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Modern Techniques for Modernizing Government IT

Cloud infrastructures are a major component of IT modernization efforts.

FITARA. The Modernizing Government Technology Act of 2016. A $3.1 billion IT modernization fund proposal. These are all efforts by federal leaders to strongly encourage agencies to modernize their IT infrastructures.

The evidence is clear—agencies have too many stovepiped, legacy systems that are expensive to main, difficult to upgrade, slow to perform, and far too insecure. These systems simply can't provide the type of fast, agile, digital services citizens expect today. And they certainly don't foster innovation or the ability to make quick decisions.

Recent OMB reports have identified these problems in stark terms. One GAO report found in 2015, federal agencies spent more than $60 billion out of a total of $80 billion just on maintaining legacy systems in 2015. Another GAO report found some agency systems have components at least 50 years old. And many others use outdated parts and software languages.

That's why so many federal initiatives are calling for extensive IT modernization. It's the only way to improve security, boost IT performance, save money, manage ever-increasing stores of data and take advantage of technology improvements.

Former Federal CIO Tony Scott clearly explains the problem in a blog post last year. "Modernization would improve the ability of these systems to deliver the necessary levels of functionality, security, and efficiency to satisfy and secure the needs of agency users, stakeholders, and the American public," he says.

THE CLOUD AS ENABLER

There are many ways to modernize IT infrastructure, and it doesn't have to be an all-or-nothing proposition. At the core, it means replacing older, often legacy or custom infrastructure and applications with cloud-enabled off-the-shelf solutions that work well and integrate with newer technologies, such as mobile devices, social media, and sensor-enabled devices.

In fact, the cloud can be a big part of infrastructure modernization. It already is for many agencies. In most cases, agencies have moved past "Cloud First" and are already using some type of cloud infrastructure. According to a 2016 Grant Thornton survey, about one-third of federal CIOs say they have moved to the cloud in some way.

There are many benefits of moving to the cloud. Not only does it encourage collaboration across organizational boundaries, it also helps keep telecommuting employees fully connected to the data and other agency resources they need to remain productive.

Agencies can also rely on cloud infrastructures to deploy resources quickly, scaling capacity up and down as needed. Applications, operating systems and other resources are always up to date and more secure than on-premise infrastructure. It's also less expensive. The Grant Thornton survey estimates the government could save more than $1 billion over two years by migrating infrastructure to the cloud.

MOVING FORWARD

While the cloud is an excellent way to help modernize IT infrastructures, don't start by simply increasing use of the cloud. Take the approach recommended the IT Modernization Initiative. While the initiative itself remains in limbo, it contains some excellent advice for modernizing agencies' IT infrastructures, including:

■ Develop updated enterprise roadmaps

■ Identify and prioritize systems

■ Develop modernization profiles for high-priority systems

A survey of federal CIOs from Deloitte also yields valuable advice for succeeding with IT modernization projects. Several federal CIOs suggested starting with something small and even perhaps insignificant, such as the placement of an icon. Following that success; move on to something larger. And continue to expand from there.

Others advise ensuring plans always align objectives with strategic goals. That way, you can more easily know how much you have accomplished and what's left to do.

And finally, agility should be your primary objective. Efficiency and resilience are still important. The ability to change to accommodate new devices and technologies, scale to meet demand, and as rapidly identifying and responding to security events, is critical.

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Big Data Answers
Big Questions

Cloud data storage can help promote all types of data analytics.

While it might not seem like discovering misappropriated funds, optimizing processes, predicting a disease outbreak or uncovering a terrorist plot have much in common; they are aspects of a single mission: serving and protecting the country and its citizens.

They share another common factor as well. None of these efforts would be successful without access to massive amounts of structured and unstructured data, along with advanced tools to analyze and make sense of the relationships between the data.

The first part of the equation is the data. Agencies are working with increasingly large amounts of data these days. And that data is coming from many places—intelligent sensors, satellites, social media, machine logs, transactions, and mobile devices, among others.

The second aspect is a powerful data analytics tool to analyze data, answer questions, and resolve problems. These tools can perform many different types of analysis, depending on the situation:

■ Predictive analytics can help predict future outcomes or behavior.

■ Descriptive analytics helps determine what happened and diagnostic analytics evaluates why it happened.

■ Statistical analytics collects and analyzes samples to help draw conclusions.

■ Text analytics evaluates words and phrases to help understand emotion, intent or relevance.

There are many other types of analytics as well, such as machine learning, hypothesis testing, and social network analysis. Putting big data and advanced analytics together is where the magic hap-

pens. A Meritalk study found nearly half of agencies are using them in combination to improve operational efficiency, for cybersecurity analytics, and to establish performance tracking metrics.

There are many real examples and possibilities. The Department of Health and Human Services, for example, is

> **"AGENCIES ARE WORKING WITH INCREASINGLY LARGE AMOUNTS OF DATA THESE DAYS. AND THAT DATA IS COMING FROM MANY PLACES."**

using this technology to root out fraud and improve tax compliance. Many agencies are using it to understand and optimize business processes. A military depot, for example, could optimize its stock based on predictions generated from sensor data. The military could also use GPS and RFID sensors to track items on delivery vehicles.

Health-related agencies are using big data analytics to predict and monitor disease outbreaks. The NSA uses big data analytics to prevent terrorists from gaining the upper hand. Law enforcement agencies use big data analytics to track criminals. Science organizations use it to analyze huge amounts of data to advance science and research.

Perhaps most importantly, agencies are using big data analytics to improve cybersecurity. According to Meritalk, more than 80 percent of feds say their agency uses big data analytics for cybersecurity to some degree. The vast majority say their agency has prevented

a cybersecurity attack by using big data analytics and 90 percent report a decline in security breaches.

CLOUD TO THE RESCUE
The cloud can help with these impressive efforts. Storing large amounts of both structured and unstructured data from

a variety of sources in the cloud makes sense. Because it is elastic and usually runs on a multi-tenant architecture, the cloud can expand to accommodate fast-growing data stores, and it can do so cost-effectively. With all data accessible from one source, it's more straightforward to gather the data necessary to perform all types of analysis.

It's also much faster. Instead of overloading a data warehouse with too much data, which can slow down processes to unacceptable levels, cloud-enabled big data is extremely fast. Fast, reliable access to data can be a real deal-breaker for big data analytics. In many cases, agencies can't get the full benefits from data analytics because of legacy silo-ed data sets.

Finally, storing and analyzing big data in the cloud provides more opportunities for collaboration. Team members from throughout an agency or even outside contractors can develop analytic models and quickly and securely share insights.

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Drive Data to the Cloud

Rapidly expanding disparate data stores are the perfect case for moving to the cloud.

Government agencies are under pressure from all sides to improve efficiency. Not only must they meet a variety of mandates, but they must find ways to use existing technology more efficiently and drastically reduce costs across the board. Addressing all of these issues is a constant challenge and requires a multi-pronged approach. Federal IT leaders know that one way or another, the path forward is through the cloud.

Embracing the cloud can seem like an impossible task, but only if you think of it as an all-or-nothing proposition, says Jeff Tabor, a senior director at Avere Systems, which delivers file system and caching technologies that speed access to compute and storage in

"APPLICATIONS WITH THE HIGHEST PERFORMANCE AND CAPACITY REQUIREMENTS ARE LEADING THE WAY TO THE CLOUD."
—JEFF TABOR, SENIOR DIRECTOR, AVERE SYSTEMS

hybrid environments. For most agencies, moving 100 percent of compute and storage to the cloud doesn't make sense. A more practical solution embraces a combined infrastructure of both on-premises and the cloud.

"You want to protect the investment you have made in your infrastructure, and you probably have older or custom applications your agency really needs but are too difficult or impossible to move to the cloud," says Tabor.

In terms of compute capacity, it's common for agencies to run out over time. And because of current mandates, it's not practical to buy more servers. Running out

of capacity is especially common during periods of peak use, such as analyzing intelligence data before a mission, providing access to evidence data after a terror attack or analyzing tax returns during tax season.

The cloud can help resolve these problems by providing virtually limitless resources without adding additional infrastructure. Avere's Virtual FXT (vFXT) Edge filers, for example, can act as network-attached storage in the compute cloud, connecting on-premises storage to cloud compute resources.

This means agencies can continue using existing servers, which are often ideal for steady-state workloads. This eliminates the problem of expensive

servers sitting idle in a data center when they aren't needed. Then they can add cloud capacity during peak times.

DATA OVERLOAD

Agencies are also struggling with ways to store a wide variety of rapidly-growing data stores. This includes unstructured, file-based data such as digital images, video, audio, genomic sequences, financial transaction records, and many types of sensor data.

Most agencies are drowning in data and don't have the option to expand their data centers. In those cases, it makes sense to move some portion of that data to the

cloud. It's especially useful for bulky data such as video or satellite imagery. With the majority of data in the cloud, agencies can make good use of existing storage capacity in data centers to retain the most active five or 10 percent of their data.

That's the route Centers for Disease Control and Prevention (CDC) took to better manage its genomic sequencing environment. Faced with a data center with 3.5 petabytes less storage capacity than it needed, the CDC chose Avere FXT Edge filers to store data, along with FlashMove to migrate live data between multiple sources and FlashMirror to replicate data between sources. The result has been better performance, easier data transfer, simplified operations for scientists, and knowing future data expansion won't be an issue.

Combining cloud-based storage with on-premises storage also helps facilitate big data analytics. For example, it makes processing large volumes of network PCAP (packet capture) data collected in Hadoop, Splunk or Vertica environments faster and more straightforward. It also improves analysis involving image processing and scientific data sets.

"Applications with the highest performance and capacity requirements are leading the way to the cloud, because they are growing fast and simply not sustainable in data centers," says Tabor. "But we expect others to follow suit. It just doesn't make sense to keep 'reinventing the wheel' in small data centers all over the country."

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