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THE MULTIVALUE  TECHNOLOGY MAGAZINE | MARCH/APRIL 2019

2019 MultiValue Conference Wrap-up

Also In This Issue:

- Improving the IT Image
- SQL Data-Types and MultiValue
- \$6M FLSS

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CONTENTS

COVER

6

International Spectrum 2019 MultiValue

Conference Recap Interview Read the interview with Nathan Rector, President of International Spectrum, about this year's conference and about the future direction of MultiValue.

FEATURES

9

Business Tech: A Place at the Table – Improving the IT

Image IT has been accused of being out of sync with the companies we work for. While I might post a pun – or six – on social media, my office e-mails tend to be more serious. We don't have to turn ourselves into perfectly neutered drones but we do need to act like we are part of the team if we want the team to accept us. **BY CHARLES BAROUCH**

14

Migrating NorthWind Database to a MultiValue Database – SQL Data-Types and MultiValue

In our continuing series of comparisons between SQL and MultiValue, we take a deeper dive into data architecture. What SQL lacks in flexibility is made clearly evident when we see how much more performant the same data can be when managed in a MultiValue datastore. **BY NATHAN RECTOR**

18

Six Million Dollar FLSS

In previous issues, we've rebuilt the OPEN and the DATE input. This time we'll look at two additional areas, error messages and security routines. We have the technology to build them better than before. Here's some ideas on how to do just that, quickly and efficiently. **BY SUSAN JOSLYN**

DEPARTMENTS

From the Inside page 4

From the Press Room page 11

From the Inside

There has been an issue that our community has been battling for years: The perceived lack of entry and mid-level developers. We hear this all the time. "I can hire .NET/JAVA/etc. programmer directly out of college and they will already know how to do 'X'".

There is a critical problem in the IT industry but lack of MultiValue developers isn't it. Upper management is only now starting to acknowledge that software is complex, layered, and dependent on many different moving parts. The fact that this is a new revelation is the bigger problem.

No one can be an expert in everything. And that college kid probably doesn't know how to do 'X' beyond the limited cases of 'X' he or she has been exposed to in the academic setting.

Most entry-level developers know only one small aspect of IT, whether it is networking, windows development, web development, or mobile development. That's what makes them entry-level. To be fair, they might know it really well. However, once they get outside that arena, their lack of knowledge of other process or systems starts causing problems.

While software in general keeps getting more complex, when it comes to business software, the stakes are higher and the interconnections are deeper. Our systems get progressively

more complicated due to all the layers of technology.

Modern business systems consist of desktop software, websites, mobile apps, reporting tools, data mining engines, and core systems. On top of that, we have connections to systems that your business doesn't control. Vendors, customers, value-added network, SaaS (Software as a Service) providers... they all fit into the jigsaw puzzle that is modern IT.

This layered approach to modern software systems means that companies have to hire entry-level people that are specialized in one area of development and then train them in the remaining segments of the business software. Whatever they bring to the table in the interview, they will need to add to that significantly to do the real work.

The question then becomes, why is it so hard to find junior or entry-level developers or DBAs? Since it takes so long to bring new developers up to speed on the business practices, new hires are expected to have some knowledge and training in the environments they are hired to work in. We want them to have a chance to hit the ground running and provide value immediately.

This expectation makes it difficult or impossible to find the right people. New hires take time and money. Businesses expect other sources — previous jobs, college — to do this for

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Layout



Learn more about the MultiValue Symbol and see what MultiValue Technologies and MultiValue Communities exist to help you support and manage your business and systems. To find out more visit

<http://www.intl-spectrum.com>

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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 and diagrams are welcome. Although there is no guarantee a submitted article will be published, every article will be considered. Please send your press releases, articles, and queries to: editor@intl-spectrum.com. *International Spectrum* retains all reprint rights.

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them, and in turn expects that new developers just exist, like ripe fruit ready to be plucked.

This is an endemic problem in the IT world in general, not just the MultiValue world. Any business that is creating more than just simple web or mobile applications is having problems finding qualified developers.

Part of the solution comes from modifying management's expectations. We need them to partner with us in building well-rounded developers out of the pile of potential developers we see in interviews. And, there are other partners lining up to help.

There were several community initiatives, that have cross-vendor support, introduced at International Spectrum 2019. These initiatives are focused on helping provide easier training to new developers, and new tools that are more familiar looking to new developers than

the decades-old tools that most senior developers presently use.

Also remember that training opportunities exist. You may not have the time, patience, or expertise to bring that new hire up-to-speed by yourself. International Spectrum provides Mentoring to entry and mid-level developers so they can continue to enhance their skills, and provides a place to ask questions that senior developers intuitively know.

Many times there are new tools and procedures available now to solve problems, ones that outside experts may know, that are overlooked by senior developers that have been working on the same system for years. In addition to International Spectrum's webinars and conference, there are on-site trainers in our marketplace.

Remember that any developer you hire will likely have basic

knowledge of the nuts and bolts of coding, and translating that into MultiValue languages is pretty easy. The struggle is in the "how do you use it effectively", "why do you use in one approach over another", and the "what in the world were they thinking" when someone new needs to modify a stable, decades-old piece of software that was developed using coding styles from twenty or thirty years ago.

It is very easy to bring additional value and modernization to your existing MultiValue system without losing the years and years of business logic and profit margin. We just need to adjust the expectations we place on our new hires.



NATHAN RECTOR
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THEME-THOLOGY: INVASION

Voices by Lisa A. Kramer

I Was a Teenage Alien by LJ Cohen

Singularity by Jeremiah Lewis

Not Like Us by Mike Reeves-McMillan

That Kind by Charles Barouch

Yellow by Bill Ries-Knight

An Invasion of Ideas by Jeremy Lichtman

Famine, with Fries by Jefferson Smith

The Several Monsters of Sainte-Sara-la-Noire by Michael Williams

Going Viral by Rachel Desilets

Dead Planet Scrolls by Timothy Hurley

Red Vapor by Michaela Susanne

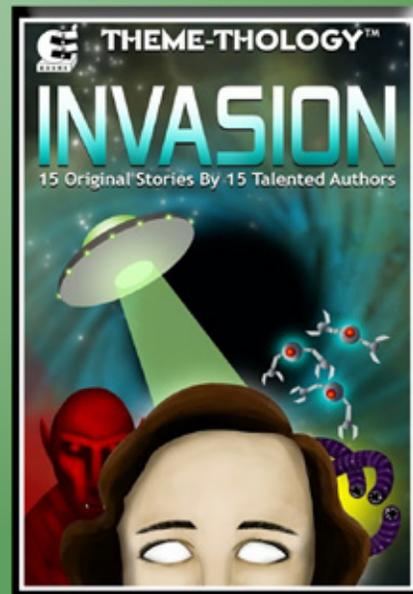
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2019 MultiValue Conference Recap Interview

The 38th Annual International Spectrum 2019 Conference was at the beloved WigWam again this year, and wrapped up on April 12th. This week of professional development and networking for the MultiValue Community was a resounding success as always. Those who came returned to work with lots of information and ideas.

There was a lot of very intense discussion this year between attendees. Many were looking to push forward

The overall IT industry has come to accept that the Relational Model (SQL/RDBMS) is starting to stifle business productivity.

with their existing systems, while others were looking at what the Sponsors had available so they could return to work with a new plan of attack for the upcoming year.

One of my functions at the conference is to make sure everyone is talking to the people they need to and to provide a neutral perspective on the MultiValue industry. Here are some of the questions I received this year:

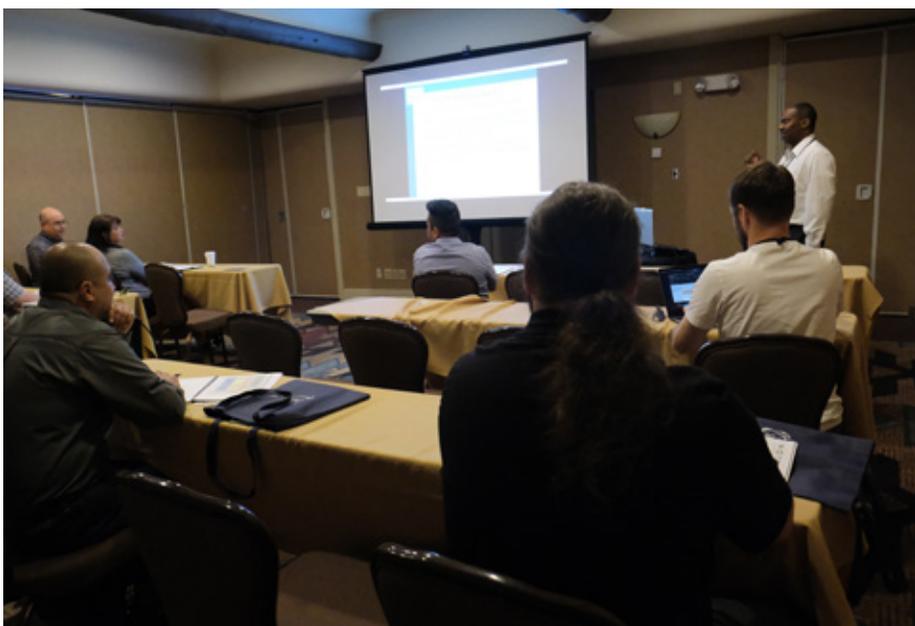
IS: *How was this conference different from Spectrum Conferences in the past?*

NATHAN: This year's conference had more intense feel to it. Attendees spent extended amounts of time talking with speakers and sponsors during the "Partner Exchange", aka exhibit floor, timeframe. There was more of a sense that budget lines were open for MultiValue projects.

These conversations weren't little 5 minute talks. They focused more on the details, the specifics, to help the attendee's address their problems.

IS: *Why did you talk about Total Cost of Ownership in the Welcome Address?*

NATHAN: Over the years, there has been a lot of talk about how to justify modernizing an existing application vs. purchasing something new. These conversations always ended up talking about two things: The costs of



The Spectrum Conference is the best place for MultiValue educational content. From the basics to modernizing your system it's all here.



Monday Kicked off with Nathan Rector's Welcome address which included a presentation on Cost of Ownership

modernizing and the battle with upper management; competing with the sales pitches they receive from outside software companies.

There wasn't much information available on presenting Total Cost of Ownership that the MultiValue Community could use when talking with upper management. When I asked to see what others had done in comparison to what I had presented, I was a bit surprised that no one seemed to have done it before.

This was the reason I took a first swipe at generating a template that could be used for this purpose. It's something many of us need.

IS: *How do I modernize my Multi-Value application?*

NATHAN: Most MultiValue developers have been looking to modernize their core applications, but found it daunting. I think that was due to a certain amount of misdirection, due to looking at the wrong things. In the past, modernization efforts were focused on redeveloping core screens and reports into graphical desktop interfaces and web interfaces.

More recently, there's been a shift in thinking. CEO/CIO/COOs have come to realize that their business is their software and their software is their business. So now the focus is less on simply adding GUI and more on creating *productive* interfaces. In other words, they are focusing on the UX (User Experience) instead of the UI (User Interface).

Each business has different definitions of what modernization is based on what would bring the most productiv-

ity to them. Some examples of modernization are:

- User-friendly reports and dashboards
- Mobile apps
- External web interfaces. Examples: Business APIs, E-Commerce
- Internal interfaces: Sales Tax, Government e-filing, Geolocation
- Office integration

Each of these processes is focused on only a small percentage of the overall core application. Most are new interfaces for very specific purposes, with very little focus on rewriting entire existing core systems.

Plus, with the Millennials moving into management, Command Line Interfaces (CLI) are once again considered acceptable production interfaces to modern systems. There is less focus on GUI/Web and more focus on business process specific interfaces. They may or may not be graphical but they must be tied to measurable gains.



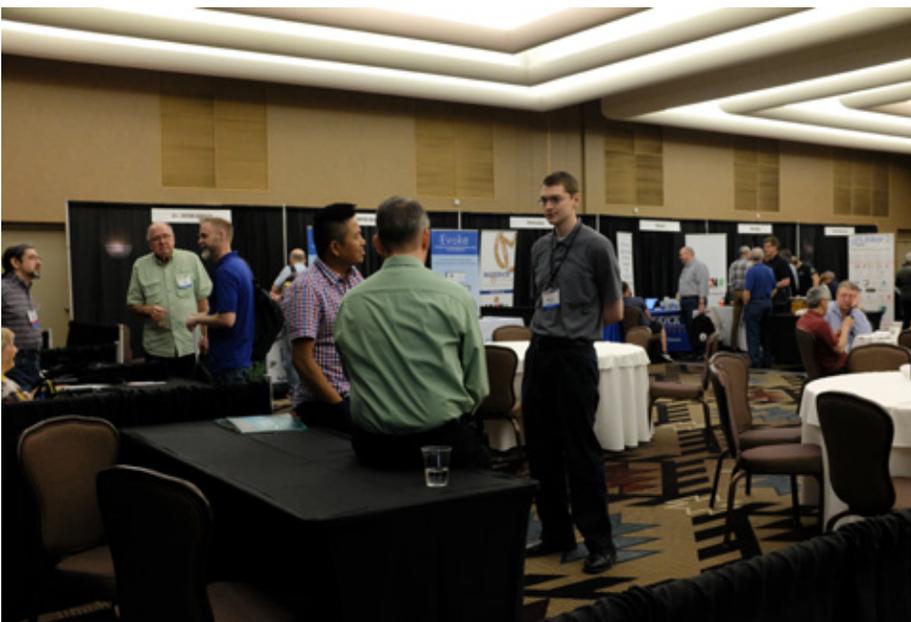
After a full day of sessions Monday ended with the conference welcome cocktail party

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Tuesday was dedicated to our Partner Exchange, aka. the Exhibit Floor



One of the really great things that happens during the Partner Exchange is that attendees are given the opportunity to have those important discussions with speakers and vendors

IS: *What do you think the future of MultiValue is? Where is it going?*

NATHAN: I think the MultiValue database and applications have a strong future. The overall IT industry has come to accept that the Relational Model (SQL/RDBMS) is starting to stifle business productivity. You can see this in the continued adoption of alternative databases — NoSQL databases — in core business application.

Software development has moved into the arena of solving the problem with the the best tools, instead of the most popular tools.

There are several cross-sponsor community initiatives that were announced this year as well. These sponsors are dedicating a lot of resources to the community, as well, rather than just focusing on their segment of the community. Keep watching for more announcements in the newsletter and magazine regarding these shared initiatives.

IS: *Any closing comments?*

NATHAN: I would like to thank our sponsors for their support and input during the conference. I enjoyed spending time talking with the attendees about their problems, solutions, and ideas. I would like to express my pleasure working with my speakers, and thank them for their support, time, and knowledge.

If you were one of our attendees this year, don't forget about the conference videos and session downloads. And even if you were unable to join us for 2019, we can look forward to seeing each other at Spectrum 2020. **IS**

A Seat at the Table

Improving the IT Image

BY CHARLES BAROUCH

When we get our seat at the table, we need to work to keep that seat. It isn't an ending, a successful conclusion. It's the start of a next phase.

Hey Dude

In the late '80s I ran an entertainment company. One of my part-timers was friendly with Rob, my primary connection into the company which contracted our services. Feeling bored one day, the part-timer left a voicemail on my primary's work phone which was just the chorus of Hey Jude sung as Hey Dude. It was three minutes long.

I wasn't upset because Rob wasn't. Please take that lesson. My reaction had nothing to do with my opinion of what he did. It had to do with whether or not the behavior embarrassed the business. Many times, what IT finds funny is also what other people in the company find funny. That doesn't make it okay in a corporate setting. We have to understand the role of image in communication.

Wrong Audience

I was working with a customer service staffer who saw a meaningful er-

ror in the in-bound data. In a show of solidarity, when he called the source company, he told the other person an everyone-makes-mistakes story about one of his own screw-ups.

This was a good bit of customer service, in that it took the pressure off of the person making the error. However, it was a tactical disaster. You see, calls may be recorded for quality assurance and my co-worker had just documented an error we'd made by telling that story on a recorded line. Because he was trying to make the other guy feel better, he omitted the part about us catching and correcting our error.

When we communicate, we have to consider the secondary audience. What I tell Alice at the client's call center might get repeated to her boss. What I share with Nick in the breakroom might get retold to my company's owner. Always know your audience and try to predict their audience.

Dogs Playing Poker

I've worked in a number of different shops, both as a consultant and as an employee. In one shop, my boss gave me a long list of verbal instructions on

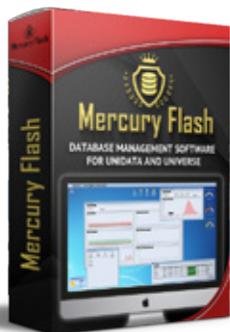
how to resolve a problem he thought I was familiar with in the accounting system. I responded by sending him a picture of a dog sitting behind a small pile of poker chips with the caption "I have no idea what I'm doing."

He laughed, we talked about the problem in more detail, and I was able to solve it. In today's environment, just the fact that I went online on a company computer to get the meme of the dog, that's a violation of policy in many companies. And, with a different boss, my admission of not knowing could have been treated as a general confession of ineptitude. I knew my audience and I knew it wouldn't be presented out of context to a larger audience. Despite that, what I got away with that one time would not fly today.

The fear of legal problems is progressively robbing the workplace of its sense of humor. Decreasing staff sizes are making companies hyper-focused on non-productive actions.

Fifteen Minutes

I had a boss that liked to pick fights with his staff. He once called me out, several times, in a meeting over things



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on my open list that should have only taken fifteen minutes to complete. Technically, he was correct in that some of them had fifteen minute solutions. There were a lot of ways I could have responded. The key was that there were dozens of open items because of positions lost within the department which he had elected to not replace. I could have blown it back on him.

Instead, I did a quick cost-benefit response, showing all the places that time was spent and asserting that this was the best use of the hours available. When I was done, we both knew I had blamed him for the size of the workload but I had done it in a way that didn't leave him a fight to pick with me. It was a tightrope walk. Ultimately, it was one of the final straws that convinced me to leave for other employment.

Blowing up might have felt good in the moment but remaining calm allowed me to control when I left the company. Even my letter of resignation was tempered. It was a good thing, too. The company brought me back twice after that to do consulting.

Contrasts

Does this mean I park my humor at the door before arriving in the office? No. Does it mean that I second guess every funny thing before I say it? Yes. I've actually been referred to, and not necessarily as a compliment, as the conscience of my department.

It is possible to still use a light tone at work. It is not a terrible thing that I might spend five minutes talking Anime to a co-worker. And, in what will seem the most unfair, there are people outside of IT who can get away with comments we can't.

Remember that we are fighting a perception. Just as the first <fill in the blank with any minority> to do a particular job has extra pressure to do it right, we are under pressure created by our stereotype. It isn't fair but that doesn't make it less true. **IS**

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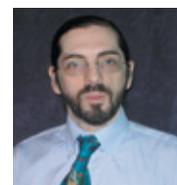
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at HDWPbooks. You
can read his writing in

International Spectrum, Theme-Thology,
Novo Pulp, Pax Solaria, PerhelionSF, and
the Interrogative series, which begins with
Tiago and the Masterless.

FROM THE PRESS ROOM



Ashwood Computer, Inc. Welcomes a New Addition to Their MultiValue ForeMost Team!

Rick Robinett, based in Cincinnati, Ohio is joining the ATeam and will leverage his extensive twenty plus year background in professional technical software and IT related sales to improve their ForeMost solutions marketing efforts. Rick has managed sales teams and trained and motivated individual sales team members, helping them meet their goals and to achieve beyond their expectations. Ashwoods ForeMost sales and development programs will benefit from Ricks extensive marketing experience and his focused competitive IT solution sales. Ricks work experience with Manufacturers and Distributors nationwide, interfacing with corporate C Level principals, IT systems managers and end-users alike, will help Ashwoods ATeam to improve their ForeMost implementations.

"As a valuable addition to our sales staff, Rick will be assisting our A-Team members and expanding our customer base as we further our quest to exceed our customer's ex-

pectations, while adding new functionality to our existing ForeMost ERP, mvTools and FastBac DR products", said Rod Owens, President of Ashwood Computer. ■



Case Study: MultiValue From the Ground Up

Concord Premium Meats relies on UniVerse to manage every aspect of its business, from manufacturing to distribution to sales. Toronto-based Concord Premium Meats was founded in 1993 with the goal of ensuring that busy families could enjoy premium-quality, pre-marinated and seasoned meat with only a few minutes of preparation. Today the company employs nearly 500 people in the United States and Canada.

Concord started using UniVerse for a few functions, and as the business has grown, we've grown with them, developing innovative, customized MultiValue solutions to optimize their processes throughout their operations.

"We stumbled along with Excel spreadsheets for our costing reports, but eventually it got to a point where we couldn't do it anymore, so we converted to Asynchron. There isn't a part of our business that their solution doesn't touch."

View Case Study at https://www.asynchronsystems.com/multivalue_from_the_ground_up.html. ■



Mercury Flash V5.1.1 Released

Paradigm Systems has announced the release of version 5.1.1 of their UniVerse and UniData database management system Mercury Flash.

Some of the improvements you will find in Flash 5.1.1:

- Improved Master Scheduler for more efficient scheduling
- Improved AutoTune now tunes more parameters
- Improved file resizing keeps files tuned correctly, longer
- New larger, more detailed gauges to track system load, memory, licenses and LCT usage
- Improved caching for quicker response and navigation
- New translation interface supports 92 languages

Mercury Flash is the state-of-the-art web based management console specifically designed for the UniVerse and UniData databases. Mercury Flash version 5 was released in July of 2018 and over the past 8 months has experi-

enced incredible growth and acceptance in the community and has quickly become the go to solution for U2 database management and tuning.

Mercury Flash does more than just perform a deep, extensive analysis of all your database files - it literally learns as your database grows. The more knowledge you feed into it, the more effective it becomes at both supporting and empowering the way you like to work. It can even make calculations and recommend adjustments based on not just the current size of a database file, but the projected file size that will handle your future data needs. It's a tool designed to free up your valuable time, automating recurring tasks so that you can get back to doing what you do best: moving your business forward and achieving your long-term goals in the most proactive way possible. ■



ONgroup Intl and Maverick Systems Announce Partnership

ONgroup Intl is delighted to announce a strategic partnership with Maverick Systems. Chas Stauffer, President and CEO of ONgroup announced the partnership ahead of this

FROM THE PRESS ROOM

year's annual Spectrum conference.

Maverick will market and support the MVON# and NetBuilder solutions. Maverick CEO, Dick Thiot says that "MVON# is the future of MultiValue, and we are excited to be part of this journey."

"For ONgroup, having the network and experience of Dick and his team at Maverick is another step forward in the growth and expansion of the product set," Stauffer affirmed in his announcement. ■



Entrinsik Informer Named Top Performer in Winter 2019 Business Intelligence Software Customer Success Report

Entrinsik Informer, has been named a Top Performer in the Business Intelligence Software category for the Winter 2019 Customer Success Report published by FeaturedCustomers. FeaturedCustomers is the leading customer success content marketing platform for B2B business software & services helping potential B2B buyers make informed purchas-

ing decisions through vendor validated customer success content such as customer testimonials, success stories, case studies, and customer videos. FeaturedCustomers evaluated all the potential Business Intelligence Software companies on its platform for possible inclusion in the report. Only 34 companies meet the criteria needed for being included in the Winter 2019 Business Intelligence Software Customer Success Report. Entrinsik Informer received an overall score of 93 earning a Top Performer award in the category.

The Customer Success Report is based on the curation of authenticated case studies, testimonials, and reviews from across the web, telling a complete story of vendors in the Business Intelligence Software space through real customer experiences. Scores are determined by multiple factors including number of total reviews, customer success content, social media presence, and vendor momentum based on web traffic and search trends.

The Top Performer designation is awarded to vendors with significant market presence and enough customer success content to validate their vision. Highly rated by customers, Entrinsik Informer consistently publishes high quality vendor produced customer success content and curates quality customer reviews from multiple third-party sites. ■



Revelation Software release OpenInsight 10.0.6

OpenInsight 10.0.6 was released on April 11, 2019. Here's what's new:

Presentation Server

General

- Optimized page swap rendering
- Implemented PAGESWAPRENDERMODE property for paging components
- Implemented REPAINT method
- Added Repaint parameter to the INVALIDATE method
- Removed "inherited event" processing
- Added RDW_FRAME when setting REDRAW back to TRUE\$

DATETIME object

- Implemented Relative time specifiers for VALUE-based properties

WINDOW object

- Implemented READPREV method

O4W

General

- Improved performance by reducing redundant output (for duplicate events and classes)

O4WQUALIFYEVENT

- Added new event "classlink" for optimization (used for example with a whole table of links or buttons so that there's only a single function that gets called to act on the click, based on a class name)

O4W Form Wizard

- Changed to use new optimized classclick event instead of individual qualifyevents on icon buttons

- Added ability to specify foreground and background colors on search results page

O4W Report Wizard

- Changed to use new optimized classclick event instead of individual qualifyevents when called as multiselect popup

Lock Manager (OI Console)

- Changed to use new classclick event

Banded Report Writer (BRW)

- Added support for SYSDICT items. Example code added to supplied RTI_BRW_SUPPORT example routine.

Miscellaneous

RTI_CHAIN_SELECT

- New routine to optimize multiple sequential SELECT statements, when issued either to local OI system or backend BFS.

- Subroutine accepts a series of SELECT statements (@fm delimited), determines if local or server selects, runs the statements as a block, and returns the final set of

FROM THE PRESS ROOM

keys as an active select list.

- Currently implemented for OI, D3, QM hosts. ■



Zumasys Announces the Winner of the \$10,000 MultiValue Idea Contest

Zumasys announced the winner of its first-ever MultiValue Idea Contest.

The MultiValue Idea Contest is a global competition that asked innovative coders and members of the PICK community to pitch ideas for how to advance the MultiValue data model. The goal was to generate ideas that are original, practical, easy to scale, marketable, and durable.

The contest generated nearly 200 entries which were evaluated by a panel of international judges that included:

- Andy Takacs, Chief Technology Officer at Zumasys
- Dawn Wolthius, President at Tincat Group, Inc.
- Ian McGowan, Principal Consultant and Creator of PickWiki.com
- Craig Alford, General Manager at Uniware Pty Ltd, Australia
- Martin Phillips, Senior

Database Architect and Creator of OpenQM, England

After combing through applications, the judges selected the work of Kevin King from Longmont, Colorado. King's idea is to extend MultiValues dimensional architecture to beyond its standard field-value-subvalue construct. The combination of connectivity for languages plus arbitrarily deep nesting for JSON data fits squarely in the category of expanding MultiValue further into the NoSQL arena. This enhances current feature-sets that work with popular front-end frameworks including Vue, React, and Angular, in addition to the use of any desired languages.

If we're going to make PICK connectable, we need to break out of the three dimensions and be able to truly store n-dimensional data, such as what can be done with JSON, said King, who has already successfully demonstrated a similar extension

to the multi-value model.

In the early days of databases, the MultiValue model was unique in allowing a three-dimensional structure to be represented in a single stream of characters. However, in the decades since, the world has embraced multidimensional data far beyond three dimensions. XML, JSON, and BSON allow data to be structured to a near unlimited depth. Our use of delimiters, while functional and proven, limits us to a finite data structure. As the pioneers of multidimensional storage and retrieval, it's incumbent upon us to keep our model competitive, both in storage and transfer of information.

Since the early 1980s, Kevin King has had his hands in a lot of different MultiValue systems. From Microdata Reality to jBASE to Universe/Unidata to OpenQM, with numerous other technologies along the way, Kevin is a passionate developer with an eye constantly on the future.

For Zumasys Founder and President Paul Giobbi, the contest represents the best of MultiValue with the community coming together for a common cause and generating engagement from thought leaders from around the world.

It's exciting to see that innovative thinking is alive and well in the MultiValue market, said Paul Giobbi, President of Zumasys. MultiValue has always been a database platform designed on flexibility and performance. We look forward to integrating Kevin's winning idea into future releases of our own products.

The contest entries focused on new tools, data, metadata, and DBMS. They showed innovative potential and new directions possible for NoSQL database solutions. Contest criteria and biography of judges are available at www.zumasys.com/contest. ■



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Migrating

NorthWind Database

to a MultiValue Database

Part III: SQL Data-Types and MultiValue

BY NATHAN RECTOR

The battle between traditional databases (RDBMS) and MultiValue databases have raged for years, and will likely continue well into the future. Because NoSQL-style databases are becoming more accepted by CEO and CIO for enterprise level datastores, the MultiValue model is being looked at very closely again.

In Part I of this series, I talked about the basics of translating the SQL CREATE TABLE command into MultiValue Files. In Part II, I talked about the flexibility of the MultiValue datastore, and when and where SQL subtables should and shouldn't be used. In this article, I'll talk about some of the other things to consider with the SQL CREATE TABLE.

Building the Database in MultiValue – Data-Type and Size

One of the main features of every MultiValue database implementation is that data-typing and size constraints are not required. While this allows any type and size of data to be saved

The BLOB is really an afterthought data-type for modern SQL database.

in each field/column of a table without producing an error, there are times when it is important to consider the

SQL data-types and how to translate them into MultiValue DICT items.

Let's look at the different data-types found in [Figure 1]. You'll see several different data-types being used: INT, DATETIME, VARCHAR, DECIMAL, DOUBLE, and TINYINT. There are many other data-types avail-

```
/* Table: orders */
CREATE TABLE orders (
  id INT NOT NULL,
  employee_id INT ,
  customer_id INT ,
  order_date DATETIME ,
  shipped_date DATETIME ,
  shipper_id INT ,
  ship_name VARCHAR(50) ,
  ship_address VARCHAR(250) ,
  ship_city VARCHAR(50) ,
  ship_state_province VARCHAR(50) ,
  ship_zip_postal_code VARCHAR(50) ,
  ship_country_region VARCHAR(50) ,
  shipping_fee DECIMAL(19,4) NULL DEFAULT '0.0000',
  taxes DECIMAL(19,4) NULL DEFAULT '0.0000',
  payment_type VARCHAR(50) ,
  paid_date DATETIME ,
  notes VARCHAR(250) ,
  tax_rate DOUBLE NULL DEFAULT '0',
  tax_status_id TINYINT ,
  status_id TINYINT NULL DEFAULT '0',
  PRIMARY KEY (id)
);
```

Figure 1

IT audits have you jumping through hoops?



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tage of data-types there are conversion codes. This is a more flexible alternative.

Since the traditional way to store data in MultiValue is in internal formats, the conversion codes allow the data to switch between internal format and external/output format without directly altering the data [Figure 2].

Building the Database in MultiValue – DATETIME, DATESTAMP

The DATESTAMP data-type is often used to store a date and time in the same field. This can be done in a MultiValue database, but if you want to keep the data stored in an internal format, then it will require a program, an A-Correlative, or F-Correlative.

Some Options:

- Store it in external format: YYYY-MM-DD HH:MM:SS

able as well, but let's consider the basic ones.

Some consider the SQL column data-type a function of data validation, but it does much more than that. In many SQL database, the data-type has to do with size of storage in addition to data validation. Both of these constraints are of limited value.

If you are unfamiliar with the SQL model, then imagine that each SQL

record is a fixed length byte array. That means that each column consumes a specific number of bytes, even when empty. This is why it is so important that you setup an SQL data source correctly the first time and try not alter it at a later date because it requires a rebuild of all the data stored. Fixed width is messy that way.

In MultiValue, there is no issue with the size of the data. To get the advan-

Data-type	Conversion Code	Notes
VARCHAR(nn)		No Conversion code on strings needed
CHARACTER(nn)		No Conversion code on strings needed
INT	MR0	
TINYINT	MR0	
DECIMAL(19,4)	MR4	
DECIMAL(19,2)	MR2	
DOUBLE	MR64	Double is supposed to have a decimal precision of 64. MultiValue systems will store it that data, but the database stored procedures can only handle math precision of 9.
REAL	MR64	See note on DOUBLE
FLOAT(4)	MR4	
BOOLEAN		Recommend data stored at '1' and '0'
DATE	D4-	Dates should always be stored as MultiValue Internal date
TIME	MTS	Times should always be stored as MultiValue Internal Time
DATETIME, DATESTAMP		This requires special handling.
BLOB, RAW		Blobs require special handling.

Figure 2

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If you do it this way, then the data will be there, but if you want to internal MultiValue date range selection against it, you will have to create a virtual DICT (Correlative or I-Type) to convert the external data into internal data that supports ranges:

As an A-Correlative Virtual DICT item, you can isolate the Date from the DateStamp:
 $A;((1(G0\ 1))(G1-1) : (1(G0\ 1))(G2-1) : (1(G0\ 1))(G0-1))(DI)$

As you can see it is a little complex, but will work and once you have the virtual DICT created you won't have to do it again.

- Store in Internal format using a Stored Procedure

If you choose to keep the data-stamp in internal format, the common way to store is: $\{internaldate\}*\{internaltime\}$
example: 12585*1144

The issue here is that to create this data, you will have to use a MultiValue Stored Procedure, but it allows you to sort and select date and time ranges very easily. You would still need to have a virtual DICT item for Date and Time, but that is much easier than in option 1:
 $Datestamp.Date = A;1(G0*1)$
 $Datestamp.Time = A;1(G1*1)$

Building the Database in MultiValue – BLOB

The BLOB data-type is really an afterthought data-type for modern SQL database. No database is really designed to handle BLOBs of data. It is very inefficient both for storing and retrieving.

Standard OS file systems are better places to store BLOB data. Although there are times when you want to store BLOB on a central server and link them to your data.

There are a few options:

- Store them as HEX or Base64 Strings and not worry about the efficiency.
- Store them on the database server's file system and create a file path link to the original blob that the application can retrieve later. (recommended)
- Create a blob chunked file to keep the BLOB data separate from the actual data, but still on the database.

Building the Database in MultiValue – DECIMAL/ NUMBERS

MultiValue Databases will store the data in any format you want to do, but depending on what you want to do with those number within the database, you will run into limitations.

MultiValue databases are designed to store and process strings and integers very efficiently, but when it comes to decimal and floating point math, it chokes a little, comparatively.

The Store Procedure language of MultiValue database is very powerful, and can do things unheard of on other database platforms, but usually has a limitation when adding, subtracting, multiplying, and dividing numbers that have more than 4 decimals.

If you keep the number in internal format, which is usually looks like a very large integer, you will not have any problems. Although if you try to multiply "1 * 0.1234567" you will find your end product rounded to a precision of 4: ".1234"

There is an option to force the precision up to 9, but that is max precision the database can do internally. (Please note: Many MultiValue databases have ways around this limit to one degree or another, but they are functions of that specific flavor of MultiValue database)

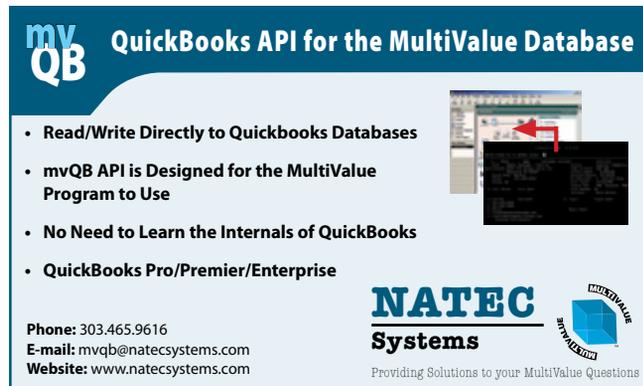
As you can see, most data-types will translate just fine into a MultiValue Database. Other than some special handling when it comes to unique data-types, storing the different types of data from Northwinds database isn't a problem. **IS**

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FLSS

BY SUSAN JOSLYN

Last time we met, back in my GOTO Hell articles, we all — some reluctantly, others enthusiastically — agreed that it's best to code away from using GOTO. Ideally, we want to achieve this by creating stand-alone nuggets of software with discrete argument lists that each perform a specific purpose.

It may be easiest to start with the most universal stand-alone subroutine functions, such as those covered previously in the Six Million Dollar series in this publication. Those examples are general. Sure, they're *specific* to mvBASIC, but not to any application. Moving one step closer to the application are

The application controls are security that you bake into your applications.

stand-alone subroutines which deal with the user interface and security. These are sort of 'middleware' functions and their usefulness expands over time.

Messages: I assume you have places throughout your application where error messages are displayed. You may have coded up all those error messages with a number and combined that with a routine that fetches the word-

ing based on the number. But you may still have the display of these error messages scattered all over your code. If you haven't already, consider replacing every single display of a message or dialog box to a 'function-like-stand-alone-subroutine' (hereafter referred to as FLSS, pronounce floss. The author just made that up.)

Say the display program has five arguments: the character string to display, a code for the type of display, a code for the interface, a returned value, and a flag. Based on that interface code (the 3rd variable) another program can be called to handle the actual display. Yes, you have to go through the software

```
SUBROUTINE MULTIDISP (TYPE, DIALOG.TEXT, UI.MODE, VAR.MSG, RTN.FLAG)
VARMSG="" ; RTN.FLAG=0
BEGIN CASE
CASE UI.MODE = "WIN";* wIntegrate
CALL WIN.DISP (TYPE, DIALOG.TEXT, VARMSG, RTN.FLAG)
CASE UI.MODE = "AT";* Accuterm
CALL AT.DISP (TYPE, DIALOG.TEXT, VARMSG, RTN.FLAG)
CASE UI.MODE = "BP";* Plain text
CALL ASCII.(TYPE, DIALOG.TEXT, VARMSG, RTN.FLAG)
CASE UI.MODE = "UNIOBJECTS"
CALL UO.DISP (TYPE, DIALOG.TEXT, VARMSG, RTN.FLAG)
CASE UI.MODE = "PWS"
CALL PWS.DISP (TYPE, DIALOG.TEXT, VARMSG, RTN.FLAG)
CASE UI.MODE = "SB"
CALL SB.DISP (TYPE, DIALOG.TEXT, VARMSG, RTN.FLAG)
CASE 1
CRT @(0,23):"ERROR: Unidentified user interface."; INPUT ANS
RTN.FLAG=1
END CASE
999 *
RETURN
```

Figure 1

base and make all displays go through this subroutine. It's really worth it even if you still only have one interface (so far,) because changes can be made quickly that are universal. Consistent. And new interfaces can be added easily. Figure 1 is a simplistic example pulled (sort of) from PRC of this face-saving little nugget. You may recognize your terminal emulator / user interface here.

Security: Another great middleware example is the application-level security. This is what your auditors refer to as application controls. Unlike IT controls, which are developer tools, editors and the like, application controls are rules that are baked into the application to authorize access.

One simple approach is to build a table of all your menu options or process names. Those are the keys to the table. Inside the record is information about who — groups, users — can run them, perhaps even a field for time restrictions. You can even put controls in that only allow a function to be run before or after another function. The possibilities are endless, really.

Adding a maintenance screen is nice, so you can edit the options/processes to change who, when, how things can be run. Once you've got this table, the

beginning of every option calls a security check sending in its own name, the user trying to run it, and a flag that comes back allowing or disallowing that user to run that procedure [Figure 2].

These are smart and useful. They are time-saving and efficient at that semi-global level; a middleware level. And you get to tie them specifically to your programming environment and to your application requirements. Many of us already have at least part of this in place. With our rapidly widening range of user interfaces and ever-increasing audit and security requirements, now might be a good time to finish it out.

Digging deeper into your application software, specifically, you'll find gazillions of other opportunities to pull code out of your legacy behemoths into simple, reusable, standalone nuggets. They're especially useful for code used in multiple places but are still good practice even if they are not.

Breaking up a giant monolith that is core to your application and has been working for years and was worked on by nth different programmers is challenging. But go after it like eating an elephant, one bite at a time. You'll get there and the benefits are bountiful.

Compatibility with future GOTO-less environments is just the beginning.

Getting away from giganta-code removes a lot of code-contention issues, as well. It keeps people from stepping on each other's work, having to wait for one another to finish work, or having to merge their changes in to each other's work.

Separating internal subroutines, repeated chunks of code and other nonsense, into these standalone programs brings flexibility and stability. It avoids variable degradation, unclutters complex programs, eliminates level-ridiculous indentation, and provides an infrastructure for reuse.

It's a six-million-dollar win. **IS**

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```
SUBROUTINE APPLSECCK(PROCESSOPT, USERID, YAYORNAY)
YAYORNAY=0
READ PROCESS.AUTH.REC FROM F.SECURITYFILE, PROCESSOPT ELSE PROCESS.AUTH.REC
LOCATE (USERID, PROCESS.AUTH.REC, 1; LX) ELSE LX=0
PROCESS.AUTH.LEVEL=PROCESS.AUTH.REC<2, LX>
BEGIN CASE
CASE PROCESS.AUTH.LEVEL=1
YAYORNAY=1
CASE PROCESS.AUTH.LEVEL=SOME-OTHER-THING
YAYORNAY=SEND-SOME-CAVEAT-BACK
CASE 1
YAYORNAY=0
END CASE
RETURN
```

Figure 2