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INTERNATIONAL Spectrum

THE MULTIVALUE TECHNOLOGY MAGAZINE | MAY/JUNE 2013

INTERNATIONAL SPECTRUM 2013 MULTIVALUE CONFERENCE

What Were the Hottest Topics?

Also in this Issue:

- Automated Unit Tests
- A Case Study in Business Tech
- Mobile Apps with O4W – Part 2

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6 International Spectrum MultiValue Conference 2013 Recap — The Most Sought-After Information

There were a variety of sessions presented at the 2013 International Spectrum Conference. We thought it might be interesting to take a look at the "Top 10" attended sessions to see if there was any pattern that might indicate what topics attendees were most interested in this year. The results may surprise you. (Or not.)

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8 **Automated Testing Part 2 – Unit Tests** Unit Tests are a fundamental building block in the modern Test Driven Design method of software development. Unfortunately, most of the literature on the subject concentrates on object-oriented design and programming. Even though several of our MultiValue platforms now support object-orientation, our legacy code from years ago does not. Second in a series, this article explores both the concept of Unit Tests and how to implement them in our non-object oriented environment. **BY BRIAN LEACH**

10 **Business Tech: Case Study** We technical folks tend to look at businesses and immediately start thinking about what technology it could use. Many times, however, we would benefit by first stepping back and learning about the business model. This real-world case study explores how that can work.. **BY CHARLES BAROUCH**

16 **Building A Mobile Application With O4W – Part 2** Part 1 of this series discussed Revelation Software's O4W web development toolkit, and how it has evolved since its introduction to support mobile devices. In Part 2, we'll take that same routine and enhance it to provide more interactivity, user input, and advanced interface elements. **BY BRYAN SHUMSKY, REVELATION SOFTWARE**

From the Inside



There has been an issue that our community has been battling for years — the lack of junior and entry level developers. One of the things that I noticed this year at the Spectrum Conference was that the age demographic of our senior developers is dropping. What this tells me is that our junior level developers are becoming our senior level developers.

The lack of junior level developers has been a hindrance to the adoption of MultiValue technologies, as well as a constant question that new CIO, CTO, and CEO bring up whenever they contemplate moving from their stable, but CTI (Command Line Interface) MultiValue system to something else.

We hear this all the time: "I can hire .NET/JAVA/etc. programmers directly out of college and they will already know how to do 'X'." I can hear you screaming at me already... it's more than just that you dummy! We all know that what these people are really stating is more than just this question, but it is an easy thing to pick at.

What businesses want most is something that helps the bottom-line, has good total cost of ownership (TCO), and is easy to train new developers on. Unless you are dealing with someone who thinks SAP is the correct solution.

As MultiValue DBAs and developers, we know that TCO of MultiValue Databases and Applications is much lower, not to mention the ease and speed to alter the business rules, processes, and data schemas. As the database providers add new features, APIs, and handle the general Buzzword compliance, what is lacking from MultiValue Databases and technologies has more to do with its advantages over our competitors instead of an IT buzzword or trend disadvantage they are trying to fill.

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. That takes time and money as well, so businesses expect other sources to do this for them, and in turn expect the new developers to just exist.

To address this, International Spectrum has created a training program through existing college Internship programs. What is this you ask?

International Spectrum is working with college students that already have some training in development, to bring them up to speed on MultiValue databases and philosophies. In the process of this training, we are evaluating coding, communication, and documentation standards and quality.

What does this mean for you? Well, your business will get access to junior level programmers who have worked with MultiValue tech and databases at an entry level.

What do we we need from you? Sponsorships. Just like with other companies, the time and resources needed to train new developers still exists. The advantage that International Spectrum has is that we can train multiple people at once, in the same way, and not have to worry about running your day to day business.

To find out more about this program, and how you can help support it and make it grow, the just go to the following link:

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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

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The Most Sought-After Information

In the last issue (March-April 2013), it was pointed out that 78% of the various sessions and presentations were providing non-vendor related information (Cliff Notes, p. 30). There were a variety of topics, and we thought it might be interesting to take a look at the “Top 10” attended sessions to see if there was any pattern that might indicate what “hot topics” attendees were interested in.

What we did was take all non-vendor related sessions and also excluded presentations, such as at lunch, in which attendees might have been present by default rather than a specific, conscious choice of topic. We then ranked these in descending order by attendee count, including ties where two or more sessions may have had the same number of attendees. (This is why our “Top 10” contains more than 10 sessions.)

We then categorized the top sessions into generalized areas: web/mobile, integration with non-MultiValue products and systems, and other development topics. Here's the breakdown for those categories.

- Web/Mobile 45%
- Integration 35%
- Development 20%

As you can see, topics about making your MultiValue data and applications accessible via the web and mobile devices was the most sought after item of information. Next was information about how MultiValue systems can live in an environment that also contains a number of non-MultiValue platforms. And finally, ongoing development topics rounded out the mix.

To give you a better idea of what type of information was covered in these three categories, here is a brief description of the top sessions. We have listed them in alphabetical order with no indication of where in the ranking they placed because

we wanted to concentrate on the trend and not imply any type of competition.

Android-Developing and Beyond

Tablets, Phones, Smart Home Panels... Android Development will take you into the future. This session will provide you information on what software you need and what steps you will need to develop for these systems and hardware.

ASP.NET MVC for MultiValue

ASP.NET MVC (Model-View-Controller) is a natural extension of developing in .NET and MultiValue. MVC allows you to simplify and enhance your exist-



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Monday Lunch Presentation

ing MultiValue applications, while keeping the power of Microsoft .NET UI and Webdesign.

Build MultiValue WebAPPs with HTML5

WebApps are a natural extension of your website, but they do require a few redesign features to make them work on Smartphones and Tablets. See how jQuery, HTML5, and CSS3 combined can made a dry and featureless website into a mobile WebApp that works with any device.

Building MultiValue Excel Add-ins

This session will talk about how-to create Microsoft Excel Add-ins. We will look at creating Excel Add-ins that interact with your MultiValue Database.

Building RESTful Interfaces

REST (Representational State Transfer) is a lightweight way of presenting Web services. It is often used instead of SOAP (Simple Object Access Protocol) in mobile applications because it does not require as much processing overhead. This session provide an overview of REST and show you how to implement RESTful web services within the InterSystems platform.

Disaster Recovery Planning

Disaster Recovering planning is usually much like closing the barn door after the



Between Session Networking

animals have escaped. Most planning is done after a disaster has taken place. Many times the disaster is minor, but planning for outages that span any length of time can be an eye opener.

Generate Word Documents on the Fly

This session will show you how to create word document on the fly by mixing templates and data from your MultiValue database. This is a web application you can use to create any type of word document.

GUI and Event-Driven Programming Design

You have been creating green screen/command line programs for years, but now you starting to create applications in Windows or the Web. Where do you start? How do you process data and validation? When should you read/write/lock your data?

How to talk to an SQL programmer... without swearing

Part of our jobs these days is to work with non MultiValue developers — usually relational database folks speaking SQL-ish — and find ways to share data in both directions. This session explores some of the communication pitfalls, misunderstanding, and commonalities that we and “they” run into and how to overcome them.

Mobile (Smartphone/ Tablet) Application with PhoneGap

This session will explore the development of MultiValue Smartphone and Tablet applications using PhoneGap.PhoneGap is an easy way to create and deploy native and hybrid applications for your business. See how simple HTML, CSS, and JavaScript can be merged with your MultiValue enterprise to create a application quickly and with native functionality.

MultiValue Mobile Applications - WebAPP vs NativeAPP, vs HybridAPP

You now need to create a mobile application for your company, but you don't know which one: WebAPP, Native, or Hybrid. This session will talk about how each one works, and what you need to know to develop each one. This is an over-



Exhibit Hall Vendor Discussion

view session that will help point you the right direction.

MultiValue Reporting with Microsoft Excel

Excel is a popular media to review and work with MultiValue Data. It provide an easy way to provide formatted output, and data mining using pivot tables. In this session we will show you how to extract MultiValue data and import it into Excel using subroutine calls. We'll talk about how to add data to individual cells, as well as do bulk updates of cells and rows.

Simply Implementing Universe Web Services

Attend this hands on demonstration of implementing Universe Web Services. Discussions on best practice for communication to the web service, step by step creation of a web service, and real live examples will be provided.

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A special thank you goes to Susan Phillips for the conference photographs.



Automated Testing

Part 2 – Unit Tests

BY BRIAN LEACH

In the first article in this series I wrote about the case for automated software testing of MultiValue applications. In this article I will be looking at the first stage in automated testing — the unit test.

Unit testing is the first step in any testing strategy and lies at the heart of modern programming practices that encourage a Test First approach to development.

Test Driven Development (TDD) encourages a tight coupling between unit testing and programming in which developers approach any new task by first creating their unit tests and then filling out the code required to pass that test, generally in a very short cycle — a few minutes at most. By doing this, the proponents argue, you not only end up with good test coverage, but also a better understanding of what your code is meant to achieve (you cannot write a test until you know what the code should be doing), and you are forced into adopting better design patterns. You are also more likely to stay focused on the requirements and also, through constant practice, to become as accustomed to writing tests as to developing code.

Unit Tests

So just what makes a good unit test?

Let's start with a standard definition, drawn from *"The Art of Unit Testing"* by Roy Osheroke:



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You are more likely to stay focused on the requirements and also, through constant practice, to become as accustomed to writing tests as to developing code.

“A *unit test* is an automated piece of code that invokes the method or class being tested and checks some assumptions about the logical behaviour of that method or class.

“It can be written easily and runs quickly. It's fully automated, trustworthy, readable and maintainable.”

As you can see from the definition above, the concept of unit tests really fits well with modern, object-oriented languages. If you are developing in a language such as C# or Java, the class structure allows you to write your code in small, discreet functions that can be quickly and easily tested.¹

The reaction from most developers on encountering Test Driven Development (TDD) for the first time is that it is a new demand on an already over-stretched and under-resourced pool. And certainly, just as with anything new, learning to adopt TDD does take time. But with the right frameworks and particularly for new code, actually creating unit tests is not as burdensome as it first appears.

Imagine that you are using C# and wish to write a function very familiar to MultiValue developers — the DCOUNT() function. You want to add this to a new Utils class as a static method and have chosen to adopt a test first approach. Fortunately, you are using Visual Studio which comes with a built in unit testing framework, one that lets you generate a test project to mirror your class library.

Before you even create your Utils class or write your DCount method, you can create a test class and start to code up your test. You know that your DCount method will need to take a string and a delimiter and should return the number of delimited entries as an integer, so you can create a test case (fig. 1).

Even if you have never seen C# you should be able to follow the test. Even this simple test encapsulates the main properties of a unit test.

Firstly, it calls one function only and uses predictable data to test expected outcomes. Higher level tests may introduce more complexity and context, but for a unit test we are first and foremost concerned with speed and predictability.

Secondly, the test sits outside the function and examines its inputs and outputs. These are checked through an assertion, and the Visual Studio tests include a range of different assertion types (Assert.AreEqual, Assert.IsTrue, Assert.IsFalse etc.) that make

1. The academic name for this is the Single Responsibility Principle (SRP) that dictates that each function or method should have one, and only one, purpose. Whole books have been written on the art of splitting down functions that are doing too much and removing dependencies to encourage isolated testing. Clean Code, by Robert Martin, expends many pages on discussing refactoring for clean unit testing and should be on every programmer's shelf.

the test easy to read. The test is not part of, and does not alter, the production code.

Finally, creating the test requires only a minute or so of typing before we can build the method to pass it and we can verify the method instantly. Visual Studio has a Run Tests button to automatically run all tests in the solution in a random order so we can make sure it hasn't impacted anything else (fig. 2).

So, is our test complete? It passes, but we have not considered any boundary conditions. What if we pass a null string or the delimiter is empty, or the delimiter is a substring? We need to test each of those conditions to be confident, so you can extend the test as you improve your code: it is a matter of style whether each of these cases should be separate tests (fig. 3).

As each case is added, the test is re-run and any improvements are made to the code to ensure a pass. The whole cycle is typically less than a minute, so the unit testing does not disturb the flow.

Unit Testing in the MultiValue World

So far we have looked at unit testing from a modern language perspective: but what

about our functionally rich but procedural server code? Let's go back to that definition of a unit test above. Just how much of that is directly relevant to MultiValue code?

Classic MultiValue Basic does not decompose down to the same extent as OO code. A typical routine may contain many internal subroutines, each of which would correspond to an internal method on an OO class. Whilst this makes for well structured code, internal subroutines are by definition enclosed and not surfaced for outside inspection so the only way to test down at that level is to instrument the code, and whilst that is possible it violates the principle that the test itself should not alter the production code.

So instead we have to consider our own definition of a unit test. It is easy to get lost in semantics when discussing the different levels of testing, but the purpose of unit testing is really to quickly check the *minimal testable unit*, as opposed to full system or process testing (integration and acceptance testing). In our case, that minimal testable unit maps neatly to an ex-

ternal subroutine or, where supported, an external function.

Functional Decomposition

Unit testing begins with good design and with the desire to make your system testable. The heart of any well designed MultiValue application is the external Basic subroutine — external subroutines form the (hopefully documented) API for your application, and should embed all the validations, business logic and activities of your system. They prevent unnecessary duplication, reduce source code control conflicts and ease development. They can be surfaced through a myriad of APIs so your application can participate in the wider world.

Refactoring an existing legacy system will be covered later in this series: in a perfect state, your application will expose reusable subroutines that perform every action that makes up your system. That then is the recipe for a testable system.

Consider the script in figure 4 written in mvTest as part of a suite used to test a support system. The test calls a subroutine re-

Continues on page 14

```
[TestClass()]
public class UtilsTest{
    [TestMethod()]
    public void DCountTest()
    {
        string text = "ONE,TWO,THREE,FOUR";
        string delim = ",";
        int expected = 4;
        int actual = Utils.DCount(text, delim);
        Assert.AreEqual(expected, actual);
    }
}
```

Fig. 1

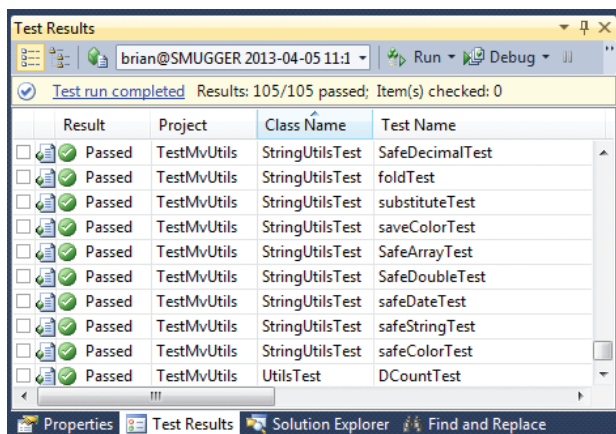


Fig. 2 Unit tests in Visual Studio 2010.

```
[TestClass()]
public class UtilsTest{
    [TestMethod()]
    public void DCountTest()
    {
        string text = "ONE,TWO,THREE,FOUR";
        string delim = ",";
        int expected = 4;
        int actual = Utils.DCount(text, delim);
        Assert.AreEqual(expected, actual);

        // empty string
        actual = Utils.DCount(string.Empty, delim);
        expected = 0;
        Assert.AreEqual(expected, actual);

        // null string
        actual = Utils.DCount(null, delim);
        Assert.AreEqual(expected, actual);

        // empty delimiter
        actual = Utils.DCount(text, string.Empty);
        Assert.AreEqual(expected, actual);

        // multi-character string
        delim = "EE";
        expected = 2;
        actual = Utils.DCount(text, delim);
        Assert.AreEqual(expected, actual);
    }
}
```

Fig. 3

Case Study

BY CHARLES BAROUCH

Lineage

My Grandpa Charlie — I'm named after him — used to move to a new town, start a business, and sell it off once it was profitable. He did the hard work of making it happen but didn't like to stay involved. Between businesses I've worked with, ones I've worked for, and ones I've owned, I have started several businesses myself. I'm just not as keen about walking away.

Presently, I'm involved in starting up five businesses. In two cases, I'm doing some mentoring. In one case, my wife and I are building something new. One more I can't talk about, yet. And, the last case, LAFP, is one where I am a partner. I'd like to use LAFP as a way to talk about business and technology a little differently.

Birth Pangs

LAPF is short for Love At First Page. It is intended to be a *dating site for books*. The idea is that you can fill out a questionnaire, like you would on a dating site, but instead of some potential lifemate, we would match you to some enjoyable reading.

David Arney put this idea out to see if he could attract any attention. Joseph Persia egged me into getting involved before he split off to try a different approach to the same business. Another possible partner, Steve Burham, stepped back because of work commitments to his day job. That

As with every other business, we tech folk do better if we understand the model on which the company is basing itself.

left three of us, David, Karen Conlin, and myself.

There could be a whole article derived from that last paragraph. We did the fast-forward version of what many multi-partner start-ups do. We fractured. To be clear: if you are in this situation, keeping everything on good terms is good sense. If Joseph's split-off results in a service which also gets to market, then the cost of educating the public that this category of service exists just got cut in half. Having competitors makes this a market segment.

As to Steve, he may find himself drawn back into the idea — on our team, on Joseph's, or on his own — and that means that goodbyes can be temporary.

Tech as a Business

Since this is going to be a web-based service with a strong algorithmic aspect, you might mistake this for a tech business. It shouldn't be. It should be a math business. The statistics, modeling, and updating of the questions are the key to success. So long as the user experience (tech and design) are acceptable, the math will make the difference.

This is a Business Tech column, so I will be focusing on the technical parts. That does not mean they are the most important.

As with every other business, we tech folk do better if we understand the model on which the company is basing itself. As we see it, we have four audiences: (A) Readers who don't want to use the match-making but would like to browse any site which has books, (B) Readers who want a match, (C) small press publishers and self-published authors who want their books to be found more easily, (D) people who want to advertise to the previous three.

That fourth group is problematic. On the one hand, ads mean funds. On the other hand, good ads distract people from our site. On the third hand — *yes, yes, I know I said we'd be good at math* — bad ads can chase people away from the site. We will be holding off on talking about ads for now.

The third group is the real focus. All of our math and matching assumes that we have a large enough database of books. To satisfy the first reader, we have to have enough variation in our selection to find his or her perfect book.

Actually, perfect is the enemy of the good. Even if we had every book indexed to our algorithm, we are much better off recommending good books over perfect books. This is why Love At First Page is a working name and not the final name we intend to use. Love is too big a promise.

Since this is question-driven, we need to look closely at the mechanics of how we will ask questions. While I could write this all in some flavor of our beloved Basic, I will be building this part in PHP. Even though the specific questions we ask publishers and authors will change over time,



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the mechanism is likely to be consistent; we need to allow responses to create branches. Anyone who has written telemarketing software will recognize this approach.

The challenge is to make the data (questions, in this case) manage the branching so that the software does not need to be re-written as the algorithm matures. I'm looking at a data architecture where the data will include two "tree" identities: (1) this question lives as part of branches 6, 7, and 9, and (2) this question — on a yes — switches us to branch 18 or — on a no — leaves us on the current branch. In code this would be something like this:

005 6]7]9
006 Y]N
007 18]0

We will have to account for answers beyond yes-or-no, and allow for some or all answers to be significant in their ability to change-up the questions which follow.

Continues on page 15

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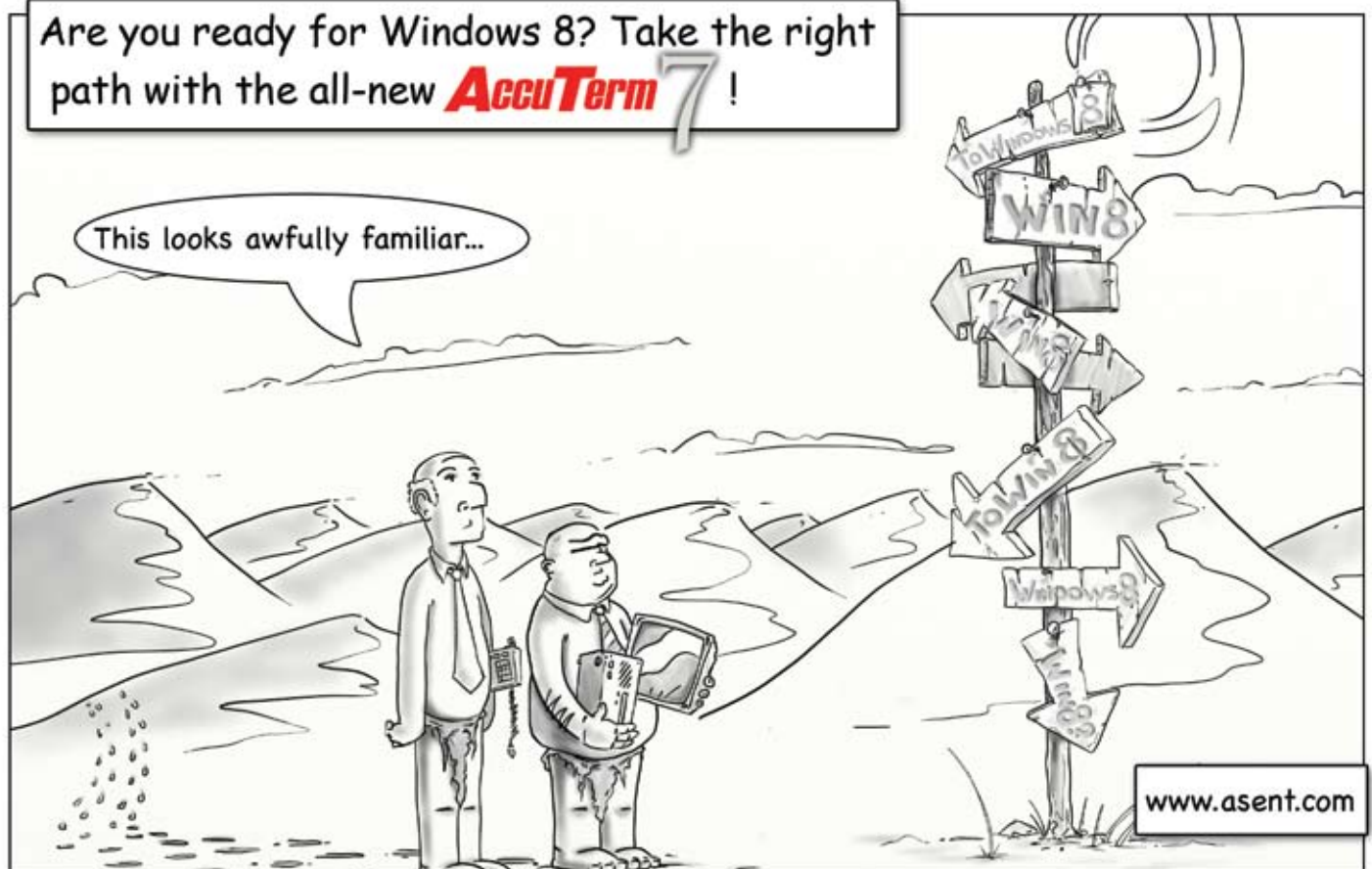
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Oklahoma City Housing Authority Implements Informer Dashboards for Data Visualization

Challenge: Reduce Time Spent Creating and Customizing Dashboards

For the Oklahoma City Housing Authority (OCHA), who provides housing and rental assistance to low-income people and their families with over 7,000 dwelling units, accessing important data was often a frustrating, complicated task. The Department of Housing and Urban Development (HUD) has various reporting guidelines for housing authorities that require a significant amount of data to ensure compliance. More urgently, HUD is beginning to require dashboards as a way of presenting this data and OCHA had no easy way of quickly and easily developing the necessary visualizations.

Solution: Empower Management with Self-Service Reporting

At the recommendation of their solution provider and Entrinsik Partner, Progenixx, OCHA selected Informer Dashboards to quickly and easily create and share data visualizations. Informer Dashboards provides OCHA with interactive data presentation options requiring almost zero training with no programming needed to create. Charts and visualizations are created using an intuitive drag and drop web-based interface and real-time rendering refreshes dashboard widgets automatically as the data is changing.

Progenixx worked with OCHA to build standard reports and dashboards that tracked key metrics like new hires, new applicants, open work orders, purchase orders, lease-ins, work orders, inspections and more using charts and gauges that provide management with multiple data views on one screen. The web-based views are highly customizable and all data is secured down to the data ele-

ment. For example management at OCHA now have access to a dashboard entitled "Percent of Emergency Work Orders Closed Within 24hrs" which they use to quickly monitor efficiencies and then drill into specific orders for additional analysis. "We found Informer Dashboards very flexible and easy to develop and modify," said Greg Clarke, Director of Technical Services at Progenixx. "In fact it was more difficult to determine the desired output that management wanted than to create the dashboards. The drill down capability is especially useful, allowing management to drill into specific data to determine actions to take quickly."

Results: Desktop Integration Quickly and Easily Delivers Real-time Data

After incorporating Informer Dashboards, OCHA is finding data reporting easier than ever. Executives and staff are able to quickly and easily access information they need to make data-driven decisions in and are now prepared for HUD's dashboard requirements. OCHA can now track and analyze critical information in real time to improve efficiencies and identify issues that require attention using data comparisons and alerts.

David Calvert, Information Systems Manager at Oklahoma City Housing Authority, is excited to be able to expand data discovery capabilities to management without the need for technical training. "Informer's easy-to-use interface allows management to access data they need to see and customize data views themselves, taking the burden off IT staff," said David. "I've been very impressed with Informer Dashboards; it's made the entire re-

porting process much more efficient.”

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InterSystems Declares Winner of Worldwide Student Programming Competition

InterSystems Corporation, a global provider of advanced technologies for breakthrough

applications, today announced the winner of the InterSystems Student Programming Competition at its annual Global Summit 2013 customer conference in Orlando, Fla., April 7-11, 2013. The annual award recognizes outstanding student programmers worldwide who develop innovative applications using InterSystems technologies.

Andrii Huk, a student at the National Aerospace University's Kharkiv Aviation Institute in Kharkiv, Ukraine, accepted the award on behalf of his team, which includes students Maxim Babich, Pavel Shved, and Alexander Myroshnyk. Under the guidance of project advisor Aleksandr Leshchenko, the team created supporting tools for a dynamically reconfigurable information

system using the InterSystems Caché® high-performance database and InterSystems Zen®, a framework for creating complex, data-rich Web applications.

“The judges were impressed by the team’s comprehensive understanding and use of the InterSystems Caché database and its features. The application features a drag-and-drop user interface, designed for non-programmers, using Zen, coupled with sophisticated use of code generation. Of particular note was dynamic class generation, both for a user interface (again, using Zen) and for the class hierarchy that implemented the business logic,” said Robert Nagle, Vice President of Software Development, InterSystems.

The prize includes \$5,000 USD for the student team, \$5,000 USD for the student’s university, an invitation for the student to attend the InterSystems Global Summit to accept the award, airfare and three nights’ accommodations for the student in Orlando at the conference hotel, and the opportunity to make valuable connections with hundreds of business and technology professionals from top global companies who attend the Global Summit.

For more information, visit InterSystems.com, www.youtube.com/InterSystemsCorp, www.facebook.com/InterSystems, or at InterSystems on Twitter. ■

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AUTOMATED TESTING PART 2 – UNIT TESTS

Continued from page 9

responsible for submitting a new support call and checks the key and any errors returned. I've removed some of the code for brevity and the script is modeled on more familiar MultiValue Basic but in essence it is not so different than the C# example above.

This kind of test is made possible by the system structure. This whole application is surfaced through a series of subroutines normally called from a web site and has been designed from the outset with testability in mind.

Data Management

Should a unit test touch the database? This is a contentious issue, but one where once again the MultiValue approach may be out of step with the mainstream. Purists may disagree with my verdict, but here are my thoughts on the matter.

When reading any book on unit testing, you will inevitably get to the point where

the author decides to mock out a database connection because it is (a) difficult (b) slow and/or (c) not relevant to a client-side developer. The expectation is that any database issues will be caught through subsequent integration or acceptance testing but otherwise get in the way of unit testing.

In the MultiValue world function and data are intimately connected. Our code runs beside our data — a MultiValue system is first and foremost an application platform (I never describe it as a database), but one that offers local persistence and fast data access. Performance and difficulty are no reasons to mock out the database, and for MultiValue developers the storage and management of data is an integral part of their responsibilities. If the action of a subroutine involves writing data, testing that data should lie *inside* the unit test box.

There is a snippet from another mvTest script in figure 5 checking a subroutine call, this time taken from an agile project

management system. The test changes the dates on a sprint causing the application to reschedule the estimated task dates and update the work diary. Notice how the test unashamedly checks the database.

Unit testing today, more than ever, is a key ingredient in delivering software quality and preserving the dubious sanity of developers. If this article has whetted your appetite, there is a huge wealth of material available on unit testing and on Test Driven Development if you wish to learn more.

In the next article I will look at integration and regression testing. **IS**

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```
$INCLUDE support.inc api.h

* Create the call details
InData = ''
InData<IN.RAISE_DATE> = Date()
InData<IN.RAISE_TIME> = Time()
InData<IN.RAISE_USER_ID> = "USER"
InData<IN.SHORT> = "AUTO RAISED HOLD CALL"
InData<IN.OWN_REFERENCE> = HOLD_REF
InData<IN.ACCOUNT_NAME> = "ACCOUNT1"
InData<IN.MENU_PATH> = "MENU1"
InData<IN.DETAIL> = Text

* Add a new support issue
Call ssAddIssue( InData, OutData, ErrText )

Key = OutData<1>

AssertEmpty "Add issue should not give error", ErrText
AssertFull "Add issue OutData should hold key", Key
AssertIs "Key should start with an L", Key[1,1], "L"
AssertMatch "Rest of Key should be numeric", Key[2,9], "1NON"
```

Fig. 4 Calling a subroutine in mvTest.

```
* Update the sprint with the new dates
Call tmUpdateSprint( SprintId, SprintRec, ErrText )
AssertEmpty "ErrText should be empty", ErrText

* Task 1 should now be starting on the first day
TaskId = TASK_LIST<1>
TaskDateRec = Read("TASK_DATES", TaskId)
AssertIs "Task 1 should start on ":FirstDate, FirstDate,
TaskDateRec<1,1>

* Task 1 should be in the diary for the assignee
DiaryId = FirstDate : "*brian"
DiaryRec = Read("DIARY", DiaryId )
AssertHas "Diary should have task", DiaryRec<DIARY.EST_TASK_ID>, TaskId
```

Fig. 5 A Unit Test checking the database, no mocking allowed.

BUSINESS TECH: CASE STUDY

Continued from page 11

The questions themselves are unlikely to be 100% static. For example, we might want a question to build on previous information, which is why we intend to incorporate word merging.

```
001 When you said that {{book_
name}} is {{genre}}, is that
exclusive or are is it also any
of these:
```

```
...
006 {{assoc_genre_1}}{{assoc_
genre_2}}{{assoc_genre_3}}
```

As you can see, if the question has to be merge-able, we have to allow for the answers to have the same flexibility.

I like PHP for this because I can store variables in the session and re-use them for merge. Yes, it could be done in other ways, but this is very clean.

Obviously, the same database structures fit the need when we question the readers.

Knowing that we are building two paths makes us think more carefully about how we implement this code.

I'm still picking through the details to see what other challenges I need to factor into the database architecture and the code.

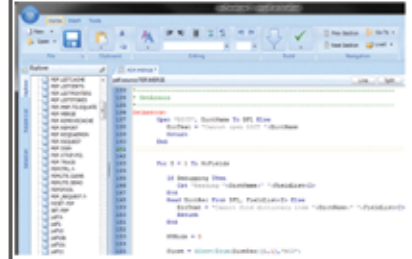
Wrapping Up

Remember, this is a start-up. There is no guarantee that the project will ever be completed. I'll update you if anything else Business Tech-worthy comes up from this or any of the other businesses in my incubator. **IS**



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We use “styles” in mobile development to tell O4W what role each section can play in the web page, and to turn normal browser output to “mobile friendly” output.

```

40 * use standard O4W API to build this output
41 O4WTableStart("locTable", o4wmobiletableoptions("1", "", "33"))
42 O4WSetCell(1, 1, "", o4wtablecelloptions("", "", "1")); /* mark as a 'header'
43 O4WText("Location: ")
44 O4WSetCell(1, 2)
45 address = "99 Kinderkamack Rd":@VM:"First Floor":@VM:"Westwood, NJ 07675"
46 * O4WText(address)
47 g_address = Delete(address, 1, 2, 0) /* remove the 2nd address line for google display
48 Convert @VM To "," In g_address
49 O4WText(address)
50 o4wsetcell(2,2)
51 O4WLink("Map", O4W_LINKTYPE_NORMAL, "http://maps.google.com/maps?q=":g_address, 'mapDisplayTab', "", O4WMobileButtonOptions('', '', 'b'))

```

Fig. 4

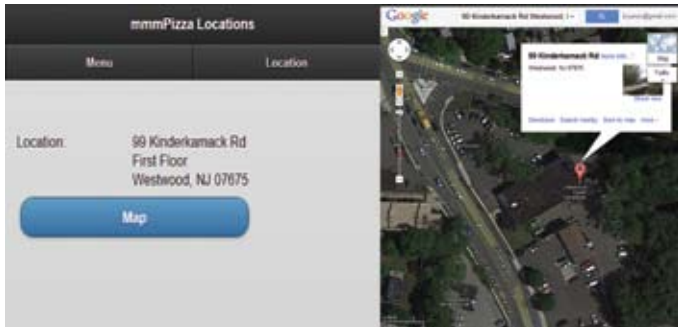


Fig. 5

those pizza-crazed mobile users to find the Rev Pizza Parlor. Instead of just displaying the address in plain text (with the O4W-Text API call), we can also display a link, and pressing on that link will bring up the Google maps output. The code change is simple (fig. 4).

...but the difference in functionality is dramatic (fig. 5).

We can use the normal O4WLink API call, with the proper parameters to invoke Google Maps, and then make it “mobile friendly” by using the O4WMobileButtonOptions option. In this instance, we only need pass in the letter “b” to indicate that we want to use the “b” “theme swatch”.

Can You Hear Me Now?

While these changes enhance the look and mobile usability of the form, they still don’t allow the user to enter any data into the application. Changing the form to include O4W’s different input elements (instead of just O4WText) will greatly increase its functionality, and make the application much more useful — in this case, allowing the pizza to actually be ordered, rather than just giving the customer a menu to read over.

We can begin by adding some radio buttons next to some “yes/no” questions. O4WRadioButton allows you to specify the prompts you’d like displayed, what values should be returned for each of the radio buttons, and the name of the variable

that the form will use for these values. We can optionally specify which value we want to set as the default in the “options/styles” parameter.

```

O4WRadioButton("No", "0", "GBREAD", "GBREAD_0",
    → o4wmarkedoptions(1))
O4WRadioButton("Yes", "1", "GBREAD", "GBREAD_1")

```

This creates a “No” and “Yes” radio button — if the “No” button is selected, a “0” will be returned as the “GBREAD” value. If the “Yes” button is selected, a “1” will be returned as the “GBREAD” value instead. To start with, the “No” button will be selected. You will also notice that each of the radio buttons has a unique ID (separate from the “variable name” of “GBREAD”) — for all input controls, there is both the “variable name” (which can apply to multiple input controls), and a “unique ID” (which *must* be unique on each form) which can be used to address that particular input control.

We’ll also enhance the text that we want to associate with the radio buttons — for example, for the “Garlic Bread” text, we’ll add the O4WTextOptions “options/style” parameter to tell O4W that it’s associated with the “GBREAD” radio button set:

```
O4WText("Garlic Bread", "", O4WTextOptions("GBREAD"))
```

This allows the underlying jQuery Mobile layout engine to put the radio buttons and the text together in a meaningful way.

Continues on page 18

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BUILDING A MOBILE APPLICATION WITH O4W – PART 2

Continued from page 17

For those input fields that require more than a few choices, we can use a listbox instead of a radio button set. The O4WListBox API call looks very similar to O4WRadioButton:

```
O4WListBox("None", "0", "WINGS", "", "WINGS_0",
    → o4wmarkedoptions(1))
O4WListBox("Half Dozen", "6", "WINGS", "", "WINGS_6")
O4WListBox("Dozen", "12", "WINGS", "", "WINGS_12")
O4WListBox("Jumbo", "24", "WINGS", "", "WINGS_24")
```

Applying these changes to all the choices in the appetizer section, we end up with the form in figure 6.

We'll apply the same changes to the Entrees section as well, but there are some items (such as pizzas themselves) where we want the user to be able to select one *or more* values (radio buttons and (usually) listboxes only allow you to select *one* value). A checkbox, rather than a radio button, is a more appropriate input element for those circumstances.

The O4WCheckbox API is also very similar to the O4WRadioButton (and O4WListBox) API call (Fig. 7)

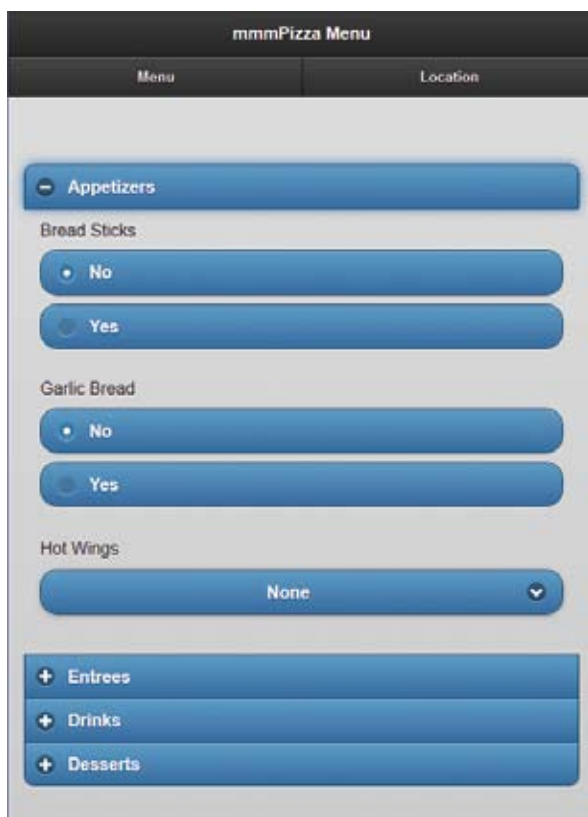


Fig. 6

```
O4WCheckbox("Pepperoni", "P", "TOPPINGS", "TOPPINGS_P")
O4WCheckbox("Sausage", "S", "TOPPINGS", "TOPPINGS_S")
O4WCheckbox("Ham", "H", "TOPPINGS", "TOPPINGS_H")
O4WCheckbox("Meatball", "M", "TOPPINGS", "TOPPINGS_M")
O4WCheckbox("Chicken", "C", "TOPPINGS", "TOPPINGS_C")
```

Fig. 7

But here, to “dress it up” for mobile display, we have to add some additional styles to the sections that *contain* the checkboxes, rather than the checkboxes themselves.

First, we create a section that has the role of “fieldcontain” to indicate that we’re going to have several elements contained together:

```
O4WSectionStart("toppingsChoices", o4wmobileoptions
    → ("fieldcontain"):o4wmarkedoptions("0"))
```

Next, we create a section that has the role of “controlgroup” to indicate that we want these elements grouped together in a single user interface element, and we provide the label for this group in the O4WFieldSetOptions style/options call:

```
opts=O4WFieldsetOptions("Toppings"):O4WMOBILEOPTIONS
    → ("controlgroup"):o4wmarkedoptions("0")
O4WSectionStart("toppingsFieldset", opts)
```

We can then use our O4WCheckbox calls to specify the available choices. When complete, and after changing the pizza size and sauce type to use listboxes, our code for the entrée section looks like the code in figure 8.

And its output looks like figure 9.

In our final installment (next month), we'll discuss how we can extract the data from the mobile form and process it appropriately. **IS**

```
98 O4WSectionStart("entreeChoices", o4wmobileoptions("fieldcontain"):o4wmarkedoptions("0"))
99 o4wHeader("Entree", 2)
100 O4WItem("Pizza", "", O4WItemOptions("PIZZA"))
101 O4WListBox("Personal", "1", "PIZZA", "", "PIZZA_1", o4wmarkedoptions(1))
102 O4WListBox("Medium", "2", "PIZZA", "", "PIZZA_2")
103 O4WListBox("Large", "3", "PIZZA", "", "PIZZA_3")
104 o4wbreak()
105 o4wSectionStart("toppingChoices", o4wmobileoptions("fieldcontain"):o4wmarkedoptions("0"))
106 opts = O4WFieldsetOptions("Toppings"):O4WMOBILEOPTIONS("controlgroup"):o4wmarkedoptions("0")
107 o4wSectionStart("toppingFieldset", opts)
108 O4WCheckbox("Pepperoni", "P", "TOPPINGS", "TOPPINGS_P")
109 O4WCheckbox("Sausage", "S", "TOPPINGS", "TOPPINGS_S")
110 O4WCheckbox("Ham", "H", "TOPPINGS", "TOPPINGS_H")
111 O4WCheckbox("Meatball", "M", "TOPPINGS", "TOPPINGS_M")
112 O4WCheckbox("Chicken", "C", "TOPPINGS", "TOPPINGS_C")
113 o4wSectionEnd("toppingFieldset")
114 o4wSectionStart("toppingChoices")
115 o4wbreak()
116 O4WItem("Sauce", "", O4WItemOptions("SAUCE"))
117 o4wHeader("Sauce", 2, "SAUCE", "SAUCE", o4wmarkedoptions(1))
118 O4WRadioButton("Red", "R", "SAUCE", "SAUCE_R")
119 o4wbreak()
120 o4wSectionEnd("entreeChoices")
```

Fig. 8



Fig. 9

INTERNATIONAL SPECTRUM 2013 MULTIVALUE CONFERENCE RECAP — THE MOST SOUGHT-AFTER INFORMATION

Continued from page 7

The Future Client

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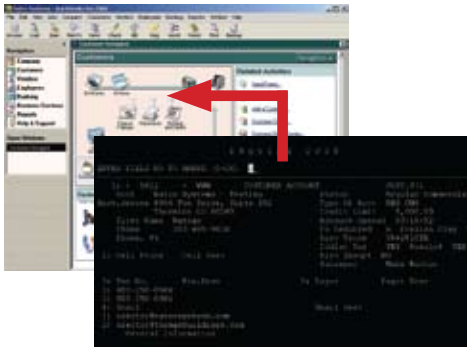
isting MultiValue database applications. Augmented Reality, Web Clients, Desktop Clients, Mobile Clients, Tablets, Natural User Interface, and much more.

Web Workshop: PHP for the MultiValue Developer

As a powerful, flexible, easy to learn, and easy to deploy language, PHP provides a platform for an easy transition into web technologies for MultiValue BASIC developers. In this session we'll look at the basics of PHP and discuss how we can leverage our U2 data and programming from a web context. **IS**

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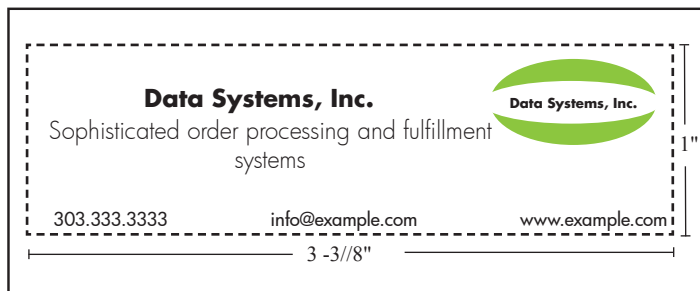
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CLIF NOTES: POPCORN? IT'S NOT MY FAULT!

Continued from page 23

Lunch presentations) sessions, categorized and ranked them, and came up with some numbers. (See the 2013 Recap article on page 6 of this issue.) Sessions dealing with Web and Mobile applications, techniques, and tools led the pack. Following that was a category we loosely identified as Integration. In other words, topics having to do with how to get our MultiValue systems to work in conjunction with non-MultiValue databases, systems, and tools. The third category was Development topics.

What does this mean? My personal interpretation (not necessarily that of International Spectrum or its staff) is that what we are seeing is that more and more MultiValue systems are being used in a multiplatform environment, and its seamless access to all the information on all systems is now the expectation. Users, both internal and customers, expect to be able to access, and in certain cases manipulate, information on your systems using their smart

phone or tablet. Whether they want to or not, MultiValue developers are being required to either provide or at least to support these efforts. That might account for the ranking of Web/Mobile and Integration sessions.

What about Development? One of the things that I am seeing in our community is an increasing discussion of formal development methodologies. For example, several attendees in my sessions reported that their companies were either using or investigating SCRUM or some other Agile methodology or mix. Additionally, I've seen some rather interesting discussions about the topic of Agile on the MultiValue-oriented LinkedIn groups. You might want to go and explore those if you are interested in the topic. At the very least you may find a bit of humor in some of the more sanctimonious postings claiming that "MultiValue has always been agile before there was an Agile." (Right...)

So, should you plan to attend the 2014 International Spectrum Conference, again to be held in Phoenix?

No.

I really don't think you should. I don't think you should spend your time and either your or the company's money to come to the conference. Your time would be better spent staying in your shop, developing applications in the same manner you been using for years, and fighting the never ending fires that come from poor planning, uncoordinated effort, and lack of any kind of methodology. Leave the web and mobile stuff to the Oracle people. And if they want to exchange data with you, insist on CSV files, since those are the only things MultiValue can handle. I really think you should.

That way my conference-attending colleagues and I can proceed with implementing modern applications with and on MultiValue platforms, thus ensuring ongoing employment and funding of our clever Plan to Take Over the World.

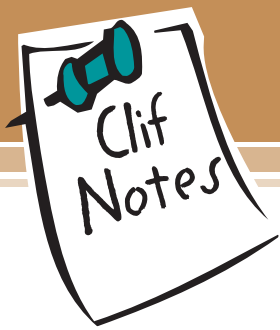
Then we'll buy the ice cream.IS

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Popcorn? It's Not My Fault!

BY CLIFTON OLIVER

Since our last issue, the International Spectrum Conference was held in Phoenix, Arizona. I'd like to offer a few observations and musings about it. Let's start with the most important — the ice cream social.

There wasn't one.

Let's get one thing straight. This was not my fault, despite the vile rumors that by featuring it so prominently in Clif Notes in the last issue, it was feared that we would be inundated by attendees whose exuberance (in addition to the presence of a no-host bar) would lead to bank-breaking ice cream over-consumption and possibly a rather messy, sticky, food fight. Nor is it true that the resort denied permission to hold it because the idea of raging sugar levels, wine and beer, and a number of competing vendors in the same room at once struck fear into the hearts of the hotel's anti-terrorism task force. No, the reason for the absence of the ice cream social from this year's conference was much more mundane — none of the corporate sponsors wanted to host it. So the decision was made.

Let them eat popcorn.

At least the no-host bar was still present so that you could get some liquid refreshment to wash it down.

Now don't get me wrong; I like popcorn. But after after playing up the ice cream in my last column, it was a bit of a shocker to walk into the exhibit hall, smell popcorn,

and not a single bowl of hot fudge to be seen. On top of that, I discover that this turn of events was known in advance of my ice cream oriented column going to press. But apparently they decided to just let it run and see how I would handle it when I walked into the situation unaware. My buddies; my pals. But that's okay. Wait until they see my pre-conference column next year. Paybacks are rough.

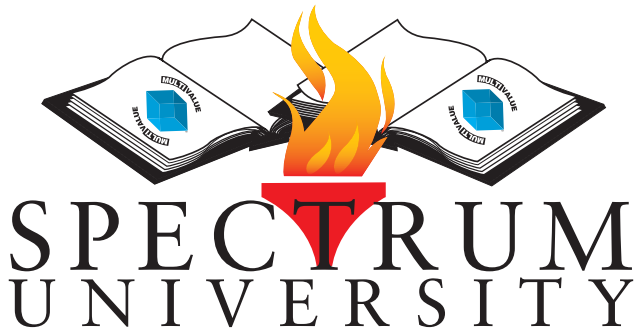
We had a number of both new attendees, and returning attendees who had not been to a conference in several years. This was primarily due to the fact that the conference changed its location from the East Coast to closer to the West Coast. People in a particular geographic region are more prone to attend the conference when it is on their side of the country. That's one of the reasons why the conference moves around every two years. Why not every year? It has to do with the economics involved in booking hotels for conferences. I am given to understand that you get a much better deal by negotiating a two-year contract. (I don't know the details of that, however. I have no involvement in that aspect of the business.) So we had an opportunity to see some colleagues that we see every year, reacquaint ourselves with colleagues we haven't seen in a couple of years, and meet some new MultiValue professionals and exchange notes. For many of us, combined with the professional continuing education aspect, that is a major motivation to attend. As I said in the last

issue, it's not about the ice cream. (And it sure isn't about popcorn.)

We also had some new attendees from other countries along with returning attendees from other countries. Personally, I was always that very heartening. Whereas a number of companies will not permit anybody but salespeople to incur travel expenses (a penny-wise, pound-foolish attitude, in my opinion), it is apparent that the conference offers enough new, strategic, forefront of the industry information that these folks find it worth the time, money, and effort to not just get on an airplane but to fly across oceans and continents in order to attend. And if you think that doesn't require a certain higher level of motivation, you probably have not traveled internationally. You take a few flights to and from a conference most of the way around the world and I can tell you from experience, it makes Chicago to Phoenix feel like a commuter flight.

Speaking of forefront of the industry information, just what kind of information were this year's attendees looking for? As I pointed out in last month's column, about 78% of the session content of this year's conference was professional education oriented. It most certainly was not day after day of vendor demonstrations and product roadmaps (although those were also available). So we took a look at the attendee counts for each non-vendor, non-communal (i.e.

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Upcoming Webinar Schedule

DATE	TITLE
Tuesday July 9th 2:00PM (PT) / 5:00PM (ET)	ActiveDirectory with Your MultiValue Application Microsoft ActiveDirectory has become a fact of life for many organizations. Most enterprise systems integrate their security with ActiveDirectory, so why not add ActiveDirectory Support into your MultiValue Application. <ul style="list-style-type: none"> • Query ActiveDirectory • Checking Group Information • Get User Information
Thursday July 11th 1:00PM (PT) / 4:00PM (ET)	Intro to .NET for UniObjects.NET Microsoft .NET framework is one of the most popular development environments being used today. UniObjects.NET provides .NET and MultiValue developers access to the UniVerse and UniData files, programs, and features. This class will introduce you to UniObjects.NET, how to use it, as well as cover the the features and how they relate to the UniVerse and UniData.
Tuesday July 16th 1:00PM (PT) / 4:00PM (ET)	Introduction to F Correlative This course is designed for the experienced MultiValue Developer who needs to become familiar with F Correlatives. Most legacy systems still have F Correlatives as a working and functional part of their dictionary design. This webinar will cover how to read, create and modify F correlatives. <ul style="list-style-type: none"> • Creating simple F Correlatives • Decoding Complex F Correlatives • Creating IF/THEN/ELSE statements
Thursday July 18th 2:00PM (PT) / 5:00PM (ET)	Calendar Data on the iPhone Providing your MultiValue enterprise calendar data on your smartphone is a stepping stone to the implementing BYOD (Bring your own Device) strategies. If your MultiValue application interacts with a CRM, or you are looking to start implementing CRM technologies in your application, then providing calendaring is a must. This information is easy to provide, and doesn't require much effort to implement. In this webinar we will talk about what it takes to provide real-time calendar data on the iPhone.
Tuesday July 23rd 2:00PM (PT) / 5:00PM(ET)	How to use .NET Threading with MultiValue Data Threading within a GUI application can cause working with MultiValue Data difficult. In this webinar we will talk about how .NET threading works, and how threading can cause problems with MultiValue connections and data. This webinar will also provide solutions to how to work with connections across multiple threads, and how to create asynchronous calls to the MultiValue Database. Threading and asynchronous design and programming will make your user software: <ul style="list-style-type: none"> • Using single session in Threading • Using session per thread • Asynchronous calls to the MultiValue Database