



For Cloud Professionals, part of the On Cloud Podcast

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Title: Migrating from mainframe to cloud: a success story in Utah

Description: Working with Deloitte, the Utah Department of Government Operations recently completed the first part of an effort to migrate its mainframe applications to cloud. It was a mammoth undertaking, but an overall successful effort. In this podcast, David Linthicum talks with project leaders from both the state and Deloitte teams. The trio discuss the project's challenges, successes, and lessons learned. They also share what's up next—an app modernization plan to help realize cloud's full potential.

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Operator:

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David Linthicum:

Welcome back to the On Cloud Podcast, your one place how to find out how to make cloud computing work for your enterprise. This is an objective discussion with industry thought leaders who provide their own unique perspective around the pragmatic use of cloud-based technology. Today on the show we are joined by Gene Riggs, application development and systems support manager at Utah Department of Government Operations, and Omer Enaam, application modernization leader at Deloitte. Omer Enaam is the managing director in Deloitte's application modernization and migration practice.

He focuses on modernizing legacy systems that run core business operations at very important corporations. He leverages Deloitte's assets such as innoWake and cloud, analytics, and artificial intelligence as an enabler. Gene and Omer, welcome to the show.

Gene Riggs:

Morning.

Omer Enaam:

Thanks for having us.

David Linthicum:

So, Gene, you're in Utah obviously, and Omer, where are you physically today?

Omer Enaam:

I'm in Irvine, California.

David Linthicum:

Oh, that's right, Orange County. So, Gene, what's a day in the life of an application development and systems support manager at Utah Department of Government Operations?

Gene Riggs:

I spend most of my time going from meeting to meeting, not only monitoring what's going on, but making sure that everyone has sufficient resources for what's about to happen and helping escalate odd things that need to be escalated.

David Linthicum:

So, basically your day is different day to day, depending on what's going on within the organization, so you have to react to things?

Gene Riggs:

Very much so. I'm in part the voice of the agency to my customers and the voice of my customers to the agency, so it really depends on what the largest issues are on either of their plates that particular day.

David Linthicum:

Right. And this is interesting. Who are your customers?

Gene Riggs:

The Office of Recovery Services is my primary one.

David Linthicum:

Gotcha. So, in other words, you're supporting folks within the organization, within the government, and you're doing so with a customer relationship kind of a function. Is that right?

Gene Riggs:

Very much so.

David Linthicum:

Yeah, that's a good way to think about it. I mean, people have always worked in internal IT support, things like that. And now they look at the folks—even though they're internal, basically within the same organization, macro-organization, but the ability to, in essence, support them as what they are, a true customer. I think that's a more healthy way to do it. Omer, what's a day in the life of you?

Omer Enaam:

Well, I work very closely with our state government clients. My focus has been on helping clients think through their legacy systems, how they can modernize and transform them to serve citizens and employees of the government agencies better. I work—for example, I have been working very closely with Gene for the last couple of years, helping him and his team with the transformation that they have done, moving away from mainframe systems to cloud-based systems and helping them with not just technology, but organizational readiness, people readiness so they are serving the citizens and running their operations more effectively.

David Linthicum:

Let's get into the project here. The focus of it was the fact that we're taking mainframe-based applications and migrating them to the cloud, which is something that hasn't been done a great deal. Even you think about it, say, 10, 12 years ago when I first got into cloud computing and first started migrating applications to a public cloud provider, there weren't a lot of ways to do mainframe-based applications, so you just kind of left them alone. Now we're kind of circling back and the low-hanging fruit's been migrated and getting to these very important mainframe applications to move them into a cloud, in whatever architecture we're leveraging, hybrid-cloud, multi-cloud, single-cloud environments, things like that, and enable them to function as they did on-premise, or even better than they did on-premise. So, Gene, can you give me the background of the project and which way you did the mainframe-based application migrations and what was kind of the core requirements that drove the task?

Gene Riggs:

There was really two different requirements. Business had wanted to start leveraging some functionality that had been more difficult to implement on the mainframe, and they'd been wanting to do that for a significant number of years. While we had very good-functioning, high-functioning disaster recovery solution on the mainframe, the non-mainframe portions of the application, and we have about a dozen subsidiary web applications with external

connections, were always difficult to move at the same time. So, they needed a solution that was not only more flexible, but it would give them a good disaster recovery solution for everything.

On the flipside, from the cost of operating the mainframe and some of the skill sets that were needed to properly staff the mainframe, the state was looking at decreasing the mainframe footprint for a long time. Just from a cost perspective, ORS had—the Office of Recovery Services—had looked at rewriting the application in a cloud-native fashion for a number of years, and the cost was just prohibitive. They had found a way of essentially translating the application from COBOL on the mainframe to Java, and at the same time re-platforming the application out to the cloud. The cost was much less significant there. And that's the option they decided to go with ultimately, after talking with other states that had gone through similar transitions.

David Linthicum:

So, Omer, what are the mechanics behind making this work and making it work the first time? What are some of the enabling technologies? How do you typically gather requirements in this kind of a project? And how do you define steps towards success?

Omer Enaam:

Yeah, main enabler here we used was Deloitte's innoWake solution, which is a proven solution used by several clients across government and commercial organizations to transform their mainframe application written in old programming languages like COBOL. We used that solution to translate, as Gene said, the COBOL code into Java, which was the state of Utah's preferred programming language, and in the process we ensured there is no business impact. The business operations run seamlessly. The user—the success of—from user adoption was the core driving principle behind that approach.

So, in short, we used a combination of innoWake technologies and AWS Cloud to transform the mainframe system to a modern system. Now the business users have the ability to use, leverage, modern technologies to serve the citizen much better. At the same time, the team who's supporting the system, like Gene's group, have opportunity to leverage DevOps and modern technologies to automate lots of operational aspects. So, it's basically a combination of a proven solution for transformation and bringing the industry practice around DevSecOps and Agile development methodologies, which resulted into this transformation.

David Linthicum:

So, in other words you created kind of a migration factory based on these toolsets, and we have toolsets customized, innoWake being one of them, which sits in a DevOps process, a DevOps tool chain, that allows us to make the migration very quickly in the cloud. Did I get that closely right, Omer?

Omer Enaam:

Yes. And then in addition to that, as part of this DevOps automation, we implemented automated regression suites using technologies like Selenium, which help us that whenever there's a change in code, we have an ability to run automated scripts to make sure that things are—that there are no like ripple effects or defects before the code is pushed into production. So, yes, it's a highly, highly automated process from code conversion all the way to code deployment.

David Linthicum:

So, Gene, there's obviously a unique skill mix that needs to come along with this. In other words, it's not just moving traditional Python code, if there is traditional Python code, from on-premise systems into the cloud, which is a pretty much lift and shift kind of a point, maybe a few pieces that are refactoring to make it cloud native when it gets to its destination. But obviously this was fairly complex, with generations of different technologies in it, so what was the challenge in terms of kind of gaining or accessing the skills you needed to make this happen?

Gene Riggs:

For us, actually, the biggest challenge was trying to fund, ongoing, the building of the new environment. The state's funding structure for decades had been more around a cost-recovery model, and the mainframe had been used as kind of the cash cow to help subsidize other building environments. And we hit right at the cusp where the mainframe funding was decreasing as a number of customers were moving off, but we needed to build out a fairly large environment. So, we had to go in and try and scramble a bit to not only find the right engineers but to find good ways to fund this environment.

And at the same time, it wasn't just finding hosting engineers, but teaching networking engineers, auditors, security engineers new skill sets or bringing in individuals. We found, somewhat to our surprise, that while it was a big application change, it was actually the environment that was the biggest change as far as the state's perspective was, and probably the one that was the most difficult to get their arms around. The cloud really isn't the mainframe, and a lot of things that had been optimized to work well on the mainframe, on the WAN, on the LAN, not only needed different skill sets but needed different points of optimization and different governance models to get them to work properly.

David Linthicum:

So, Omer, what's your take on the skill mix needed for doing this? Obviously you had a deployment perspective and had different aspects of technical alignment to fill up. What were some of the challenges, and how did you overcome the challenges?

Omer Enaam:

Yeah, I will break it down into two parts. One is the migration staff itself, which is the once, one-time activity, and then the second aspect is the ongoing operations and maintenance. Relative to the migration, since it was—the skill set that we needed included engineers who have experience in using the innoWake technologies to do the core conversion. The second piece was about data migration. So, we had data on—terabytes of data—on a mainframe database, and migrating that to the AWS cloud required a skill set for that. And the third thing was around automated testing. We implemented a suite of automated test scripts which gave us an ability to perform functional equivalence between the migrated system as—between the mainframe system and the migrated system. So, just to summarize, there were three types of skill sets we were looking for, innoWake engineers who can work the code, the data migration experts, and then the testing experts.

Now once the system is migrated and deployed in the cloud, now we're looking at ongoing operation and maintenance, where the key skills included AWS cloud engineers, DevOps engineers, and Java developers for the most part. So, those are the key skill sets that Gene's department have quickly brought

onboard for the ongoing maintenance support. And as you can imagine, these are the widely available skill sets, whereas before the migration, Gene and his team had a struggle to find the right talent to continue to maintain the mainframe system.

David Linthicum:

Yeah, and the reason I asked the question is it's the number one question I get from certainly my clients and my acquaintances that are migrating mainframes into the cloud, was skill-set mix, where do you find them? Because, ultimately, that's the limitation to the project, the ability to kind of get the right skills at the right time to do the right things. And that seems to be something that's a little bit more difficult to overcome as we start moving forward and the competition for talent gets more heated.

So, Gene, say you get into a time machine and go back to the beginning of the project. What would you tell yourself in terms of what to do and what not to do? In other words, what worked and what did not?

Gene Riggs:

I think probably the biggest thing that worked is that we delivered literally on the weekend that was targeted 15 months earlier when we kicked the project off. And, as far as changes to the customers, it truly was an equivalently-functioning system out in the cloud. So, that worked well, and we were able to pick up, or to train internally, some of the skill sets that we had needed, most of the skill sets, actually, that we had needed to work there.

I'd say probably the biggest thing to change would be to start infrastructure earlier. And our initial focus was on what the developers, the people maintaining this system day to day, would need. And while that's very important, we were surprised by the number of ancillary skill sets. Networking on the cloud is different enough that we really do need networking engineers to pick up that skill set. Getting—especially as we're moving more into cloud-native architecture—getting people or training people with that skill set is taking longer than we had thought. And again, as I thought, our biggest concern was just around the application developers, I would've started with the infrastructure skill sets much earlier, and I would've staffed up them much more aggressively at the beginning of the project.

David Linthicum:

So, Omer, same question: Get a time machine, go back to the beginning of the project when you first started to interact with Gene. You know, what would you tell yourself to do differently, and what did you think you did right and you want to do again?

Omer Enaam:

I'll start with what went really, really well. The courage and transparency that all state workers had and the commitment to each other that we're going to run the project as one team. There were multiple departments and entities involved from state of Utah and Deloitte as the system integrator helping them through the journey. We all came together and had a goal that we're going to deliver this project on time and on budget, and that, basically, commitment to each other worked really, really well. So, I would say the partnership aspect.

The second, as Gene said, the technology aspect, the conversion, automated testing, implementation of DevOps technologies, and, lastly, use of cloud to, given the scale that we needed, worked like a charm. From the people standpoint, the willingness of the business to adopt new—a system on the new platform with a promise that they're going to get an opportunity to get access to a lot more technologies to be able to service citizens much better. They were ready to jump in and they've provided the support during the validation process, user-acceptance testing, and through go live. That was phenomenal. On the technical staff side, their ability to pick up the new system and maintain it on their own resulted into great efficiencies. So, those things worked really well.

Now coming back to what we could have done better, Gene rightly pointed out the focus on infrastructure setup, especially—this project was the first undertaking for the state to go in the cloud, and so the cloud technologies were relatively new. So, I think the lesson learned here was that we should have spent a little bit more upfront time on infrastructure planning, the skill set required, and all those things that go with it. The good news is that with a strong commitment to each other, a great partnership, we were able to lean on each other and fill in the blanks wherever and whenever needed, which resulted in the on-time delivery of the project, which was critical for the state and citizens.

David Linthicum:

Yeah, and I think it's—the most important lesson learned is that, ultimately, the people moving the stakeholders and everybody on the team has to be committed to make the thing work. I know there is a culture of getting things done, understanding the obstacles, removing the obstacles, and moving forward, just doing it. Sometimes I see too much planning going on, too much focus on strategic nature of how we're going to leverage cloud. At the end of the day, this is about looking at the best way to take this particular segment of applications and data and move it into the cloud and then make it better than when it existed on-premise. And I think that's a question that often isn't being asked. We just—we talk about different things.

So, Gene, back to you. So, what's the future of this and where are you going to take the project now? What are your next steps? What are you kind of focused on during the day and, what keeps you up and night, and what makes you sleep better?

Gene Riggs:

We're going through and we're now modernizing the system. We made a conscious decision not to do modernization. It was just a lift and shift on steroids as we moved to the cloud. Now we're putting human-centered development into the application. We're moving it to cloud-native technologies. We're starting to implement and to streamline some of the things the business had wanted us to do as a result of moving to the cloud. And it's a lot of fun as we're going through, but something you said really sprang to mind. One thing that we're learning to let go of with the state is there is no right architecture. The cloud is moving quickly enough that the more we get into the cloud, the more we say, "We don't have the time to design the perfect architecture, and if we did, a year down the road it would be different. So, let's choose the best thing that we have now and work towards that, and when we're done, we'll choose the next-best thing six months down the road and work towards that."

It's a significant mindset change from both the technical perspective, and from the customers' perspective, too, because they're used to being able to take the time and craft the best solution for what they want, assuming that the environment's going to be static for years or decades. And that's no longer the case.

David Linthicum:

Yeah, that seems to be an emerging best practice right now. Like I tell my clients, you have to architect for change. This is not about getting a solution correct the first time. This is about setting up a solution which is going to have the agility to shift and to move into different areas as the business changes, which is always going to be—anyway, you had something you were going to say, Gene?

Gene Riggs:

Oh, and I was going to say, and as we're going more—still an ongoing discussion is that we're modifying our funding structure, is we're going in and saying, "Okay, we now have a development environment. If we only have it up during the day, Monday through Friday, and spin it down, that decreases the cost significantly." And by the way, our operational costs are now 37 percent of what they were on the mainframe. So, the customer's quite happy about that. But some of the things that really can't be missed like security, some of the infrastructure stuff, we're having to move from a per-head or per-operational-hour funded model. You just say, "You know, this is going to be a set cost and you're going to pay this regardless, and some of these other costs are more directly tied to things that can come and go. We can tie to how many servers do you have spinning per hour or per minute, how much disc space you have." So, that's another big change that's still ongoing for the state.

David Linthicum:

So, Omer, you're going to advise other people who are doing this same thing. In other words, what would the three lessons learned during the project, or things that you know professionally, that you would tell them to pay attention to, not considering just the state of Utah, but considering people who are going to be relocating and modernizing mainframe applications and moving aspects of them into the cloud?

Omer Enaam:

Well, David, thanks. The key thing here is that as we have experienced through this COVID pandemic, the organizations that have a more Agile infrastructure, modern application, they are thriving and they're able to serve their mission and customers a lot better. So, I think agility is the key here, making the decisions quicker about the migration, identifying the tool sets that are available to them, and looking at proven solutions, talking to other entities and organizations who have been through the journey to gather their lessons learned. And the third thing I would say here is the—having the stakeholder alignment between both the technology stakeholders as well as the customers, the business stakeholders, is the key here. Like Gene pointed out, the cloud technologies have provided us the flexibility and agility, and you can adopt very quickly. So, having that mindset going into their journey for modernization is the key, and not looking for a perfect solution is another success factor here.

David Linthicum:

Yeah, I appreciate a couple of things. Number one, you both came on this show and shared what the upsides and the downsides are in doing this, and what some of the real challenges, are as well as what are some of the real opportunities and ways to do it better, and you put one in the win column. And so obviously lots of folks are dealing with their application portfolios now. They did the low-hanging fruit. They did their LAMP stacks. They did their traditional Java-based applications which have analogs that exist in the public cloud. Now we're moving things that are a bit more difficult to move, and I think that people being successful in doing that is a step in the right direction. I appreciate you guys sharing this.

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Operator:

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