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## MV Speaks JSON

**Also in this Issue:**

- Building MV Staff Part III
- Finding MV outside of MV

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How do we teach our staff to be analytic in their approach to problems? Have a seat on the analyst's couch and let's explore that. **BY CHARLES BAROUCH**

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# From the Inside

It looks like 2020 will become the year of implementing government regulations in businesses. There are several new federal and state laws going into effect this year, and it is catching a lot of business by surprise.

### California Privacy Laws

California was the first state to pass privacy laws roughly modeled after the European privacy laws, but it didn't take effect until 2020. Since the wording of the laws wasn't as clear as they originally wanted it, there has been some back and forth working through it. While it seems to be more focused on regulating the larger Social Media and Tech company, it will affect smaller companies as well.

There are two major takeaways that everyone should be aware of. The law is not limited to California companies. It affects on *any* company that does business in California if they collect consumer data. So, even if your business is based in another state, if you do business with anyone in California, then you can't collect or receive consumer data without complying.

That's pretty much everybody. Even if you think you aren't affected, consider this: If you are working with a marketing or data collection company, like the ones that provide loyalty programs, or any company that provides data analytics for you, you need to consider your legal position.

There are still some gray areas that are being worked out. For example, if you are using cloud storage for security cameras, the law's wording implies that images on those recordings are part of the consumer's privacy rights. If the consumer states they don't want to be recorded for privacy reasons, then you are not allowed to record them even in public areas. That's how broad this law is.

### New York Privacy Laws

Like California, New York is proposing a bill that would allow people to find out what data companies are collecting on them, see who they're sharing that data with, request that it be corrected or deleted, and avoid having their data shared with or sold to third parties altogether.

The difference is that New York's bill would allow their residents to sue companies directly over privacy violations. While the California law is focused on companies doing more than $25 million, New York's would apply to company of any size.

New York's SHIELD Act will directly affect how data is stored by business software regardless if they are based in New York or not. Just like California's law, it is designed to act as a right for the person who resides in their state regardless of the infringer's location.

### Federal W4 and Payroll

The Federal Government has redone their payroll systems. There are new tax rules and new tax tables. Not to mention, new W2 and Tax forms to be filled out.

While this doesn't affect existing employees of a company, any new employees that have been



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hired in 2020 are required to use the new forms and tables. Many companies have outsourced their HR and Payroll systems, but if you are doing payroll internally still, this may come a bit of a surprise.

### Freelancer Laws

New York and California are also crafting freelancer laws, designed to stop companies like Uber and Lyft from abusing the drivers. The reach is far longer, affecting anyone who freelances, including writers and possibly consultants.

These topics are going to be covered at the International Spectrum 2020 Conference in Tampa, Florida on April 20th. Watch for more information in the coming months!

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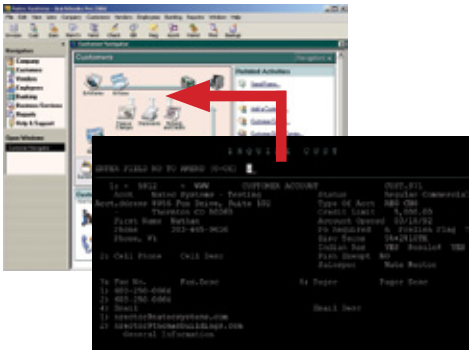

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# Parsing JSON Data with jBASE, QM, and U2

BY NATHAN RECTOR

## jBase

There are many different ways to parse JSON, but if you are working with jBASE 5 or above, then there are tools built directly into the BASIC language.

### jDO

jBASE BASIC allows developers to use the Dynamic Object (jDO) feature to parse JSON into in-memory objects. While the Dynamic Objects has many uses beyond simple JSON name/value pairs, it simplifies parse and interacting with JSON strings.

Figure 1 shows the example JSON that we will be parsing.

For those who don't read JSON, the equivalent in XML can be found in Figure 2.

### Parsing JSON into Memory

The first thing that needs to be done is load the JSON string into memory. This will create an in-memory structure that make accessing JSON easier. In order to enable Dynamic Objects "$OPTION jabba" must be included at the top of your program.

```
JSON.DOCUMENT = JSON.STRING->$fromjson()
```

$fromjson() converts the JSON string into a dynamic object. Dynamic Objects are part of jBASE's Object Oriented Programing features for BASIC.

### Retrieving a Name/Value Pair

Once you have your data collection variable, you will need to access the JSON data in it. Let's say you need to access

```
{ "orderID": 12345,
"shopper": {
    "Name": "John Smith",
    "Email": johnsmith@example.com
},
"contents": [
{
"productID": 34,
"productName": "SuperWidget",
"quantity": 1
},
{
"productID": 56,
"productName": "WonderWidget",
"quantity": 3
}
],
"orderCompleted": true}
```

**Figure 1 JSON Example**

```
<order>
  <orderID>1234</orderID>
  <shopper>
    <Name>John Smith</Name>
    <Email>John Smith</Email>
  </shopper>
  <contents>
    <product>
      <productID>34</productID>
      <productName>SuperWidget</productName>
      <quantity>1</quantity>
    </product>
    <product>
      <productID>56</productID>
      <productName>WonderWidget</productName>
      <quantity>3</quantity>
    </product>
  </contents>
  <orderCompleted>true</orderCompleted>
</order>
```

**Figure 2 XML Example**

the "orderID" information. To do this, you would do the following:

```
CRT JSON.DOCUMENT->orderID
```

In jDO notation, the "->" indicates that orderID is a property of the JSON.DOCUMENT variable.

NOTE: Just a reminder to people new to JSON… JSON is case-sensitive. In this case, "OrderID", "orderID", and "orderid" are all different property values according to the rules of JSON.

### Retrieving a nested Name/Value Pair

The JSON data you are working with will rarely be a simple Name/Value Pair. Generally, it will be nested data. Shopper Name is an example. If you needed to access the Shopper Name, you would use the following JSON Dot notation (not supported in MV) to reference it:

```
echo shopper.Name; \\ output: "John Smith"
```

Using a Dynamic Object, the code is very similar to the JSON Dot Notation:

```
SHOPPER.NAME = JSON.DOCUMENT->shopper->Name
CRT SHOPPER.NAME
```

### Retrieve Data from Arrays

Some JSON strings will have data found in arrays instead of just nested JSON objects. In the example, this would the 'contents' data. If you were accessing this information using JSON Dot Notation, then you would do something like the following:

```
echo contents[0].productID; \\ output: "34"
echo contents[1].productID; \\ output: "56"
```

Using a Dynamic Object, there we first need to figure out the size of the array in order to get the information from each product:

```
PRODUCT.NUM = JSON.DOCUMENT→contents→$size()
-1
FOR PCNT = 0 TO PRODUCT.NUM
 PRODUCT.ITEM = JSON.DOCUMENT->contents->@p
 CRT PRODUCT.ITEM->productID
NEXT PCNT
```

### Formatting JSON

As a byproduct of the jDO functions, there is a cool feature that allows a developer to format a JSON string as human readable indented format. Many time JSON data will be provided in a compressed format. That is, no spaces and line feed, which make debugging JSON issues harder.

```
JSON.DOCUMENT = JSON.STRING->$fromjson()
CRT JSON.DOCUMENT->$tojson(1)
```

### Additional Information

You can find out more about the jBASE Dynamic objects in the jBASE manual under "Introduction to Dynamic Objects".

## QM

If you are working with QM 3.3 or above, then there are tools built directly into the BASIC language.

QM BASIC allows developers to use the Data Collection feature to parse JSON into in memory objects. While the Data Collection feature has many uses beyond simple JSON name/value pairs, it simplifies parse and interacting with JSON strings.

We will be using the same example that we used for jBase as seen in Figure 1 and 2.

### Parsing JSON into Memory

The first thing that needs to be done is load the JSON string into memory. This will create an in-memory structure that make accessing JSON easier.

```
JSON.DOCUMENT = JPARSE(JSON.DATA)
```

JPARSE() converts the JSON string into a Data Collection variable. Data Collection variables in QM can be pass around inside subroutines and COMMON blocks the same way that File handler and dynamic arrays can.

### Retrieving a Name/Value Pair

Once you have your data collection variable, you will need to access the JSON data in it. Let's say you need to access the "orderID" information. To do this, you would do the following:

```
CRT JSON.DOCUMENT{'orderID'}
```

NOTE: Just a reminder to people new to JSON: Everything is case-sensitive. In JSON, "OrderID", "orderID", and "orderid" are all different property values.

### Retrieving a nested Name/Value Pair

The JSON data you are working with will rarely be in a simple Name/Value Pair without the nested data. For example, if you needed to access the Shopper Name, you would use

the following JSON Dot notation (not supported in MV) to reference it:

```
echo shopper.Name; \\ output: "John Smith"
```

Using a Data Collection variable, it is very similar to the JSON Dot Notation:

```
SHOPPER.NAME = JSON.DOCUMENT{'shopper','name'}
CRT SHOPPER.NAME
```

### Retrieve Data from Arrays

Some JSON strings will have data found in arrays instead of just nested JSON objects. In the example, this would the contents data. If you were accessing this information using JSON Dot Notation, then you would do something like the following:

```
echo contents[0].productID; \\ output: "34"
echo contents[1].productID; \\ output: "56"
```

Using a Data Collection variable, it is very similar to the JSON Dot Notation:

```
PRODUCT.ID = JSON.DOCUMENT{'contents',1,'prod
uctID'}
```

While the above code shows you how to access a specific array position, if you needed to process each item in the array you need to get the array size:

```
PRODUCT.NUM = INMAT(JSON.DOCUMENT{'contents'})
FOR PCNT = 1 TO PRODUCT.NUM
 CRT JSON.DOCUMENT{'contents',P,'productID'}
NEXT PCNT
```

### Formatting JSON

As a byproduct of the UDO function, there is a cool feature that allows a developer to format a JSON string as human readable indented format. Many time JSON data will be provided in a compress format. That is, no spaces and line feed, which make debugging JSON issues harder.

```
JSON.DOCUMENT = JPARSE(JSON.DATA)
CRT JBUILD(JSON.DOCUMENT)
```

### Additional Information

You can find out more about the Data Collections in the QM manual.

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## U2 (UniData or UniVerse)

If you are working with U2 (UniData or UniVerse), then there are several built-in functions that simplify the processes.

Starting in Universe 11.1 and UniData 7.3, the U2 Dynamic Objects (UDO) functions were added. The UDO commands are designed for developers to parse Name/Value pair data from both JSON, and in some cases, XML strings. U2 dynamic Objects will load the information into memory, so be aware of how large the data is.

We will be using the example of JSON and XML found in Figure 1 and 2

### Parsing JSON into Memory

The first thing that needs to be done is load the JSON string into memory. This will create an in-memory structure that the rest of the UDO function will use to access the data.

There is one last thing you will need for the UDO functions to work. You have to include "$INCLUDE UNIVERSE.INCLUDE UDO.H" into your program [Figure 3].

The UDOFree() statement is very important. This will clear the JSON document from memory, which is important for security and to avoid Memory Leaks. It is NOT recommended you store the JSON.DOCUMENT.HANDLE in COMMON statements for this reason.

### Retrieving a Name/Value Pair

Once you have your data in-memory, you will need to access it. Let's say you need to access the "orderID" information. To do this, you would use the UDOGetProperty [Figure 4].

UDOGetProperty will return the value of 'orderID' in the ORDER.ID variable, as well as, tell you what kind of information it is in DATA.TYPE. The data type information for function will return if the data is a String, Boolean, Array, or another JSON object. This will be important to know when trying to retrieve the Product data.

NOTE: Just a reminder to people new to JSON… JSON is case-sensitive. In this case, "OrderID", "orderID", and "orderid" are all different property values according to the rules of JSON.

### Retrieving a nested Name/Value Pair

Very rarely will the JSON data you are working with be clear Name/Value Pair without the nested data. For example, if you needed to access the Shopper Name, you would use the following JSON Dot notation to reference it:

```
echo shopper.Name; \\ output: "John Smith"
```

Using the UDO functions, you will still access the data with UDOGetProperty, but you need to use the following steps [Figure 5].

```
IF NOT (UDORead(JSON.DATA,UDOFORMAT_JSON,JSON.DOCUMENT.HANDLE) = UDO_SUCCES) THEN
   * JSON is not formatted correctly.
END
…
…
UDOFree(JSON.DOCUMENT.HANDLE)
```

**Figure 3**

```
 IF NOT(UDOGetProperty(JSON.DOCUMEHT.HANDLE,"orderID",ORDER.ID,DATA.TYPE) = UDO_SUCCES) THEN
    * Unable to find OrderID
    UDOFree(JSON.DOCUMENT.HANDLE)
    RETURN
 END
```

**Figure 4**

```
* Retrieve a handle to the shopper Object
IF NOT(UDOGetProperty(JSON.DOCUMEHT.HANDLE,"shopper",SHOPPER.HANDLE,DATA.TYPE) = UDO_SUCCES) THEN
 * Unable to find Shipper in the JSON Document
 RETURN
END

* Retrieve the Name value from Shopper Object
IF NOT(UDOGetProperty(SHOPPER.HANDLE,"Name",SHOPPER.NAME,DATA.TYPE) = UDO_SUCCES) THEN
 * Unable to find then Name property in Shopper
 RETURN
END
CRT SHOPPER.NAME
```

**Figure 5**

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You will notice that you first access the 'shipper' property from the document. In this case, the value will be a JSON object. Since it is a JSON object, the value returned is a handle which allows you to access the properties specific to that JSON object.

Once you have SHIPPER.HANDLE defined, you use that variable instead of the JSON.DOCUMENT.HANDLE to reference the properties associated with the 'shopper' data.

### Retrieve Data from Arrays

Some JSON strings will have data found in arrays instead of just nested JSON objects. In the example, this would the 'contents' data. If you were accessing this information using JSON Dot Notation, then you would do something like the following:

```
echo contents[0].productID;
\\ output: "34"
echo contents[1].productID;
\\ output: "56"
```

To retrieve these values using the UDO function, there are several steps to go through [Figure 6].

When you do a UDOGetProperty on a JSON property that is an array, then the DATA.TYPE variable will return the value UDO_ARRAY. It would be smart to code your program to test for this before trying to do a UDOArrayGetNextItem to help avoid any assumptions in the JSON data.

### Formatting JSON

As a byproduct of the UDO function, there is a cool feature that allows a developer to format a JSON string as human readable indented format. Many time JSON data will be provided in a compress format. That is, no spaces and line feed, which make debugging JSON issues harder [Figure 7].

### Additional Information

You can find out more about the U2 Dynamic Objects in the UniBASIC Extensions manual. IS

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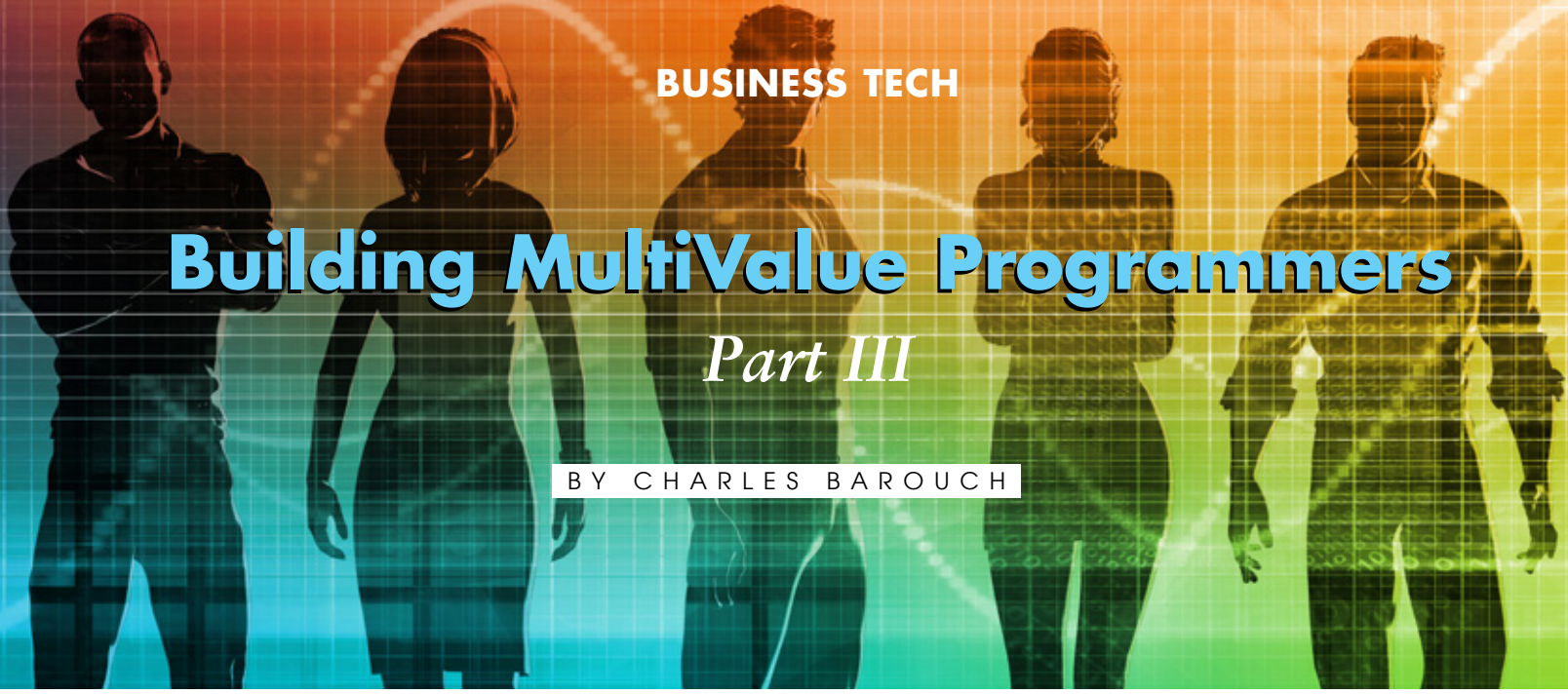
```
* Retrieve a handle to the contentsarray
IF NOT(UDOGetProperty(JSON.DOCUMEHT.HANDLE,"contents",CONTENTS.HANDLE,DATA.TYPE) = UDO_SUCCES) THEN
 * Unable to find contents in the JSON Document
 RETURN
END

* Process each item in the array
LOOP
 SUCCESS = UDOArrayGetNextItem(CONTENTS.HANDLE,PRODUCT.HANDLE,DATA.TYPE)
WHILE (SUCCESS = UDO_SUCCES) DO
 * Retrieve the Product ID
 IF NOT(UDOGetProperty(PRODUCT.HANDLE,"productID",PRODUCT.ID,DATA.TYPE) = UDO_SUCCES) THEN
  * Unable to find then Name property in Shopper
 END
 CRT PRODUCT.ID
REPEAT
```

**Figure 6**

```
* Tell UDO to output as formated
IF NOT(UDOSetOption(UDOOPTION_OUTPUTMODE, UDO_OUTPUT_FORMATTED) = UDO_SUCCESS) THEN
 * Unable to set Options
END
IF UDOWrite(JSON.DOCUMEHT.HANDLE, UDOFORMAT_JSON, JSON.OUT) = UDO_SUCCESS THEN
 CRT JSON.OUT
END
```

**Figure 7**



# Building MultiValue Programmers

## *Part III*

BY CHARLES BAROUCH

Finding people who have no exposure to programming is becoming much less common. That doesn't mean they are well grounded in what they do know. As with databases, I'm going to start very simplistically, not because people are starting from zero, but because far too many people are starting from way down in the negatives.

The school of "but it works" has been producing vast herds of terrible coders in every language. So, I don't teach programming initially, I teach analysis. When people start from a position of "my job is for the problem to stop being a problem" instead of "my job is to personally code our way out of this hellscape-nightmare that every problem is" we get better employees.

### Is It Right?

Go to a Ren Faire and look around. Colorful costumes, amusing performers, sure. But is it accurate? No, not really. It isn't an accurate representation of a time period. It is a facade designed to evoke a feeling. So, I guess Ren Faires are terrible?

> ***We need to ask: What is the thing being accomplished?***

No. They would be if exacting historical precision were the goal. Likewise, before we judge a business situation where MIS is required to solve the problem, we need context. We need to ask: What is the thing being accomplished?

I go to Ren Faires to have fun. I go to soak up a different sort of experience and be with people who have all agreed to suspend disbelieve to some degree. I don't fly into a rage when I find out the bathrooms available to us commoners have indoor plumbing. The fact that I'm allowed to drive there instead of hiking or going by drawn cart… also not offensive.

So my first advocation to a new employee is to understand the problem and the context before leaping in to save the day. Analysis is about doing the homework, not about doing the heroics.

If the goal is slaying the dragon, we may need to fire up the forge and make a better sword. If the goal is for the dragon to stop eating the sheep, we might have a vast array of solutions available that don't involve violence.

### Ask Again, I Dare You

One of the first questions I teach people to ask is: What is the urgency? An answer of "not very" is not a conversation ender. Having a backlog of nice-to-do projects is worthwhile. Additionally, the part that Mary the A/R Clerk is asking about might be a lower priority while still being the tip of a bigger iceberg. Her not-a-rush might also be Joe in A/P's top issue. The person reporting it may not be the best arbiter of the need.

So, why ask it if we can't trust the answer? Several reasons. First off, it conveys respect in their expertise. Secondly, they are often correct. Perhaps more importantly, it is an equalizing ques-

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tion. If Mary demands I do something, she needs to take responsibility for it bumping other things. If Mary assigns it a lesser position on the queue, she cooperates with us in de-drama-ing the problem in question.

I don't discount someone saying the priority is high but I often disbelieve a claim of low priority.

### Is This trip Really Necessary?

The next good question is something along the lines of: What if we just stop doing the entire thing where the problem shows up?

I'd rather show them a different report which has what they need rather than refactor the report they are using to work a little less worse. I'd rather find them a better way.

I can't understate how often the problem I'm asked to solve is a symptom of a solution someone else thought up. If you can get to the root issue, often you can do less work and create more success.

To be clear: This is a problem caused by people trying to do the right thing. They didn't just dump their problem on us, they tried to work out a solution. Most of these stage-two issues come from the homebrew solution failing, combined with the person being emotionally invested in the current path. It is their idea, their contribution. Respect that.

### Remember When You Were Six?

You'll notice that I have barely said anything technical at all so far. Analysis has very little to do with technology. Computers, all of tech, is just one possible route to a solution. Analysis is about people and their expectations. Being an analyst is a human-to-human skill, not a coding skill.

Some people are stuck in a loop. They have a limited approach and they enact it over and over, even when it stops working. Even when it never really worked. Our job as analysts is to help them get at least an inch past their pattern so that better solutions can be found.

Likewise, it is easy for us to get stuck in other people's opinions. If everyone says Joe is a whiner, dismissing Joe's complaints becomes easy. Now, Joe might be. Or, based on how he is treated, he whines but would respond differently to a smidgen of respect.

If we don't want people to endlessly re-enact their past behavior, we need to see them as more than that behavior. There was a sitcom where one of the kids is going back through their report cards and realizes that each teacher started with assumptions based on how the teacher before them had seen the student… the notes in the file. The question became: Am I in an Honors Program because I impressed my Kindergarten teacher with the symmetry of my mud pies?

The brilliant employee sitting before you can give you inaccurate details. The put-upon drudge in the back office might have their finger on the pulse of this particular crisis. Don't judge people on who they were when they were six.

### Teaching That

Respect and empathy are the real lesson. People at ease are more likely to give you more complete information. They are more likely to go along with your systemic, step-by-step approach. And nothing puts people more at ease than being treated decently. Are some people immune? Are some people just terrible? Yep. But I tend to attract better people and better nature from not-better people with this approach. I teach decency both because it is morally right and because it is pragmatically better.

### Negative Review: Zero Stars

People who know me know that I don't think programming should be a job. Not what you expected to hear in a business article in a tech publication, but there it is. I believe that coding — coding brilliantly — should be part of the analysts job. Separating problem, and interpersonal analysis, from coding is a bad path.

is a bad path. Banging on keys to create more lines to maintain is not the best plan. I won't debate if it was ever a good idea in the past, but today, no. Just, no. We have low-code solutions.

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We have no-code solutions. We have non-tech solutions. Can technology, coding specifically, be the right answer? Frequently. Should it be done by people who didn't go to the meeting and are isolated from the people who will have to live with their solutions? I'll give that a firm no.

And yes, programming is a muscle. We should generate metric tons of code early in our career to develop that muscle. We should periodically do it throughout our career to maintain and build that muscle. That doesn't mean that code should all end up in production.

Nathan has raised this flag periodically: If you only code at work and to-task you aren't really improving yourself. Musicians don't only play at the concert. They do the work at home. They try things out alone or with their team. We need to acknowledge that and act on it.

I certainly haven't presented you with a masterclass on analysis here. I've touched on a few things that should be part of any new programmer training. Next issue, we'll start the coding part. Please don't skip over this article in your rush to get them to the next one. There are already enough bad programmers in the world. IS

**CHARLES BAROUCH is the CTO of HDWP, Inc. and the Publisher at HDWPbooks. You can read his writing in International Spectrum, Theme-Thology, Novo Pulp, Pax Solaria, PerehelionSF, and the Interrogative series, which begins with Tiago and the Masterless.**

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# From the Press Room

## Carnation Software Release MacWise Version 20

MacWise version 20 has been released with new version number for 2020. Minor upgrades to version 20 will be released throughout during the year.

MacWise version 20 is a 64-bit app and is compatible with Catalina, Mojave, High Sierra and Sierra.

MacWise version 19 was the first version that was a 64-bit app, released in 2019.

MacWise version 18 is a 32-bit app and is compatible with Mojave, High Sierra, Sierra, El Capitan, Yosemite, Mavericks, Mountain Lion, Lion, Snow Leopard and Leopard. ■

## Kourier Integrator Release 4.7 Now Available

Kore Technologies is pleased to announce Kourier Integrator Release 4.7.

The primary focus for this release is increased performance. Kourier is now up to twice as fast when extracting data from UniData/UniVerse files. This release also improves the overall performance, execution and transparency of Kourier generated SSIS packages with the new Package Execution Manager and SSIS Package Queue dashboard.

These and other improvements support Kourier's continuing mission of being the fastest and most complete ETL and EAI solution for MultiValue and Microsoft SQL Server-based systems.

### Key Enhancements

**Data Export Performance**: Kourier's export engine has been optimized to extract delimited data from UniData/UniVerse files up to twice as fast as previous versions. The actual performance increase will vary depending on the installed versions of the database and operating system.

**Package Execution Manager**: Provides a stable and fault tolerant environment in which to run SSIS Packages. Ensures that all packages are run in a timely manner while minimizing overloading of system resources within the available constraints of the server.

**SSIS Package Queue**: Dashboard to view the operational status of packages by server and account. A drill-down into each status category displays individual package performance metrics and the ability to view the SSIS package output results to diagnose package run-time errors. ■

## New MultiValue Mobile App For Food Trucks

Alcomtec ERIL, a MultiValue Partner in Peru, released Fudtraker, an app for general public use that can be downloaded from Google Play, helps customers:

- Locate their favorite food trucks
- Get directions to the food truck via Google Maps
- View the menu
- Call the food truck
- Follow their favorite food trucks on social media including Instagram and Facebook
- Place orders online (coming soon!)

Fudtraker was built using the Rocket UniData, U2 RESTful services, Angular and Flutter. The Fudtrak app, hosted in Amazon Lightsail, starts with the minimum configuration available and will scale from there as the app evolves and grows.

To read more about it:

https://blog.rocketsoftware.com/multivalue/2020/01/new-multivalue-mobile-app-for-food-trucks/ ■

## New DateTime Functions Coming Soon to UniVerse 11.3.2

Datetime is a very important data type for business applications including law enforcement, fire and EMS agencies. For example, when an urgent event happens across different time zones, the vital and high-quality information Computer-Aided Dispatch software requires includes Datetime and time zone support, making it possible to store consistent information about the time of events and transactions.

It's for these reasons that one of our partners requested some new features to make it more convenient to use Datetime in UniVerse application development on Linux and Solaris.

Internally, datetime objects are stored as a single 64-bit integer representing the number of milliseconds since the Unix epoch: midnight UTC of January 1, 1970. All the datetime before the Unix epoch are represented as negative numbers.

In Universe, we've done three things to support the UTC datetime.

1. New variable @TZ (time zone support).

2. A set of new BASIC functions in relation to datetime.
3. New conversion code for Datetime(ICONV/OCONV).

Found out more at:

https://blog.rocketsoftware.com/multivalue/2019/11/new-datetime-variable-coming-soon-to-universe-11-3-2/ ■

## Zumasys Hires Robert Burke and Promotes Mike Wright to Director of Technology

Zumasys announced that Robert Burke, former Worldwide Director of Technical Support for Rocket Software, has joined the company as Manager of Technical Support. Robert brings more than 20 years of MultiValue experience in support, Quality Assurance (QA), migrations, and professional services. He will be based in Zumasys' San Clemente offices.

Zumasys also announced the promotion of Mike Wright to Director of Technology. Since early 2019, Mike has been instrumental in his role as Senior Software Developer with Zumasys, collaborating with clients on modernizing their systems and leading some of the company's community-related efforts with MV Basic and www.pickmultivalue.com. Prior to joining Zumasys, Mike Wright was the VP of Information Technology for Equiant Financial Services, a D3 end user in Arizona.

### Introducing Robert Burke, Manager of Technical Support

Robert began his career at Pick Systems (subsequently TigerLogic), where he was first recruited to work with some of the company's largest customers. After making his way into QA, he quickly became Director of Technical Support at TigerLogic overseeing the D3 database. When the PICK segment of TigerLogic's business was acquired by Rocket Software, Robert was made Worldwide Director of Technical Support and QA over all MultiValue databases including D3, mvBase, Universe and Unidata.

Having led support teams for over 20 years, Robert has a depth of experience providing timely, professional support for customers with a diverse array of requirements. He also has experience with Zumasys' databases jBASE and OpenQM. Now the Manager of Technical Support at Zumasys, Robert will play a critical role in developing and supporting the unified support program for the company's growing portfolio of offerings which include AccuTerm, jBASE, MVConnect, MVDashboard, and OpenQM.

Having gone through multiple mergers and acquisitions during his career, Burke is adept at integrating diverse teams and processes. Burke explains, "Each acquisition comes with new developers, QA teams, and support programs—all things that need to be standardized across the support organization. As Zumasys continues to grow, I'm looking forward to building a world-class support program that can scale with the business."

### Announcing Mike Wright, Director of Technology

Less than one year after coming on board as a senior member of the Zumasys development team, Mike Wright has been promoted into a new role as Director of Technology. Mike's ability to help customers migrate to new databases like OpenQM and jBASE and implement web-based interfaces while maintaining their valuable business logic has been essential to Zumasys' success and recent growth.

In his new role, Mike will be responsible for technology design and product vision and will serve as a key escalation resource for all technical departments. As Director of Technology, Mike will continue to lead technical teams to drive innovation for Zumasys while developing and supporting the company's evolving portfolio of solutions. ■

# MARKETPLACE

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Mentors give developers the ability to ask industry experts for direction, code examples, and/or just ask them to see if something makes sense. Sometimes, all you need is a resource or example to start or complete a project.

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### WANT TO BE A MENTOR?

We have many retired or semi-retired professionals out there that would love to share their knowledge of MultiValue development. If you are one of them, please contact us to see what mentoring is all about.

E-mail: nathan@intl-spectrum.com

BY KEVIN KING

# Finding MV Outside of MV

In the wide, wonderful, and sometimes wacky world of MultiValue (MV), we tend to see things as either MV or not MV. However, our perception does not dictate reality. The wheels of database technology continue to turn and things change in unexpected ways.

As a result, I propose a question that some might view as ridiculous at best, heresy at worst. Ready for the question? Buckle up — here goes: Might your next MultiValue database be … SQL?

Before you answer that — or send a hitman — let's establish some context.

### SQL is Flat, MV has three dimensions

Since being named the winner of the Zumasys idea contest, I've come under a bit of fire for proposing that MV needs to be modified to extend beyond three dimensions. I had suggested that there could be significant benefits to embracing encodings like JSON which supports multidimensional structures to a practically unlimited depth. In addition to the dimensional support, JSON supports internationalization using UTF-8 out of the box and can encode the full Unicode character set if needed, it's easy to work with, lightweight to transport, and well supported throughout the entire world of technology. And hey, it already can support MultiValue-type data.

*… is there anything in the wild now that has the benefits of MultiValue…*

Unrelated to the merits or demerits of that idea, this became a flashpoint for others to share their ideas with me. What followed was a series of online and offline discussions about the potential benefits of adding more schema support to MV, collection nesting, storage and retrieval optimization, and a whole host of other great and crazy ideas. The idea of what MultiValue could be was evolving beyond adding dimensions.

This then started me thinking… is there anything in the wild now that has the benefits of MultiValue plus some of these other things, like strong schema support or nested collections? There's several NoSQL options out there besides us now. Common sense would dictate looking that way first.

Certainly, the SQLs of the world would not do the kinds of things that we're doing for, because hey, they're not MultiValue… right? Considering the various products that have built a MultiValue system running on SQL databases, maybe there is an SQL option that fits some or all of our wishlist.

### Stuck in the Codd Model or Low ACID

When you compare most SQL implementations to MV, the differences are stark. Most SQL solutions, for all their billions of dollars of development, still insist that data is remarkably ***flat***. Dr. Codd still rules the roost with these platforms as they remain steadfastly committed to first — and second and third — normal form table structures.

On the other end of the spectrum, many NoSQL products also vary significantly from MultiValue. For example, MongoDB and CassandraDB are both great for scalability, redundancy, and distributed data, but they veer farther away from the ACID compliance, structure and query-ability that both SQL and MultiValue provide.

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International Spectrum is currently working on updating membership information for all our readers. We always like to have the most current information so that we can keep you informed of current news in the MultiValue Market.

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intl-spectrum.com/membership

Having said that, both SQL and NoSQL options have MultiValue beat hands-down when it comes to out-of-the-box connectivity. There are drivers available to connect just about everything to just about any database that isn't MultiValue.

In my opinion, that right there is a huge problem for MV. SQL databases also have very complex and tunable query planners to allow database designers the flexibility to optimize retrieval strategies. While we have options in MV for improving queries, sometimes a solution calls for more than just another index. There are plenty of ways to deal with this, but they involve rolling up our sleeves more often than not.

### Post Fix?

If only there existed a database that allowed both the flexibility of NoSQL with the structure and index support of SQL, could house complex multi-dimensional and unstructured data, plus a healthy dose of open connectivity. Both structured and unstructured, living in perfect harmony. Now THAT would be a trick.

Yet, that is exactly what PostgreSQL intends to do. PostgreSQL is a SQL database with some MV-like leanings. It's not **exactly** SQL and it's not **exactly** MultiValue, but it's an interesting hybrid that does a lot of things we admire in both camps, and most of it is done very well. Now, there are readers that will wince just a little bit every time they read the word SQL, so for our purposes today, let's just call it Postgres.

### Old and Reliable

One of the strong arguments for MultiValue is that it has been around the block and proven itself over and over again. Postgres isn't a newcomer either.

Postgres is an +30-year veteran of open source development that can be installed easily using the package manager of your favorite Linux distribution. It can be downloaded from postgresql.org and installed on Windows desktops and servers as well. It has a command line, like most SQL and MV databases, and in the spirit of SQL, all updates and queries are done using SQL data manipulation language (DML).

There are two intriguing features of Postgres that may be of interest to the MV world. First up is the ability to create compound data types using existing data types. This allows you to create new data types to represent a row that might be stored in MV as a multi-valued or sub-valued field. However, instead of being separated over multiple attributes, all the data for that row is kept together according to the data type as you've defined it.

Say, for instance, that you want to store the two lines of an address, plus the city, state, and zip together. This could be done by creating a new data type for the address. Let's call it "t_address":

```
CREATE TYPE t_address AS (
 addr1 text,
 addr2 text,
 city text,
 state text,
 zip text
);
```

Once this has been created, it can then be used when creating a table. By adding one column of this type to the table, you're really adding 5 different subfields into that one column. You can then address each of the subfields directly when inserting or retrieving data from the record.

The second, and (I think) more interesting feature of Postgres as it pertains to MV developers is the ***array data modifier***. In short, any field anywhere can be stored as an array — i.e. multiple values — all in the same field. This is where Postgres thumbs its nose at Dr. Codd's rules of normal form, embracing the wide world of MultiValue.

Using our t_address example earlier, one could create a table with a simple address like this:

```
CREATE TABLE customer (
 name text,
 address t_address
);
```

To convert this into a multi-valued list of addresses, one simply needs to add "[]" to the end of the t_address data type, like this:

```
CREATE TABLE customer (
 name text,
 address t_address[]
);
```

Independently, these two features are quite powerful. Used together, however, they vault Postgres into the realm of being a database for everybody — whether flat or dimensional.

All this is fine for data that require structure, but what if you need some additional thing that is more free-form? In that case, Postgres has two data types that allow JSON storage, right in the row as a first-class column. The "json" data type stores raw JSON that must be parsed to be used, whereas the "jsonb" data type stores a binary, pre-parsed representation of the structure that can not only be queried like regular fields, values deep inside of the JSON can be indexed and leveraged in query planning and execution.

There is much more to Postgres than just this, but I find these to be particularly interesting features to those of us with long careers in any flavor or flavors of MultiValue.

I am by no means a Postgres cheerleader. I want you to see the good and the bad. With that in mind, let's take a peek at the dark underbelly of Postgres, at least in terms our MultiValue perspective.

First, because Postgres is fundamentally SQL-based, it uses data manipulation language constructs like INSERT and UPDATE to do updates. This may be great for flat tables but it is really pretty awful for doing multi-valued nested inserts and updates from the command line.

Removing a specific value from a multi-valued array is not a standard feature of the DML, but it can be accomplished with a PLSQL procedure. Interestingly, you can rewrite an entire "attribute" with nested structures intact, not unlike what we might do with a WRITEV on a MV record. However, updating specific data elements in nested structures requires some pretty tricky SQL chicanery.

Speaking of PLSQL, Postgres has its own procedural language. Or to be more exact, there are four supported procedural languages (including Python) plus an entire framework for adding in additional languages for writing stored procedures. Of course, none of these are mvBASIC, but it would be an interesting study to see if the procedure language framework could be used to bridge that gap. Another time, perhaps?

Spectrum has already published code [http://www.intl-spectrum.com/article/r992/] to bring parts of the OCONV to python. That would be one way to bridge the gap. JBASE and MVON# cross-compile mvBASIC to other languages. Someone could make a cross-compiler to convert mvBASIC to python or another supported language, allowing us to port mvBASIC programs with little or no changes.

To be clear, SQL procedural languages aren't like mvBASIC in that you don't write the entire application in SQL languages. The business logic typically exists in some separate repository, whether that be written in C#, PHP, Go, Dart, JavaScript, or any number of other languages in the wild. But in recent years, more work is being done outside of the MV environment as more of the front end moves to the web and apps. And since python is on both lists, procedural and application...

The important takeaway from all this is simply to acknowledge that MultiValue isn't as far outside of the mainstream as we might otherwise think. Both NoSQL and PostgreSQL support features that are important to us, while not sacrificing the fundamentals that have made them successful. When it comes to multi-valued data, the mainstream has now come to us.

More importantly, the more MultiValue people that get involved with products like this, the more likely it is that we can take the awesomeness that we know as MV and use it to influence the world. <insert_evil_laugh_here/>. IS

**KEVIN KING is the President and Chief Technologist with Precision Solutions, Inc., a leader in technology solutions, support, and training.**

## Feedback

***What came first, the letters or the letters-to-the-editor department?***

International Spectrum Magazine has a Feedback Department, sometimes known as Letters to the Editor.

We want to hear your comments, your reactions, your agreement or disagreement with what you see. Also, do not hesitate to let us know about things happening in the MultiValue Community we may not have heard about yet.

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