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**SPECTRUM**

THE MULTIVALUE  TECHNOLOGY MAGAZINE | SEPTEMBER/OCTOBER 2017

# Leadership?

what about

# Followership?

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- Coding and Compliance
- Populating PDF Forms with MultiValue Data
- Case Study: Coding Yourself into Hot Water



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International Spectrum has always been a business and technology resource. A View From the Top is an occasional column dedicated to business perspectives that affect the entire business, not just the technology and technologists. **BY BENNETT BAROUCH**

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**9 Business Tech: UX and UI Part III – Compliance** When we think about law and coding, it usually conjures up movie images of hackers doing illegal things in thirty seconds that would take hours or days. Truth is, even the good guys can run afoul of the law – easily and without intent – but still in an extremely serious way. Legal compliance isn't just a thing we have to do, it is a thing we must embrace. **BY CHARLES BAROUCH**

**13 Populating PDF Forms with MultiValue Data** PDF documents are commonly used as a medium of exchange for read-only information between businesses, users, and customers. They are used as email attachments, and for delivering invoices, reports, and many other documents that businesses do not want altered. One commonly overlooked feature of PDF documents is the ability to generate them automatically. We can create a mail-merge process to populate pre-formatted forms with business data. This article will talk about how to populate your PDFs with MultiValue data. **BY NATHAN RECTOR**

**18 Case Study: Plumbing Company Modernizes Services with Revelation Software** Often, when explaining what we do as programmers and analysts, we compare it to the building trades. We talk about wiring up code or framing out the processes that make a business work. This time we'll be talking about the software plumbing that makes one plumbing company flush with success.

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# From the Inside

As I plan for the 2018 Conference in April, I'm always looking for interesting and fun things for attendees to do. As part of the planning for the MultiValue Bootcamp track I was looking for how other conferences have run that sort of training in their own industries. In doing so, I ran across the concept of a Coding Retreat. A Coding Retreat is very similar to the Code Katas that I've talked about in past FTIs, but it sounds like a lot more fun.

So I decided to include both a Boot Camp and a Coding Retreat in the conference this year. They do sound very similar, but they are not the same.

A Boot Camp's focus is to quickly get developers and/or users up-to-speed and working with practical and useful information in the shortest possible time.

Boot Camp sessions focus on the most commonly used tools, features, and knowledge (basically the middle-of-the-road approach) of a system. While this doesn't create a majorly experienced developer, it does provide a good foundation for junior developers or users looking to understand their administrative tasks better.

At previous conferences, we have called this our fundamentals track, or Back-to-Basics, but, in reality, there is more than just an understanding of the MultiValue fundamental concepts that need to be covered. Things such as creating accounts, setting up logins, encryption, printers, etc. are all tasks that developers must understand besides just "How to create dictionary items" and "How to write a program."

A Coding Retreat is more focused on refining the skills already known, by making someone solve the same problem multiple times, using more than one technique or design principle. For example, part of the retreat will have a developer create a program without using GOTO, GOSUB, or Loops.

Once that is done, we scrap the program they just created, and have them create another (solving the same problem), but with an added twist to it. Everyone starts their program however they want, but every five minutes they have to switch their code with someone else and continue coding, using someone else's code. This could go on for twenty to thirty minutes, switching coding every five minutes.

All of this is designed to force developers to work outside of their comfort zones and have them solve the problem in different ways. It also provides a way for developers to see how other developers solved the same problem, and perhaps learn new ways to approach something that they may not have thought of.

Both the Boot Camp and the Coding Retreat tracks at the conference are designed to help developers and users with new concepts, as well as to teach them how to maximize their MultiValue Systems; or to help them improve their current MultiValue skills.



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# Value-Add Followership

BY BENNETT BAROUCH

**T**o: Corporate Leader at Any-Company

Subject: You Have Abandoned Most of Your Employees

What is your ratio of management to individual contributors? Just as a point of reference, let's use one out of ten. Whether you think of that as a good overall average, or a sure sign of having too much overhead for a modern business, at that rate, ninety percent of your workforce has little to no hope of career advancement to management. Odds are, you consider your management team as either full or perhaps over-full. Pick any other ratio; the point will remain. There is relatively little room for advancement in most companies until someone higher-up leaves the company, or growth calls for a new management position. Both of which are, for the average business, rare events.

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*“Well, we value and reward leadership, not management,” you say, as if management were some disease from the Middle Ages.*

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How unfortunate if my quickest path to advancement is for my manager to fail.

Wait a minute! Who said that being a made a manager is the only way to advance one's career? Almost everyone. Managers have more status inside and outside the organization because they have more decision-making responsibility, more formal and informal influence, a larger cross-organizational role, more impact on the working conditions — and pay — of others, and are themselves paid at a higher rate.

But advancement isn't everything. What about being part of something terrific? I'll return later to the sort of terrific thing I think most people want to be part of, but for now, let's just say that your employees don't believe this. If they did, they'd eventually notice that most businesses, likely including yours, keep referring to revenue and profitability as the most significant yardsticks for the company as a whole.

It's principally about the money and industry standing when we try to establish value for a company. Unsurprisingly, with an individual, it's also typically about the money and industry standing, which usually translates into job title.

“But in our company, we have dual career ladders,” you say. “There are explicit advancements on a non-management track that are also accompanied by increased status, recognition,

decision-making, influence, and pay.” Some companies do use this model.

Using a software company, for example, you may say that a technical lead is parallel to a manager, an architect is parallel to a director, and a fellow parallels a vice president, but you probably don’t mean it. Neither does hardly anyone else.

When you change someone’s position from tech lead to manager, you feel you need to give them at least a small raise, because you see them as now having more responsibility. Conversely, when you make someone an architect, you do not in fact require that their contribution be similar in overall impact on the business as you would with a good director.

“Well, we value and reward *leadership*, not management,” you say, as if management were some disease from the Middle Ages, “and there are many ways to lead and be rewarded for it.” Even assuming that most companies know what leadership looks like in its many forms, and how to reward it — or better yet how to cultivate it — it would still come down to job titles, salaries, bonuses, and real, on-the-ground authority, influence, and recognition.

I want to make a point about leadership: it is, by its very nature, rare. And that’s okay. If everyone in your company were a leader and no one was a follower, you’d get nothing done. That’s why your management-to-staff ratio is what it is. *Your company runs on followership, not leadership.*

The company is efficient when everyone is well-aligned to the purposes, tasks, and culture set by the few. The few are necessary, but useless without the many. Just as much as the many

are necessary but useless without the few.

If, we have a ten to one ratio, implicitly, you need ninety percent or more of your workforce *to excel at following*. Understanding this explicitly will help you see your company more clearly. Pizza on Fridays is a nice way of rewarding followership, but it is a token; a pale gesture. We need to rethink our system of encouraging this critical behavior.

World class followership is not the commoditized, mindless enacting of someone else’s orders. World class followership is value-add followership. It is getting invested in making *someone else’s* idea succeed — often much harder than getting behind your own brainchild — by challenging it constructively, enlarging it, trimming it, and bringing it to life in a way that fulfills the original inspiration, not the latest instruction. Pizza Friday just doesn’t cut it.

As we learn to be articulate about the things we need our staff to do, we must underline those behaviors explicitly with public recognition every week. When architect Andrea has a great idea and engineer Eddie enlarges or constrains it in a way that improves it, thank Andrea, but after that, let the greatness of the idea speak for itself. By contrast, your public recognition of Eddie’s smaller but critical contribution is necessary to tell your staff *what you want from most of them most of the time*. Give Eddie his one minute of fame and a gift certificate to take his family out to dinner (and let him be his family’s hero for an hour) and you have built loyalty in the same instant you have breathed life into the day-to-day stuff that makes your company great instead of not great.

When Bob makes the build system ten percent faster, it does not revolutionize the world, but it makes a tangible difference in how long it takes to go through a development and test cycle. When Beverly knocks off twenty percent of the bug backlog, don’t praise her for doing it on weekends (which is only a sign of your own management shortcomings), but for improving product quality (which is unequivocally good). When someone gets you to agree to put time into the schedule to materially reduce the bug backlog without anyone having to work weekends, celebrate that person’s accomplishment. Help others see how to make a convincing case in the face of competing pressures. This not only rewards the one, it instructs the many, and it is a positive way of letting people know that making good on this opportunity is the best way to win similar arguments in the future.

Managers should track instances of great followership, periodically review them with their employees, bonus them on it, increase their pay based on it, give them public recognition for it, and use it as a major criterion for promotion on both the management and technical career tracks.

*Your company is not suffering from an insufficiency of hero worship.* Neither is it likely to be suffering from an insufficiency of good ideas. It is very likely to be suffering from a disjunction between lofty vision and down-to-earth execution. That’s not because your execution team doesn’t understand the business urgency. It’s very likely because you don’t communicate your appreciation of the execution. The lofty ideas part, no matter how “innovative,” however hard it is, becomes child’s play compared to actually deliv-

ering of a product or service that copes with its own past, prepares for its own future, and delights customers by solving problems in the real world today.

Never forget: You get what you measure. If all you measure is punctuality, you'll get warm chairs. By focusing our efforts on measuring the right things, we communicate effectively — and nearly effortlessly — what we need. Praising your people for the things that drive the company forward encourages others to emulate those traits and behaviors.

And there is not a single thing you need more of than value-add followership. Start publicly measuring it, and publicly appreciating it. The value-add individuals, and value-add teams, are in fact the engine of your success. Oh, and by the way, don't call it followership, because our culture has poisoned

the idea that there is anything praiseworthy in being any part of a team other than the leader.

If the staff finds that their ideas add value and are appropriately recognized, and thus feel they are a valued part of their work community, do you think concerns about job titles will increase or decrease? Do you think productivity will increase or decrease? Do you think innovation will increase or decrease? Do you think people will be eager to maintain and improve their standing in this uniquely rewarding, socially connected, respectful company, or jump at the next offer from a competitor?

If you are successful in establishing a culture in which numerous small improvements are the subject of public appreciation, do you fear that all the big ideas will somehow disappear? To

the contrary, when everyone knows that no idea is too small or too off-the-mark to be respected, and all good ideas may find a home, more of your team will have the confidence required to have and share ever-bigger ideas, and increasingly synergistic ideas. You have nothing to lose, and the larger contributions of your entire workforce to gain.

If you want to be a great company, start by being a great employer. If you want to be a great employer, start by rewarding value-add followership. **IS**

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**BENNETT BAROUCH** has over 30 years of industry experience spanning design automation for integrated circuits deployed in satellites, financial portfolio software, high transaction volume and big data systems, information management, secure on-site and mobile networking, and IT operations software. His customers run from individual retail consumers to the largest companies in the world.

Groundbreaking work under Bennett's leadership produced a virtual assistant that could understand 20 million English phrases and respond with a wide array of information and with complete computer-telephony integration. This work was made part of the permanent collection of the Smithsonian Institution, for Outstanding Achievement in Information Technology, 14 years before Apple released Siri and became the basis of the OnStar virtual assistant found in GM automobiles. Bennett has been certified in ITIL, and as a Scrum Master and as a Scrum Product Manager.

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# UX/UI Part III

## Compliance

BY CHARLES BAROUCH

A number of years ago, I was chatting with a good friend who is also a MultiValue programmer/analyst. He made a passing reference to his ex-wife as She Who Must be Obeyed. I asked him if he knew where that phrase came from and he mentioned Rumpole of the Bailey, a television program. I told him that it was originally from the H. Rider Haggard novel *She*.

I mention this for two reasons. First, this article is about Compliance and the She Who Must be Obeyed in compliance is the law. Second, like my friend, you may find yourself with incomplete information that looks complete.

### The Tire Story

I have another friend who nearly turned purple with remembered rage as he told me the story of why he isn't in the tire business. It seemed that he and his partners had bought land and started to set up a factory only to find that nearly everything they were about to do was illegal. They hadn't done an environmental impact statement before selecting their site. They hadn't determined which buildings were downwind of the smoke that making

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*It may not be fair, but the burden of knowing all the rules falls on us.*

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tires would produce. They were in an area which was zoned for industry but not that particular industry. There were more issues, but you get the idea.

Why didn't he know the rules before putting down money? You might think that it would be reasonable for the government to have a simple, single-source location where you could tell them what sort of business you want to run and they'd spit back a neat list containing all the rules. You'd be wrong. Because the rules, like the government, aren't really one monolithic thing. They are an assembly of parts.

The rules for building a factory in Flushing are not going to be the same as the rules for setting up the same business in Fort Lauderdale. Both places are in the United States and share the same federal laws, but we don't just have that one layer of government. Everyone from the town council on up has the ability to make their own laws and demand compliance. It may not

be fair, but the burden of knowing all the rules falls on us.

### Not Alone

The good news is that we are rarely in a wholly unique business. There are associations for people who do what we do. The local Chamber of Commerce is another asset to consider. Odds are, there are lawyers who specialize in your business as well. Common needs often create common solutions.

And once you find out what governmental groups have jurisdiction, you can ask those groups directly. They will be obligated to provide you all the rules. Start at the smallest level and ask them for the hierarchy. I assure you that the Flushing Town Council knows who is above them in the governmental chain all the way up to the Federal level.

Sometimes a few phone calls or a Google search can give you a fast way to acquire the information you need. Wading through it is another matter. If you aren't fluent in legalese, you may need to hire someone who is.

### Disclaimer

I'm a compliance geek. Not as geeky as Susan Joslyn or some of my other

friends, but I am what I am. It isn't that I enjoy being told what to do. I find that the laws surrounding a business are like a map of what can go wrong. The majority of compliance rules, in my experience, are reactive. They come into existence after something has gone badly. There's a story hidden inside most rules.

The gruesome saying I grew up with is true: stop signs and traffic lights are planted in blood. While some are placed based on carefully architected maps created by city planners, fatalities — and the likelihood of future fatalities — are often the deciding factor.

### UI & UX

What has all of this got to do with making web pages or apps or anything else that we have been talking about in this series? To state the painfully obvious: breaking the law is illegal. The burden, as we already discussed, is on us to know the law. What you code can make you culpable. What you design might make you liable.

To give you a non-interface example: I used to work in international import and export. While coding for a subsystem that moved automobiles from one country to another, I was asked if I had factored in U.S. Fish and Wildlife. If that confuses you, then you know how

I felt. I said something witty such as "Fish don't drive cars."

Turns out that leather seats, being made from animal hide, come under their jurisdiction. They have a strong opinion about which sorts of animals can and can't be used.

The next week I was working on the importing of fine china. Once again, I was asked a question that seemed to make no sense: Did I take the Food and Drug Administration into account? "Food goes on plates, not in plates," I replied.

Turns out, china plates have a certain amount of lead content. Assuring that reasonable steps have been taken to keep the lead in the plate and not leeching out into the food falls under FDA rules.

Recently, I was in a discussion about how HIPAA (Health Insurance Portability and Accountability Act) laws impact credit and collection. I won't go into the details here. I'll just leave these three examples here as a cautionary tale that we need to take the wide view when looking for laws which might apply to us.

From a UI/UX standpoint, one of the hot topics is accessibility. The ADA (Americans with Disabilities Act) is a

part of that landscape here in the U.S. If we think of compliance as a set of rules planted in blood, those rules become guidance toward better ways of doing what we do. Making a website or a program more accessible is making the audience for it wider.

Generally speaking, when we build something, we want it to be usable by everyone who should use it. So, instead of being weighed down by the rules, let's learn from them.

### Greek to Me

Imagine if I built you a great website but the entire text was in Greek even though your target audience is entirely made up of people who speak French? While some French speakers may read Greek, I've limited your audience. A site that layers colors in a way which renders it useless to the colorblind is a limiter. Compliance is very often a road-map of potholes, designed to help you avoid getting your tires chewed up.

If we see the ADA rules as hundreds of hours a research into what to avoid, they become a time-saver, not a burden. Working with these rules has made me rethink a lot of my design approaches. Getting a fresh perspective on work I've been doing for decades is a happy side-effect of compliance.

Remember, in this case, resistance isn't just futile, it's counter-productive. **IS**

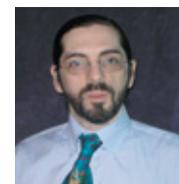
## IT audits have you jumping through hoops?



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

# FROM THE PRESS ROOM



## Entrinsik Announces New Software Release of its Business Intelligence and Data Discovery Platform

Entrinsik Inc. recently announced the General Availability release of the next generation of Informer, its BI and data analytics platform. Informer 5, which introduces a new, modern interface and expanded functionality, was released on August 31, 2017.

With this release, Informer continues to earn its place as one of the most highly rated business intelligence platforms on the market. Informer 5 has been re-imagined from the ground up to leverage an extensible modern architecture and enhanced performance to simplify data discovery and analytics without sacrificing functionality.

With Informer 5, organizations can quickly connect to their traditional or uncommon databases, spreadsheets, and unstructured data streams all without time-consuming warehousing or cubing. Users can access, blend, and cleanse data in a few easy steps, then utilize data discovery to explore, analyze, and visualize relevant information. Informer enables end users to confidently manipu-

late and interact with data, collaborate with colleagues, or even create a personalized home page. Featuring a crisp and clean, bold and graphic interface, Informer 5's new UI provides an easy to follow hierarchy and an immersive user experience that drastically cuts down on the learning curve associated with other BI products.

"The development team here at Entrinsik is very excited to release Informer 5," said Brad Leupen, CTO at Entrinsik. "We have worked hard for several years to bring a product to market that will make it even easier for our customers to put their data to work." ■



## APT Solution Becomes Latest Mercury Distributor

APT Solutions Ltd (APT) announced that it has been appointed by Paradigm Systems as its distributor for Mercury Database Console in the United Kingdom. Under the agreement, APT will become the primary provider of service and application support in the region.

"With APT as our distributor in the United Kingdom, we bring our state-of-the-art solution for U2 database management to the region," said Jay LaBonte, President and CEO of Paradigm Systems,

Inc. "Our goal is to continuously improve our customers' experience in every aspect. Expanding our network of sales and support personnel and being in close proximity to where our customers are is a key initiative towards achieving that."

This agreement covers England, Scotland, Wales and Northern Ireland. "We are particularly pleased and excited by this appointment as it provides an excellent opportunity for our existing and potential partners to work much closer with their customer base," said Stuart Shepherd (APT Managing Director, United Kingdom). "We were initially attracted to Paradigm Systems because Mercury Console is a solution for all Rocket U2 environments and is designed to lessen the load on System Administrators and Managed Services Providers alike." ■



## Synergetic Data Systems Releases UnForm 9.0.26

UnForm 9.0.26 has been released.

Key updates include: Improved client startup performance when connecting to Windows servers, smarter error handling on async email delivery, move to .NET 4.5 for all Windows components, local demo activations so no

manual activation is necessary, new gtextwords() function for AFO jobs, Workflow 3.1 with upgraded user interface, several minor bug fixes.

For more information, please refer to the release notes found here: <https://unform.com/support/documentation>. ■



## Rocket Releases WEB DE 5.3.0

To leverage your existing investment in Web DE, Rocket has created an Enhanced Scheduler to drive new types of applications. With Enhanced Scheduler, you can extend your applications to new devices, languages, and frameworks, because it enables you to use RESTful services to call any non-interactive process with an HTTP interface.

With the new version of Web DE you can:

- **Go mobile.** Expose your existing RBOs as RESTful RBOs to build mobile solutions.
- **Easily deploy.** Create a deployment package to move RESTful services between systems.
- **Stay in the know.** Enhanced monitoring and logging capabilities help you keep on top of your system.
- **Track problems.** Advanced troubleshooting allows you to identify issues and quickly drill into the associated processes to

# FROM THE PRESS ROOM

identify what went wrong.

- **Stay current.** Updates to Eclipse Luna, Jetty 9, SSI, SSH and PCI-DSS 3.1 compliance means you're fully covered and secure.
- **Manage your system.** A new a web-based user interface gives you more flexibility when updating your configuration, monitoring, and security preferences, or building your own using the Admin Web API. ■



## BlueFinity's Evoke Solves Web App Browser Caching Issues

Ever since web apps have been deployed to users there has been the frustrating issue that browsers use cached web assets. This means that the last used version of a web app may be accessed, and therefore updates to the web app may not make it through to the user. Worst still, different browsers and even different devices act differently, which can make the potential use of cached web assets even more unpredictable. Even a user's personal settings for their browsers can make browsers produce different results in respect to how the cached web assets are used.

The internet is full of suggestions for addressing this issue

with web apps; most common is that users of web apps on desktop devices should always perform a manual forced reload when using a web app. This is not very user friendly and is certainly open to human error, and the issuer of the web app has no ability to confirm if a user has performed the procedure or not.

Web apps are useful and popular as they are easy to deploy, available across platforms, simple to modify and can offer sophisticated business functions.

Companies using Evoke, from BlueFinity, to develop their web apps not only benefit from extremely quick development and the ability for their existing staff to build and deploy high functioning, sophisticated business apps, but all Evoke apps have automatic cache updating, across all platforms, when a new version of an Evoke built app is deployed.

The powerful Evoke designer provides developers with everything they need to produce high quality business apps. They can quickly and cost effectively build interfaces, define and manage data, and use Evoke's unique business logic components to create apps. As the business requirements change, speedy enhancements can be made to the app in the Evoke designer. Evoke can deliver web, hybrid and native apps. With its single design structure, changes only need to be made once and the revised app can be immediately gen-

erated, automatically incorporating any customization, for all device types. At the time of app generation, Evoke users can increment a "published" version number and this will force the browser of the app user to update any web assets that have been updated the next time they access the app.

Malcolm Carroll, a director of BlueFinity said, "The inability for a company to ensure that the app their customers are using is the latest version of that app has caused well documented problems for years. Users have complained of incompatibility of apps after an upgrade, inability to log in to apps and numerous other issues. Automating the update process, by using Evoke to develop apps, takes this issue away from app users and helps companies to provide a more consistent, better service through the apps they have developed." ■



## Zumasys Named to Civic 50 Orange County List

The Orange County Business Journal just announced the fifty most community-minded companies in Orange County, and Zumasys made the list!

The Civic 50 Orange County, presented by the Orange

County Business Journal (OCBJ) in partnership with OneOC, provides a local standard for superior corporate citizenship and showcases how companies can use their time, skills and other resources to improve the quality of life in the community where they do business. This is the first time the Civic 50, a national initiative of Points of Light, has been localized for a specific market. Since 2012, The Civic 50 has recognized the fifty most community-minded companies in the nation each year as determined by an annual survey developed by True Impact.

Companies were selected based upon four dimensions of their community engagement programs: investment, integration, institutionalization, and impact. The Civic 50 OC honorees include businesses from three categories: small, medium, and large (based on the company's number of local employees). The inaugural Civic 50 OC Awards Luncheon will be held October 19, 2017 at the Hotel Irvine, featuring keynote speaker Matthew Emerzian, founder and CEO of Every Monday Matters (EMM). All 50 honorees will be recognized at the event, and five awards will be given in the following categories: small, medium, and large company; emerging company; and legacy company. The Civic 50 OC List and Special Report will be published October 23, 2017 in the Business Journal. ■

## Populating

## PDF Forms

## with MultiValue Data

Walk into any shop, Multi-Value or not, that's been around for years and you are likely to find special form-overlay programs which PRINTS data on forms, using either physical printers or virtual printers that overlay raw print data on images. It's a tried-and-true way to get the job done. These programs always work great until the form changes for one reason or another.

The reason each form change becomes an issue is that we aren't *really* working with the form when we create an overlay. We are working with where we expect the spaces to be. PDF forms address this problem. Once you have a PDF document with form prompts on it, you can merge the data into your form and not worry about where on the form it needs to go. The PDF document will take care of that for you.

### What You Need

In order to populate a PDF with data, you will need one third-party program on your system:

PDFtk by Pdflabs

<https://www.pdflabs.com/tools/pdftk-server/>

*PDF forms are set up with a unique name assigned to each field.*

This program is delivered as part of the distribution version of many Linux systems but is not limited to Linux only. There is a windows version of the same program, so for those with Window based systems, this will work as well.

PDFtk (PDF toolkit) does a number of useful things, even before we add our MultiValue magic. It is designed to merge, encrypt, decrypt, add watermarks, and single PDFs split into mul-

iple individual files. And, of course it can fill-in PDF form data.

### Example Used

I want to keep this article business-practical, so my example will involve filling out a legal form for the payroll department. The sample PDF that I will be using is the IRS W9 Form [Figure 1]. While this form isn't something that is used every day, it is a good example. If you aren't working with an American company, you'll find that there's an equivalent document in most if not all other countries.

To get your own copy of the original PDF: <https://www.irs.gov/pub/irs-pdf/fw9.pdf>. Once you have that, you

The image shows a screenshot of a web browser displaying the IRS Form W-9, 'Request for Taxpayer Identification Number and Certification'. The browser window title is 'Please fill out the following form. You can save data typed into this form.' The form is titled 'W-9 Request for Taxpayer Identification Number and Certification' and is dated December 2014. It includes instructions and fields for providing personal or business information, tax classification, address, and TIN. The form is presented in a light blue and white color scheme.

Figure 1

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can follow along and build your program as we continue our way through the article together.

### Retrieving the Form Data

Like HTML forms, PDF forms are set up with a unique name assigned to each field. This is very much like how we assign dictionaries to individual fields in our database. Unfortunately, the names aren't visible when you look at the un-filed document. Since we don't know what these names are, we have to extract them in order to have the names when we populate the form.

The following command will extract this information for you:

```
$ pdftk fw9.pdf dump_data_fields > fw9_fields.txt
```

This will produce an output [Figure 2] file that contains information about each field in the PDF document. Each PDF input will have 4-7 pieces of information designed to describe how

the field is to be populated. The key data you need is `FieldName`. This will be the unique identifier which will mark each spot that can be filled-in. Connect the right data to the right name and the results will make sense.

I have found that the input field names aren't always self-explanatory. You may have to do a little bit of homework in order to get the right field for the right input [Figure 3]. The easiest way to do this is test the tab order. Open the PDF document and tab between the fields to verify which fields are the first, second, third, etc. in order.

You will also need to watch for the `FieldType` information to make sure you are providing valid information. If you look at Figure 2, you will see a `FieldType` for the button, which has two `FieldStateOption` values. The first value is the checked (Yes) value and the second value is the unchecked (No) value.

```
---
FieldType: Text
FieldName: topmostSubform[0].Page1[0].f1_1[0]
FieldFlags: 8388608
FieldJustification: Left
---
FieldType: Button
FieldName: topmostSubform[0].Page1[0].FederalClassification[0].c1_1[0]
FieldFlags: 0
FieldJustification: Left
FieldStateOption: 1
FieldStateOption: Off
---
```

Figure 2

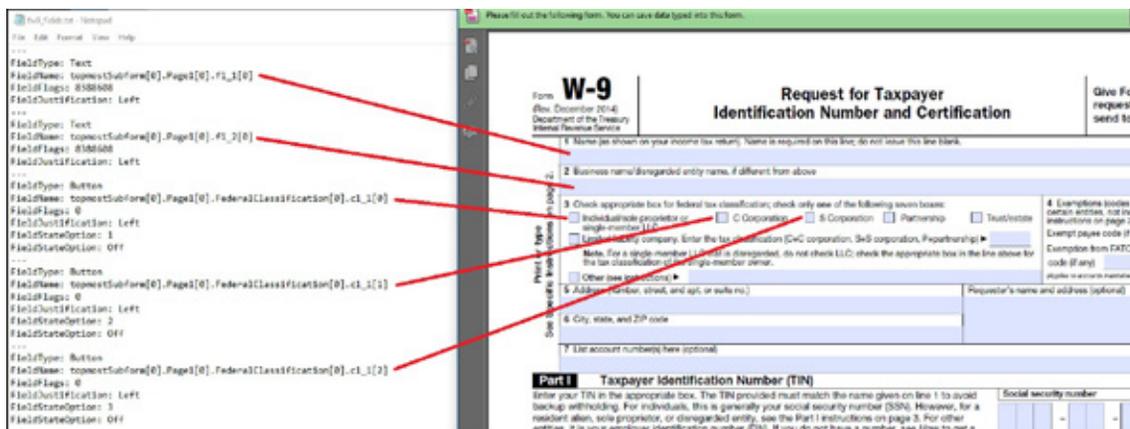


Figure 3

You will also need to watch for the `FieldType` for Choice, which may contain two or more `FieldStateOptions` as well, if it is present. This might be a good time to remind you that I didn't design this methodology, I'm just explaining what PDF forms provide.

If the `FieldType` is Button, then you need to look at the `FieldStateOption` field to find out what values are allowed to be assigned to the field.

## Form Data File

Once you know what the field names are, you need to create a Form Data Format (FDF) file. This is a special file format used by PDFs to populate the data. They made it really easy for us by keeping this file text, but it does look a little odd [Figure 4].

If you have read previous articles on generating PDFs from within MultiValue BASIC (<http://www.intl-spectrum.com/mag/JULAUG.2009/default.aspx> and <https://www.intl-spectrum.com/resource/category/168/PDF.aspx>), you'll see a similarity in the file formats and structures.

That's a truly ugly layout. If this is your first look at PDF internals, it may be hard to follow. Believe it or not, it is actually pretty simple. This file is basically a Key/Pair file. The /T indicates the key and the /V represents the val-

ue. The data is wrapped in parenthesis, much like you would use quotes. Once again, not my design. The first two lines in Figure 4 are the header of the file, and the last five lines are the footer. Both the header and the footer will always be the same for any FDF-formatted file.

In between the header and footer is where we need to put the data we want to merge into the PDF [Figure 5].

Once you have created your FDF file, and it has been saved with the .fdf extension, you can merge the pdf and data together to create a new PDF document:

```
$ pdftk fw9.pdf fill_form
fw9_data.fdf output fw9_
merged.pdf flatten
```

If you look at this command line, you will see the original PDF is named fw9.pdf, the data is in the FDF file

fw9\_data.fdf, and the final merged document will be called fw9\_merged.pdf. The flatten keyword will create the new PDF document without editable input fields. The original files will remain as-is and can be used again.

## Alternate Form Data Format

There is an alternate FDF format called XFDF, which is XML based [Figure 6]. Why didn't I cover that format first? Well, depending upon the version of pdftk you have on your system, XFDF may not be supported.

I thought it would be best if you have the most up-to-date version of pdftk, but that is not always the case, so I started with the harder format first. Besides being easier to understand, XFDF has one more advantage. It will support Unicode in UTF-8 format. The FDF format does not support Unicode.

```
%FDF-1.2
1 0 obj << /FDF << /Fields [
<< /T(topmostSubform[0].Page1[0].f1_1[0]) /V(International Spectrum) >>
<< /T(topmostSubform[0].Page1[0].FederalClassification[0].c1_1[1]) /V(2) >>
<< /T(topmostSubform[0].Page1[0].Address[0].f1_7[0]) /V(3691 E 102nd Ct) >>
] >> >>
endobj
trailer
<< /Root 1 0 R >>
%%EOF
```

Figure 4 - FDF format

```
<< /T(topmostSubform[0].Page1[0].f1_1[0]) /V(International Spectrum) >>
<< /T(topmostSubform[0].Page1[0].FederalClassification[0].c1_1[1]) /V(2) >>
<< /T(topmostSubform[0].Page1[0].Address[0].f1_7[0]) /V(3691 E 102nd Ct) >>
```

Figure 5

```
<?xml version="1.0" encoding="UTF-8"?>
<xfdf xmlns="http://ns.adobe.com/xfdf/" xml:space="preserve">
  <fields>
    <field name="topmostSubform[0].Page1[0].f1_1[0]">
      <value>International Spectrum</value>
    </field>
    <field name="topmostSubform[0].Page1[0].FederalClassification[0].c1_1[1]">
      <value>2</value>
    </field>
    <field name="topmostSubform[0].Page1[0].Address[0].f1_7[0]">
      <value>3691 E 102nd Ct</value>
    </field>
  </fields>
</xfdf>
```

Figure 6 - XFDF format

## Extended Features Error

Some of original PDF documents start with `Extended Features` enabled. If this is the case with a document you are working with, you'll get an error when you open it in Acrobat:

"This Document enabled extended features in Adobe Reader. This document has been changed since it was created and use of extended features is no longer available."

Sometimes this is due to Signed PDFs, other times, its due to security settings like related to Page Extraction. In order to remove these errors, you need to run the `PDFtk` command one more time to strip this information:

```
$ pdftk fw9_merged.pdf cat
output fw9_finished.pdf
```

## Putting This all Together

As you can see, this is all really easy to do. While you can do it yourself, there

are subroutines available at the following URL that will takes all this into account:

<https://www.intl-spectrum.com/resource/category/168/PDF.aspx>

## Creating Your own PDF Documents With Form Inputs

You aren't limited to pre-made PDF documents. If your company has documents they regularly fill out, like liens, mortgage forms, tax forms, or credit requests, then you can convert any existing PDF document into a PDF document with input. You just need the right program. Adobe Acrobat Pro is the most commonly used, but also the most expensive. A good open source version is OpenOffice. **IS**



**NATHAN RECTOR**  
President  
International Spectrum  
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## Feedback

*What came first,  
the letters or the  
letters-to-the-editor  
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# Plumbing Company Modernizes Services with Revelation Software

**N**ew England Water Heater (NEWH) is a plumbing services company specializing in water heater repair and installation based in North Waltham, MA. The company provides a centralized service through a network of geographically dispersed plumbing companies in the surrounding region, including its own company, Home Services of New England (HSNE) Plumbing.

NEWH's services include the sale, lease, installation, and repair of water heaters for non-commercial customers in the New England states, as well as other plumbing services, ranging from fixing leaking faucets to handling oil-to-gas conversions.

To support this work, the company provides a customer hotline in Massachusetts for more than twenty thousand accounts. Revelation Software is the backbone of the overall IT system.

### Times Change

Today, businesses of all types are changing the way they operate. They are adopting hosted services rather than purchasing and maintaining software and hardware on-premises, and,

---

*Working with a 28-year-old application, we found that there are many features that are no longer in use, while other capabilities are leveraged all the time and have been working forever.*

---

as a result, employees also now frequently work remotely.

With the advances in IT services that have taken place over the past five years, NEWH saw an opportunity to move to a cloud-based system to support its employees and customers. The goal was to improve its overall quality of service while also enabling office staff to access systems from home.

In addition, the company wanted to eliminate the overhead costs of office space, a local area network, and shared printers. Critical to the new set-up was the ability for its affiliated plumbing companies, as well as its own HSNE staff, to input information about service visits and billing into the system, and access new assignments while on the road.

### Nobody Here, Everybody's Available

In September 2015, NEWH and HSNE decided to eliminate their physical offices, where each employee was provided with a desk, telephone, shared printer, and a desktop computer connected to a local file server to perform their job, said David Harmacek of Harmacek Database Systems, who specializes in Revelation Software products. The process of publishing the company's 28-year-old Advanced Revelation application to the cloud was handled by Harmacek, who has been a consultant to NEWH since 1994.

When the decision was made to migrate the system, NEWH had a typical Windows Server, internet connections, IP phones for customer support, and a range of website-oriented support interfaces, as well as a hybrid Arev (Advanced Revelation) 32 and OpenInsight 9.4 database system.

To modernize the operations, Harmacek put a plan in motion to switch to a hosted system and began implementing this new approach in February 2016.

The Arev32/OpenInsight system was migrated to a Parallels server. Since

the telephones were already on an IP system, no adjustment needed to be made, but office documents and storage outside of the database needed to be moved to Microsoft Office 365 and OneDrive.

As a longtime Revelation Software customer, NEWH uses a system on Revelation's OpenInsight 9.4 for business processes such as document management, phone calls, and customer support — everything but accounting.

Because the system is so critical to its business — handling processes such as document management, phone calls, and customer support — the NEWH migrated the system to the Parallels 2X RDP server, while also maintaining the physical system, to make sure that everything transitioned flawlessly.

Eventually, even though the company had not yet moved from its physical

office space, it began using only the remote services, as if all the employees were working from home, said Harmacek. The dual on-premise and cloud approach lasted until late spring. By June 2016, the company no longer had physical offices, said Harmacek.

### Biggest Challenge

"Working with a 28-year-old application, we found that there are many features that are no longer in use, while other capabilities are leveraged all the time and have been working forever," said Harmacek.

"The biggest challenge was eliminating the dependence on a local network for file storage and local printing, since the employees could no longer walk over to an office and hand someone a piece of paper, and they could no longer print anything," he said. This issue has been solved by using the feature in

Parallels 2X that allows a local folder to be managed from the application. Reports and PDF files can be placed on the remote desktop. Files, both PDFs and images, can be uploaded and integrated with the hosted database. "Anything that needed to be done had to be accomplished by interacting with the system. I had to find all the places in the processes where there were manual steps previously needed and change the system to allow it to be done that way."

### The Result

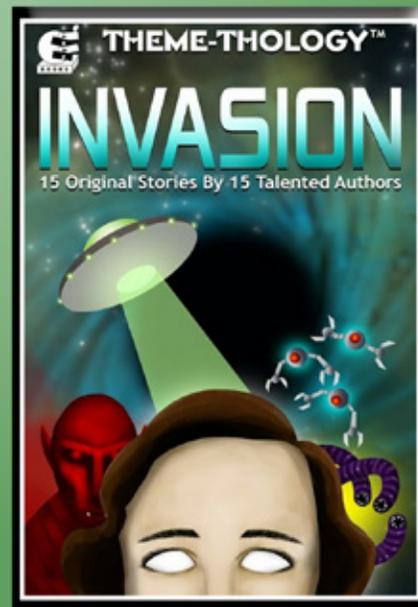
The hosted system takes care of everything from managing all the documents that users work with on a regular basis to historical information, including leases, phone calls, and customer support.

The system integrates the older Arev interface and the newer OpenInsight interface via the Parallels 2X RDP

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server to the company's employees, who are now able to do updates, schedule printing of letters, produce emails, and create PDF files on their desktops every day.

The NEWH website also features a customer self-service portal using Revelation's OpenInsight for Web (O4W), a flexible and powerful web development toolkit for OpenInsight and other MultiValue databases. The system provides the ability to view billing and payment status, download or view recent invoices, make payments via a PayPal interaction, and register and receive their invoices through email instead of by mail, via O4W.

Job assignments are dispatched to vendor plumbers using the system, via text, email, and fax, while jobs routed to HSNE are accessed by its plumbers

who constantly log in to the website, where they receive alerts via their tablets to call customers for scheduling. Outside vendors can also upload their invoices and job reports through the website.

The WinWin Solutions, Inc. consultancy, which owns Revelation Software, is the company hosting the revamped web application for NEWH. WinWin specializes in hosting O4W and OpenInsight-based websites, and currently hosts sites for retail systems, financial operations, and product download websites.

"WinWin has a network in which they have been doing this for other customers so I felt very confident moving all of the OpenInsight-based networking to them," said Harmacek. "WinWin also has a network specialist I could

discuss upgrades with, and has been very supportive."

There was a time when Harmacek considered moving from MultiValue to a relational database system such as SQL Server. "But I stuck with this and I am glad I did because OpenInsight is quite a good Windows platform and I am very happy with the things that OpenInsight and MultiValue let us do."

With OpenInsight 10 coming in the future, Harmacek says that he is looking forward to additional performance improvements. "Over the years, Revelation has been able to interact with the latest technologies," he noted, adding, "They have been able to keep me from having to become a Windows programmer." **IS**

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