL option and enter OFF.

Function Keys

System Builder uses function keys to perform certain activities. F1,F2,F3,F4 and F10 are predefined and the remaining function keys are available for your use.

F1 calls help for the current input field. This key is always available.

F2 is used to accept and save data for the current record.

F3 calls intuitive help if it is available for the current prompt. Its availability is indicated in F1 help by the appearance of F3 at the end of the help message.

F4 will delete a record. You will always be asked to confirm the deletion.

F10 is used to access the action bar, if available.

Action Bar

The action bar is available from most tools and includes common processes like Print and Copy.

SB+, a rapid application development environment, is easy to use and is very powerful and adaptable. My next article will continue with more introductory System Builder information. **is**

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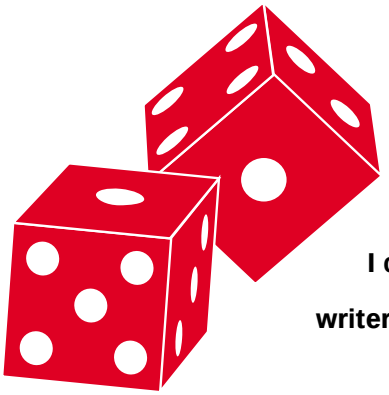
Odds-On Favorites for the Coming Year

BY MELVIN SORIANO



Guessing How the Dice Will Fall

When I see lists of predictions, I cringe. They're biased to the writer's background, preferences, and world view. As long as you keep that in mind, however, you may be able to look into some technologies as they might apply to your business. Or, at the very least, you'll find out what things tickle my fancy this year.

I could play it safe and say something like "Madonna will star in a bad movie" or "Californians move towards the Green Party," or "Hackers send out virus through Outlook to attack Microsoft NT." But come on. Those aren't easy predictions, but bad habits.

Instead, I'm going to suggest a short list of things that may become more important to businesses, database companies, and the MultiValue community. These aren't in any particular order, so you can at least reserve the right to prioritize.

1. Wi-fi-ification

Mobility is in. The laptop's inexorable drive to take over every desktop can only get stronger, as most college kids are opting for notebooks that can be dragged all over campus. As these kids enter the already mobile workforce, the need for speed and freedom from wires will also keep on increasing.

Hardware manufacturers are keen on encouraging the trend, as laptops are not only more profitable, they are also replaced more frequently. Powerful laptops are now appearing at the base level of $800, so mobile computing in general has gotten affordable.

Latching on top of these demographic and economic trends will be the wireless world. Wireless has caught on and this year we should see more products come out with options to clip wires. The options go beyond the PC, of course, so expect to see many more mobile media players, cell phones and PDAs too.

Although Wi-Fi 802x has been the most popular, all methods of transmission are

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in play. Combined, the use of Wi-Fi, Bluetooth, infrared and RF frequencies will make us all more connected all the time.

Surprisingly, the largest impact may be on your mouse and keyboard connectivity as the price for these gadgets has dropped drastically. This year we saw a big jump in Wi-Fi use in home networks. It will continue this year. Already, some apartment renters are sharing out their access with each other and then splitting up the cost. As the cost, and more importantly to me, the security of these transmitters become better and cheaper, I expect all types of residential implementations to appear.

2. Cell Phone Mania

Cell phones are finally everywhere. Seriously, if an athlete can interrupt a football game to talk on a cell phone, then there's not much left that can be excluded from "Can you hear me now?" The key to the successes of course was economics, but the rapid replacement of devices can be attributed to other aspects. Namely, phones are getting pretty sophisticated.

I recall when cordless phones appeared and, boy, was that a liberating experience at home. Suddenly, we could meander around the house without having to run back and forth from one landline phone to another.

Bah! Child's play. Phones can carry music, PC files, PDAs, Windows computers, email, text messaging, GPS devices and now pictures. We're getting ready to see video cell phones too. Can you imagine? Video phones never took off using landlines, and yet we may see them become all the rage when made mobile!

Mobility is in. The laptop's inexorable drive to take over every desktop can only get stronger, as most college kids are opting for notebooks that can be dragged all over campus. As these kids enter the already mobile workforce, the need for speed and freedom from wires will also keep on increasing.

And camera phones, this year's biggest hit, are getting better. One-megapixel camera phones may not be a good value yet, but that is rapidly changing. With pictures like that, normal prints could be taken, versus the barely acceptable resolutions available now; the pictures would be worthy of making copies and prints. Nokia predicts that perhaps two out of every three cell phones could eventually contain cameras.

3. Text Message/Chatbots

Riding on top of cell phone saturation is text messaging and chatbots. People all over the world are passing up on landline phones and conventional PCs, as cell phones offer many data-oriented functions. On top of that, they don't get the blue screen of death.

It's odd, really, to think that many are using a device meant to make talking mobile as a device used to send text back and forth instead. But the cell phone has moved directly into the realm of the PC, so this is a natural function. The cell phone represents communication in all its forms.

The great software we started seeing this year was the connection of the text message software to chatbots and alerts. The alert has been around a couple years, and for sports fans who travel a bit, er, like me, it's a fantastic way to stay on top of scores. But that's just unidirectional. Today, we see text messaging taken to a far more advanced level, going in both directions.

Instead of just sending messages to an individual, you send it to a service that looks like an individual. The service transforms the message to another service, perhaps a Web or Internet service, and then returns the response to your device.

AOL's Instant Messenger, for example, allows you to use text messaging as a way to AIM others on your buddy list, even though AIM is used predominantly on the desktop. On top of that, AOL has connected bots (automatic robots that react to your communications). You can chat the AIM bot called AOLBuddy to get weather, news, sports and movie information; AOLYellowPages is a "person" that will tell you the phone numbers of local businesses.

I think many businesses are missing out on the opportunities here. If your business needs to communicate information to people on the move, you can set up bots that reply in AIM or in text

messages to those customers, distributors, or other business contacts.

In essence, Web content and communications aren't about browsers or perhaps even PCs anymore. Web, http and other forms of middleware are still there, holding it all together, but all these services have made the browser just a pretty face. In a way, fulfilling what I've been writing about for the past decade here at *Spectrum* magazine, we're discovering that it's not about the interface, it's all about the data and making that data available to the end user.

4. Spying

Cell phone craziness has also opened up other, more unsavory problems. The inclusion of cameras on cell phones has made it incredibly easy for realtors, insurance adjusters, emergency care providers and others who benefit from instant pictures to do their work.

It has also made it easier to take pictures in locker rooms. Gyms and schools across the U.S. have started banning the cameras in locker rooms. Entertainment venues are starting to give warnings. Be prepared for outright nastiness when video cell phones emerge.

The issue of spying, though, is more difficult than ever. I wrote an article on conventional security issues last year and this year there are devices that make spying even easier. On top of the Bondian camera phones, we now have the huge popularity of USB-based memory devices. These keychain gadgets are intensely convenient for transporting large documents. Today, affordable midget gadgets hold 256Mb, but the multi-Gb versions are quickly being developed.

And here I used to cut out notches on my 5-1/4 floppy so that my Apple II could use both sides of the 143-Kb diskette. With all the other trends I'm forecasting, it won't be long for hackers to set their crosshairs on the cell phone. Take pictures. Take files. Take communications. We're going to see a lot more of this in the coming year, so button up your blouses and zip up your files.

5. XML Settles In

We've had XML projects popping up like mushrooms. As more companies are touting XML as a convenient form of data interchange, and as more companies are buying into the concept, XML has begun replacing flat files and other data formats. The newest soft-

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WEBONOMICS

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ware programs are written with only XML interfaces.

As a result, I see XML as maturing and getting implemented for reasons outside of just the world of widgets and wahoos. Its flexibility and extendability are a reasonable way to make apples look like oranges. More business and software houses are working in XML as a way to streamline their business processing and keep different IT departments from pointing fingers.

I used to have a gripe that XML takes magnitudes more character bits to convey the same information as even a flat file. It's different today, since disk space and bandwidth are cheap. I'm over it.

> Spying: Cell phone craziness has also opened up other, more unsavory problems.

6. Hardware Replacement

Y2K was a while back. Many companies replaced zillions of computers and servers with new equipment, in anticipation of e-Armageddon.

Today it's time to look at those aging doorstops. Zillions of computers are starting to wheeze and sputter on the demands of the newest Microsoft operating systems. For those in the MultiValue world who are content to live on older versions of their operating systems, it's getting increasingly difficult to get the price performance benefits from the new hardware.

So, in a trend that began last year, hardware will be replaced. Good news for you hardware types. Good news for those whose licenses are tied to the hardware. Good news for software vendors who can convince folks to keep the old box around as test machines, and get new licenses for the replacements.

7. Fragmenting Languages

OK, so this one may really be a gripe and not a trend. I'll let you decide.

Programming languages are all over the place. There isn't just one language that you need to know nowadays. We're living in an electronic Tower of Babel. As we continue making it easier for all the disparate programming environments to talk to each other, it's increasingly difficult to keep conventions, standards, and protocols up to speed with the fast-moving business world. It's the United Nations meets Dilbert. Someone find me a geeky Babelfish now and stick it in my ear. **is**

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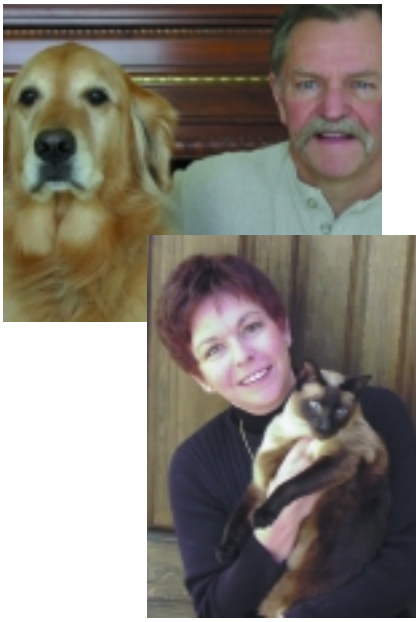

UniVerse and UniData Hashed FILES Part I

BY JEFF FITZGERALD AND PEGGY LONG

The Pick Operating System and its descendents are noted for their flexible handling of data. Files contain data records that are composed of an arbitrary number of fields, values and sub-values, all of which can be of completely variable length. This is a radical departure from traditional, fixed-length data records and provides a very attractive environment for business applications. This flexible data structure places demands on the underlying data storage mechanisms; these demands have been met by the hashed file systems in use on the various Pick variants. Our series of articles will examine in depth the specifics of hashed files as implemented in the UniVerse and UniData environments.

Fixed length records offer a number of advantages from the point of view of data storage. Perhaps the biggest is that the address of any record can be calculated. Similarly, since each data field within a record is of fixed length, the location of any field of a record can be calculated. Since locations can be calculated, a variety of direct access methods can be devised to provide quick data retrieval.

Variable length data isn't as easily handled. Since the location of data fields can't be calculated, Pick uses special characters as delimiters — the familiar field or attribute mark, value mark, sub-value mark and segment mark. Locating data is done by scanning — for example, the 5th field is between the 4th and the 5th field marks. And since the location of a data record in the file can't be calculated, scanning through a list of records is required to locate a specific record.

One way of limiting the number of records that must be scanned in the search for a specific record is to subdivide the data. If only part of the file must be scanned, it will be quicker to access a record than if the whole file must be scanned. Of course, there must be a mechanism for determining which part of the file the desired record is in. The file storage schemes that we will be examining use a method called "hashing" and thus the files in these environments are called "hashed files."

This first article will explore the basic structures and mechanisms involved in UniVerse and UniData hashed files. Later articles will be more specific and look at various aspects of these files in more depth.

UniVerse and UniData Hashed Files

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Hashed File Basics

The parts into which a file is subdivided are called "groups" because each part contains a group of data records. The number of groups is specified at the time the file is created and is referred to as the "modulo." The word modulo is a reference to "modular arithmetic" which was discovered by the German mathematician Carl Friedrich Gauss in the year 1801. See the accompanying sidebar for a bit about modular arithmetic.

Modular arithmetic provides a mechanism to sort a file's data records into groups. The data records that share the same remainder when divided by the modulo of the file will all "hash" to the same group. This means that by looking at the remainder we can determine the group the record belongs to and access it by only scanning that group. Less data to scan means faster access!

The Hash Key

Wait a minute! How do you get a remainder for a data record? Well, first each data record has to be identified by a unique record key. The key is chosen by the user or designer of the file and can be nearly anything from a sequential number to a name or a social security number. Since record keys can be non-numeric we have to have a means of converting them to numbers — "remainder" only has meaning when referring to numbers. The number that the record key is converted to for the hashing process is called the "hash key."

Actually, computers already represent characters numerically. There is a code called the "ASCII code" that specifies numeric representations for characters. "ASCII," by the way, stands for American Standard Code for Information Interchange and was developed a long time ago for use with teletypes. As an example, suppose we have a record with the key of "PEGGY". Here are the ASCII codes for the characters in the key:

Character	ASCII Code
P	80
E	69
G	71
G	71
Y	89

Once we've converted the characters to numbers, we could invent many different schemes to create a numeric hash key from the record key. In fact, UniVerse offers 17 different techniques and UniData offers two — these are referred to as "file types" or "hashing algorithms" and we will talk much more about the choices later on. In this article we will use a hashing algorithm that we made up — but it is very similar to the standard Pick hashing algorithm, the UniVerse type 18 algorithm, and the UniData type 0 algorithm.

Here are the rules for our algorithm: Start at the beginning of the record key. Initialize an accumulator to 0. Multiply the accumulator by 10 and add the ASCII value of the next character. Repeat for all the characters in the key. See sidebar for a BASIC program version of the algorithm.

The following table shows the process at each step:

Step	Character	ASCII Value	Accumulator
1			0
2	P	80	80
3	E	69	869
4	G	71	8761
5	G	71	87681
6	Y	89	876899

So using our hashing algorithm the record key of PEGGY has a hash key of "876899". Although the record key must be unique in the file, the hash key will not necessarily be unique. It will allow us to determine into which group of any hashed file to place the record with the key of PEGGY.

Hashing the Record to the Group

Remember that each hashed file has a modulo which specifies the number of groups in the file. The next step in hashing is to divide the hash key by the modulo. The division yields a quotient and a remainder — remember from our discussion of modular arithmetic that the remainder is the important part. The remainder is always going to be a number in the range 0 to the modulo minus 1. If we now add 1 to the remainder, it will be between 1 and the modulo; if we number the groups of the file beginning with 1 there is a direct, one-to-one correspondence between the remainder plus 1 and the set of groups in the file. Thus, the remainder plus 1 addresses the group where the data record will be placed.

As an example, suppose a file has a modulo of 7. Using our record with the key of PEGGY, we know that the hash key is 876899. Let's divide the hash key by the modulo:

876899 / 7 = 125271 + (2 / 7)

Quotient = 125271

Remainder = 2

We add 1 to the remainder to get 3. Viola! The record with the key PEGGY "hashes" to group 3 of our file. Whenever our system reads or writes the record it will know that it resides in group 3.

It is interesting to compare the results from our made-up hashing algorithm with those used by UniVerse and UniData. Create a test file using a modulo of 7 — on UniVerse use type 18, on UniData use type 0 (the default). Now use the RECORD verb to test various record keys and see which group they hash to. Here are examples:

```
UniData:
:CREATE.FILE HASHTEST 7
Create file D_HASHTEST, modulo/1,blocksize/1024
Hash type = 0
Create file HASHTEST, modulo/7,blocksize/1024
Hash type = 0
Added "@ID", the default record for UniData to DICT HASHTEST.
:RECORD HASHTEST PEGGY
PEGGY hashed to group 2 and was not found
UniVerse:
>CREATE.FILE HASHTEST 18 7 1
Creating file "HASHTEST" as Type 18, Modulo 7, Separation 1.
Creating file "D_HASHTEST" as Type 3, Modulo 1, Separation 2.
Added "@ID", the default record for RetrieVe, to "D_HASHTEST".
>RECORD HASHTEST PEGGY
Record "PEGGY" hashes to group 3 but was not found.
```

Notice that the group number in the UniData file is 1 less than in the UniVerse file? UniData numbers their groups beginning with 0 instead of 1. So for UniData files our made-up algorithm could dispense with the final addition of 1 to the remainder. You will find that our algorithm will produce the correct group number for most record keys in UniVerse type 18 and UniData type 0 files. Please don't call us with exceptions that you find! We said MOST because our made-up hashing algorithm doesn't exactly duplicate the real ones.

Data Storage Within the Group

At this point we've explained how data records are assigned to groups; now let's have a look at the way in which the data are stored in the group. Because of the variable length nature of the data, the records are treated as a list. The most significant implication of this is that locating a specific record within a group requires a scan of the records within the group. This has major performance implications that will occupy much of our series of articles.

UniVerse and UniData organize the data records within a group in very different ways. We will describe each method, beginning with UniVerse. Our description will start with the basics, ignoring exceptions such as large records. Later articles will refine the description to include the subtleties.

UniVerse treats the records in a group as a linked list — each record has a link to both the next record and the previous record. There is a twelve-byte header at the beginning of each record — the header contains the forward and backward links and a number of bits that reflect various pieces of status information about the record. Immediately following the record header is the record key and the record data with a segment mark (the HEX "FF" character) between them. The forward link is the physical address within the file of the beginning of the next record. This facilitates scanning the group as it provides the address for the next read. It also facilitates data retrieval as subtracting the current record address from the next record address yields the length of the record.

UniData uses a different method in which the record keys serve as an index to the data locations. A position near the middle of the group is chosen —we will refer to this location as DA—APOS. The data record keys for the

A Bit About Modular Arithmetic

One of the core statements of modular arithmetic is this: Two integers are congruent with respect to a modulo if and only if they have the same remainder when divided by the modulo. Symbolically, the mathematical statement is this:

X == Y (mod Z)

which is read as, "X is congruent to Y modulo Z".

As an example, suppose we choose the modulo of 7 and consider the integers 141 and 181. Dividing 141 by 7 yields a remainder of 1 while dividing 181 by 7 gives a remainder of 6. Therefore, 141 and 181 are NOT congruent modulo 7. 141 and the number 176 ARE congruent modulo 7, as they both have a remainder of 1 when divided by 7.

When using a modulo of N there can be only N possible remainders: 0, 1, 2 ... (N - 1). Another word for remainder is "residue" and the sets of numbers that fall into the N categories are called "residue classes" in the mathematical jargon.

Here's an interesting fact: In the decimal system all numbers are congruent to the sum of their digits, modulo 9. For example, 1643 has a remainder of 5 when divided by 9; the sum of the digits, 1 + 6 + 4 + 3 = 14, has a remainder of 5 when divided by 9. This is true of all decimal numbers.

This is the basis of a trick that can win free beers (depending, of course, on the type of crowd you drink with!). Here's how the trick goes:

Have someone write down a number with two or more digits without showing you the number. Then have them rearrange the digits to form a new number. Then have them subtract the smaller number from the larger. Next have the person circle one of the digits in the answer. Ask them to tell you the remaining numbers. Add these numbers and subtract the result from the next multiple of 9 — that is the number they circled. If the numbers they give you add to a multiple of 9 then the number that they circled is either a 0 or a 9, so in that case you have a 50-50 chance of getting it right.

Here's an example:

First number	135
Rearranged number	513
Subtraction	513 - 135 = 378
Circle a number	the 7
Add the remaining numbers	3 + 8 = 11
Next multiple of 9	18
The circled number is	18 - 11 = 7

UniVerse and UniData Hashed Files *Continued from page 41*

group are placed in a list, with the number of characters in each key preceding the key. For example, if our record keys were ONE, TWO, THREE and FOUR the list would look like this: "3ONE3TWO5THREE4FOUR". BUT, the list is reversed — it starts at DATAPOS and goes backward toward the beginning of the group, so it would appear more like this: "FOUR4THREE5TWO3ONE3". Starting at the beginning of the group are pairs of numbers containing the length of each record and the physical address of the data for that record. The data itself is written after DATAPOS and grows toward the end of the group with a segment mark between the data for each record.

This approach offers some advantages, too. Scanning the list of record keys for a particular record is quick because we are simply parsing a short string of keys — there is no need to read past the data. Once the required record is located we get the corresponding length / address pair which tells us how much data and where it begins.

Buffer Size, Blocksize and Separation

After reading the preceding discussion of how data records are stored in groups, a natural question is, "How big is a group?" The answer is, "That depends." The size is configurable by the user at the time the file is created. Both UniVerse and UniData allow specification of the buffer size used by the file, however, the two environments use different terminology.

UniVerse uses the term "separation" to define buffer size. Separation is the number of 512 byte units that compose a buffer. So a separation of 1 means the buffer size is 512 bytes; a separation of 2 yields a buffer size of 1,024 bytes; separation 4 gives a buffer size of 2,048 bytes and so forth. The

syntax of creating a file varies in UniVerse according to the "account flavor" being used. In "Ideal" flavor the command looks like this:

```
CREATE.FILE filename type modulo separation
```

For example,

```
CREATE.FILE TESTFILE 2 3 4
```

will create a file named TESTFILE with a file type of 2, a modulo of 3 and a separation of 4.

UniData uses the term "blocksize" to indicate the buffer size of the file. The UniData commands use a "blocksize multiplier" to specify blocksize. A blocksize multiplier of 0 produces a buffer size of 512. Positive integers from 1 to 16 are multiplied by 1,024 so that 1 gives 1,024, 2 yields 2,048, etc. The highest buffer size available in UniData is 16K. The UniData command to create a file looks like this:

Since the buffer size is finite, what happens when more data is hashed to a particular group than can be contained in one buffer?

```
CREATE.FILE filename modulo,block.size.multiplier TYPE type
```

For example,

```
CREATE.FILE TESTFILE 3,2 TYPE 0
```

will create a file named TESTFILE with a modulo of 3, a buffer size of 2,048 and which uses hash type 0.

Future articles will deal in depth with strategies for picking buffer size and will explain the interactions and performance implications of various choices.

Overflow

Now that we've discussed the size of buffers used in groups, it leads naturally to the subject of "overflow." Since the buffer size is finite, what happens when more data is hashed to a particular group than can be contained in one buffer? For instance, suppose that we have a UniVerse file with a separation of 4, thus each group starts out with one buffer of 2,048 bytes. Suppose we add 30 records that average 100 bytes in length and all 30 records happen to hash to the same group of the file. The amount of data to be stored is 3,000 bytes — more than can be held in a buffer of 2,048 bytes. What now?

Both UniVerse and UniData accommodate this situation by adding "overflow" buffers to the group. An overflow buffer is an additional buffer that is linked to the primary buffer of the group. From a logical point of view the group can be treated as though it were simply extended and doubled in size. From a physical point of view, the overflow buffer is not contiguous with the primary buffer and additional disk I/O will be required to retrieve it. The

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UniVerse and UniData Hashed Files *Continued from page 43*

more disk I/O that is needed to retrieve data, the slower the retrieval will be. Since there is more data in the group the process of scanning for a required record will also impact performance.

If the first overflow buffer becomes full, additional overflow buffers are linked to the group. In fact, a group can be composed of as many overflow buffers as are required to hold the data. But the longer the chain of overflow buffers in a group the slower access to data in the group will be. And the relationship between overflow and performance is not linear — it is geometric. This means that retrieving data in the tenth overflow buffer will be more than twice as slow as retrieving data in the fifth overflow buffer.

It is safe to say that overflow in hashed files can be the single biggest factor in system performance.

Resizing

Since overflow has such a huge performance impact, you might guess that there are strategies for eliminating or reducing it. Both UniVerse and UniData provide tools to resize their files. Resizing recreates the file with altered values for the modulo, file type (hashing algorithm) and buffer size. Intelligent choice of these parameters can turn a poorly performing file into a fast one.

Resizing is time consuming and requires down time. And, the analysis and selection of optimum parameters is not always straightforward. Future articles will talk in great detail about the trade-offs and strategies for file tuning. The hashed file basics that we've explained will make these future discussions more readily understandable. **is**

A BASIC Program to Implement Our Hashing Algorithm

Here is a BASIC program that will perform the steps to create hash keys according to our algorithm:

```
ACCUM = 0
INPUT KEY:
FOR I = 1 TO LEN(KEY)
    ACCUM = ACCUM * 10
    ACCUM += SEQ(KEY[I,1])
NEXT I
PRINT
PRINT ACCUM
STOP
END
```

We give you the homework assignment of extending the program to prompt for a modulo and record key and then output the group number that the record key hashes to.

TWENTY YEARS AGO **Peggy Long and Jeff Fitzgerald were running a critical benchmark on a top-of-the-line Prime INFORMATION system. The benchmark aborted. After several hours of detective work they identified a damaged file. That started a discussion concerning performance, broken files and how to check the internal structure of files after a system crash.**

After several weeks of work using Peggy's FORTRAN skills and Jeff's INFO BASIC knowledge, they were confident that they understood the file internals. This led to a utility that would quickly scan a file, report errors and recommend the optimum MODULO and TYPE parameters needed to RESIZE the file. A year later they began marketing FAST, which evolved from this utility.

Peggy and Jeff are uniquely qualified for their 20-plus years as file maintenance and performance specialists. Jeff was a police detective for 10 years and Peggy has a Ph.D. in Music Education.

Their company, Fitzgerald & Long Inc., is located in Aurora, Colorado, a suburb of Denver.

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new Products

Revelation Releases Universal Driver Lite

Universal Driver Lite, a small-network version of Revelation Software's popular Network Product line, has just been released. Revelation's new package is designed specifically to enable small companies and departmental application users to network their runtime applications for up to three users cost-effectively, while enjoying the benefits of enhanced application performance, increased data integrity and reduced downtime. Revelation Software's Universal Driver Lite package, currently priced at $995.00, comprises a Universal Driver module plus a three-user OpenInsight application development engine.

"We've put together this release specifically for our customers running on smaller networks, but who don't currently use a network product," said Mike Ruane, president and CEO of Revelation. "We have a price and product that will enable users at smaller sites to protect their data and increase their processing speed."

The Universal Driver Lite allows database activity to be offloaded onto the file server, dramatically reducing the volume of network traffic, which translates into a significant increase in LAN performance. It also protects against data corruption by recognizing when an error occurs on the network and notifying the user, at the same time protecting the application's data table from the corrupted data.

The Universal Driver Lite is compatible with Windows NT, 2000 and XP workstations and runs on Windows, Novell or Linux servers.

MultiValue Programmers Are Now Web Developers

The DesignBais team has finalized the port of DesignBAIS on jBASE. DesignBAIS is a functionally rich toolset that allows developers to design and create enterprise-wide Web-based applications.

DesignBAIS supports the creation of design templates. These design templates allow for creation of a standard user interface that can be easily applied throughout an application or its modules. With drop down top menus and sidebar menus as a standard feature, user navigation is simple and intuitive.

The DesignBais evaluation program is now ready. The object of the evaluation program is to familiarize the developer with the DesignBais toolset, particularly the form designer. It will provide the developer access to create subroutine calls for validation or update purposes, so you get a feeling for how simple it is to create powerful, well-presented Web applications using DesignBais.

Developers will be provided access to a standalone evaluation account. This account comes with a client database, client properties and an example client maintenance form. The client database includes associated multi-value field sets, so you can experience firsthand the ease of creating MultiValue applications for the Web.

You will also be able to invoke search forms, add update processing and sub-forms to your application. On-line documentation will be available to help guide you through your first form.

For more information, visit DesignBais' Web site at www.designbais.com. If you wish to be a part of the evaluation program, please email your required user name and password to Designbais@bais.com.au.

Revelation Releases OpenInsight 7.0

Revelation Software has released OpenInsight (OI) 7.0, with many new features including: a revamped Application Manager, enhanced Form Designer, Table Builder, and User Interface Workspace, plus a new System Editor. OI 7.0, internally referred to as project LeapFrog by the Revelation team, is a free upgrade to current members of Revelation's Works Program.

"Our development team was eager to make this leap ahead in Application Development Tool technology," said Katie Moran, director of partner programs. "OI 7.0 is a combination of revolutionary and evolutionary changes that will provide long-term benefits to all Revelation Partners.

Mike Ruane, Revelation's president and CEO, stated: "We've entered the ring of mainstream Application Development Tools for the small and mid-sized business world. With a ROI for developers that becomes profitable in only a few weeks, no other tool can compare with OpenInsight 7.0. With the ability to create powerful applications for both the Windows and Linux world, we feel that we've really empowered our developers."

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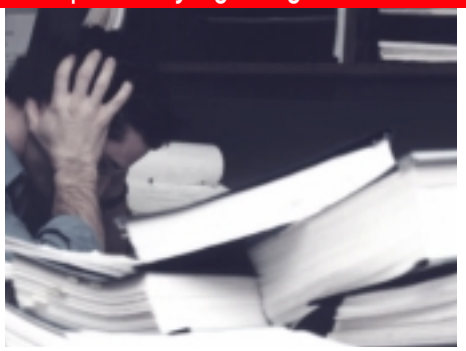

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