Overcoming the Challenges of Your Legacy Systems

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Legacy Technology at the Intersection of Business and IT

Finding the right IT solutions for dealing with aging IT infrastructure is all about timing and analysis. That means knowing if your legacy systems can be modernized or if their component systems need replacement. That's a question that many organizations using mainframe and AS400/iSeries struggle with as they attempt to determine the best approach for meeting today and tomorrow's needs.

The IBM iSeries server has been the foundation of many enterprises for many years, running the core business applications of real-world companies in every industry—from manufacturing and transportation to insurance and finance—every day. The challenge with these legacy systems is that they require constant maintenance and complex updates to keep up with digital transformation needs. While they have been workhorses for a long time, the question becomes whether they can cost-effectively play a central part in enterprise innovation.

How Legacy Tech Slows Enterprise Innovation

Legacy systems like mainframes must be able to integrate with the rest of the systems in order to maintain relevance. Legacy tech needs to be capable of embracing new technologies such as artificial intelligence (AI), machine learning, and the Internet of Things (IoT). If not, the technology systems can be rendered less competitive in the digital age.

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Legacy technologies can slow the pace of time to market and stifle innovation by making it difficult to launch new services and quickly respond to market needs. These systems have escalating maintenance costs, and the fact that they traditionally operate in silos makes it difficult to integrate them with new technology platforms and approaches. Mainframes and other legacy technologies can lock businesses into particular providers. This can lead to a point where the technology's lifecycle is ending in a way that makes it incompatible with future tech. More importantly, updates become more challenging and require support for the platform's maintenance needs from a dwindling base of engineers.

Technology End of Life and the Skills Shortage

One of the growing challenges with legacy technology like older mainframes is the specific expertise they require for maintenance and upgrades. Many of today's IT technicians have more experience working with commodity servers and lack experience with mainframe systems.

IBM's latest version of the AS/400 (IBM iSeries 7.1 introduced in 2010) is still used by the vast majority of users. However, IBM announced that they would be ending support for IBM iSeries 7.1 by the end of April 2018. This puts a spotlight on the end of life/warranty issues that are inherent to legacy technologies with significant CAPEX replacement costs and OPEX maintenance costs.

Legacy mainframes require more maintenance time, which leads to higher OPEX as they age and new technology platforms become the norm. As the legacy mainframes age and new platforms take over, the pool of skilled technicians fluent in the legacy technology dwindles, which also poses problems for the enterprise.

At first glance, the 12th Annual Mainframe Survey from global software solutions provider BMC is encouraging. It shows that just over 50 percent of mainframe professionals are under 50 years of age. The problem is finding them, hiring them, and paying their demand-driven salaries.

This effectively leaves most businesses without mainframe expertise at present or soon down the road. Even the IBM Systems Magazine 2017 Mainframe Edition cites finding mainframe talent as one of the top business challenges.

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Legacy Programming Languages

One of the challenges of legacy systems is the incorporation of old code and software that can't be supported by a modern workforce. The COBOL programming language used in many legacy mainframe systems is a perfect example. Without skilled techs that know these languages, the systems can become outdated and no longer scalable. This leaves the technology unable to take on new tasks and technologies, which inhibits organizational innovation and evolution.

System recovery and redundancy can be hampered by complexity due to gradual enhancements. Over time, poor record management leads to gaps in system evolution knowledge that makes it difficult, if not impossible, to efficiently maintain the system or make further changes.

While innovation is possible with legacy mainframes by adopting Java, internal APIs, or Linux, there are a number of potential pitfalls to the process. There are also automated parsing tools that directly work on CA-GEN text outputs that can convert them to directly executable and readable Java applications. The downside is that this fix can foster application and operational challenges that lead to:

» **System complexity**

» **Lack of developer familiarity**

» **Lack of documentation of changes to the overall software architecture**

» **Lack of workforce continuity that leads to a breakdown in guidance for system maintenance**

Poor Patch Management Shuts the Door on Business Benefits

With legacy system end of life, patching becomes more problematic. If the in-house IT team can't understand legacy technology infrastructure, patch management becomes difficult. The end of life that these systems experience can often mean the end of maintenance and support. The result is a lack of new patches to fix evolving security vulnerabilities.

Even when legacy technology continues being supported by the vendor, many businesses have a difficult time staying current with patch management. The reasons for this poor patch management is often traced to:

» **The significant amount of time necessary for devoting to testing patch sets before application**

» **An inability to deal with downtime for critical systems without redundancy**

» **Operating system (OS) end of life**

» **The absence of a patch management policy or procedure**

» **Unmonitored patch deployments**

All of these factors contribute to growing vulnerabilities associated with legacy systems from a legal, technological, and operational perspective. Given that mainframes integrate and become interdependent with other technology systems in the enterprise IT infrastructure, it becomes difficult to create automatic protections from new threats.

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An Application-Centric Approach to Legacy Tech

## Application Needs in the Digital Transformation Age

Despite the mainframe reputation for security and resiliency, application and system-level security are ongoing concerns as the network edge expands through IoT, the cloud, and a mobile workforce. In addition, application code-based vulnerabilities are a particularly overlooked aspect of mainframe security.

Configuration-based vulnerabilities can come from system configuration errors, but code-based vulnerabilities can result in bigger problems. These vulnerabilities can be difficult to track and are damaging to the IT infrastructure. Although there are solutions that can scan for these code vulnerabilities, they are not capable of finding them in the larger operating system.

Exploited application vulnerabilities permit access to the data of a single application. That doesn't help with the need to scan for operating system vulnerabilities when the coder hasn't followed the IBM statement of integrity or has used poor coding techniques.

OS-level vulnerabilities are a bigger problem, due to potential hacker exploitation that gives access to data, applications, and users across the mainframe. A single flaw can result in negative effects across hundreds of applications and thousands of users.
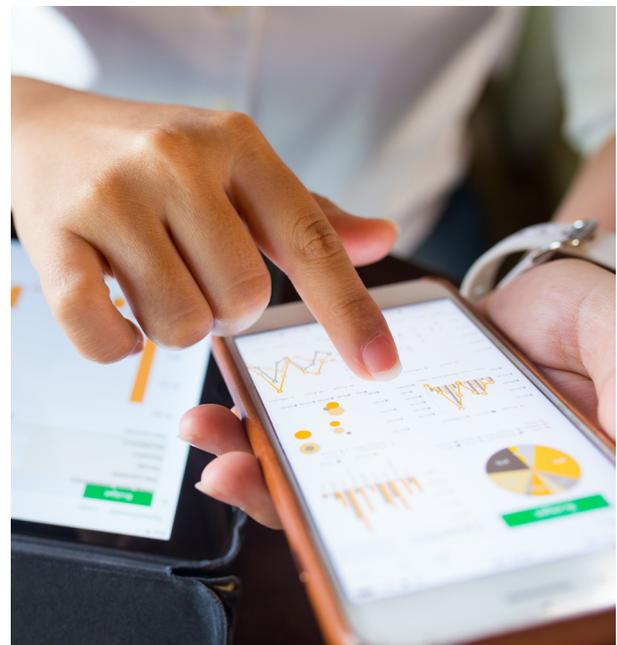
Bridging the Gap Between Legacy Tech and Digital Transformation

Integration Challenges

Mainframes are extremely powerful and versatile, but they have historically existed in silos away from other systems. This makes mainframe integration with other systems, software, and hardware difficult, which hampers the enterprise's performance, productivity, flexibility, and competitive edge.

That competitive edge is represented by digital transformations. For finance that can mean huge numbers of mobile transactions, while in utilities it can mean the IoT device power usage data from thousands of edge devices managed by VMware Pulse IoT Center during a heat wave.

These and other forms of technology usage innovation are foundational to digital transformation. It's true that Legacy mainframes have the capacity to easily handle the compute processing load of thousands of IoT devices in such a scenario. The

problem comes in practice where they may lack the ability to smoothly integrate with the new technology in such an ecosystem, which may halt that innovation.

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DevOps can be another area where legacy mainframe integration with new platforms and the cloud can require significant and costly upgrades. Without the legacy mainframe expertise to make this transition possible, app development times are slowed in ways that further hamper innovation and new lines of business.

While mainframes can be modernized for a connected world, it can be complicated to update the mainframe development environment and make it compatible with modern software development best practices like DevOps. This is where the mainframe, the cloud, and virtualization can be used in unison to bridge the gap to digital transformation.

Mainframes, the Cloud, and Virtualization

The mainframe, the cloud, and virtualization can work together in ways that leverage the unique strengths of each platform. For example, certain applications and components can be more efficiently sourced from the cloud via VMS. In a hybrid cloud environment, they can be connected to mainframe data and apps through APIs.

The goal is to keep those mission-critical applications on the mainframe that are too costly to refactor. This ensures that they have the highest level of reliability, performance, and security.

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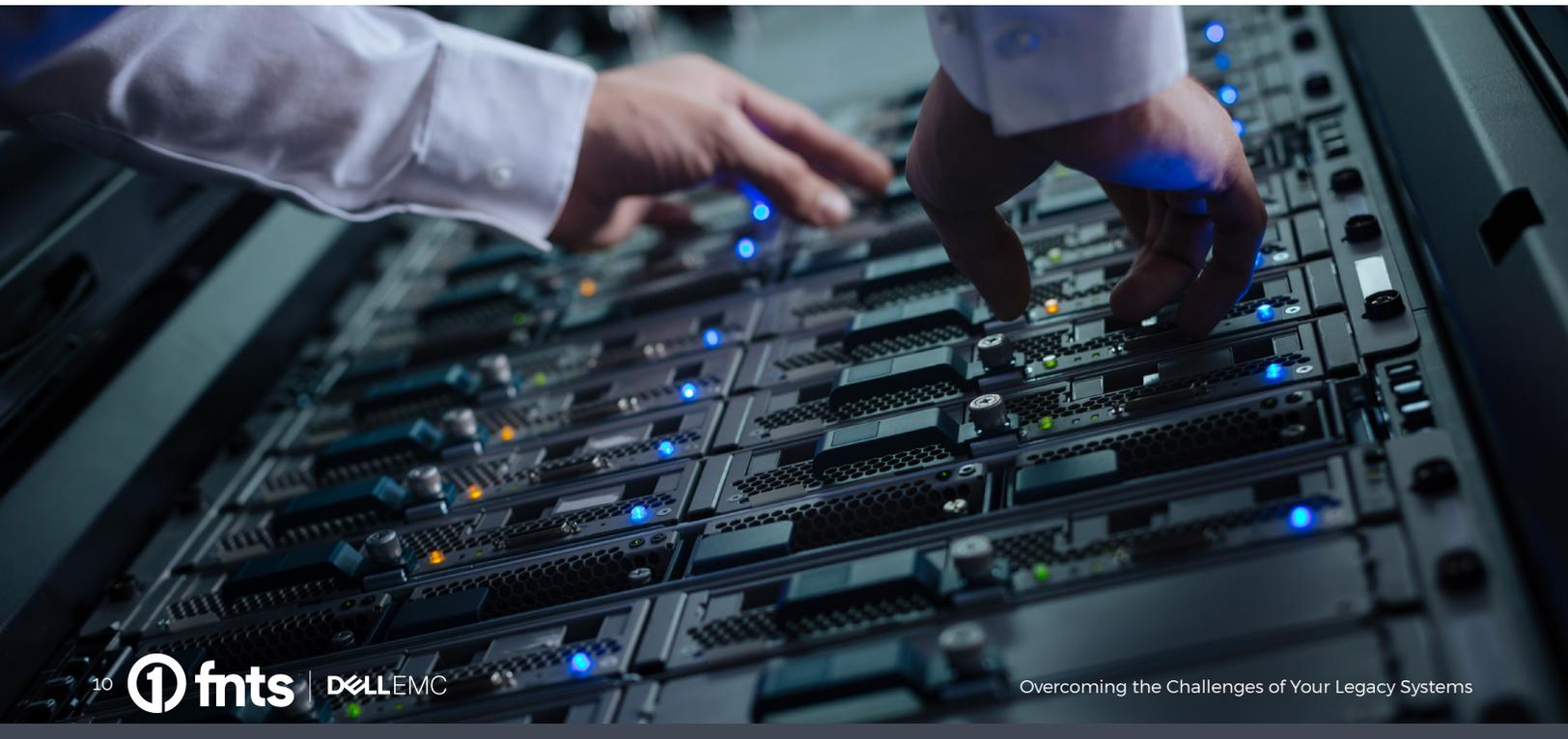
Moving Past the Mainframe Migration Conundrum

Legacy Assessment for a Virtualized Environment

For all but the biggest enterprises with enormous CAPEX budgets, retiring legacy systems for virtualized x86-based systems is the logical choice, but orderly migration of legacy systems poses many daunting challenges. This is due to the critical applications that they run and the complexity of migrating some of them to the cloud.

Legacy system migration should not disrupt the business, so the question of how to evolve the legacy system becomes the next issue. Organizations can achieve their goals by doing one of the following:

» **Continuing to maintain the legacy system**

» **Re-engineering the legacy system**

» **Migrating to a new system**

OPEX for maintaining legacy systems will increase over time, but the true cost is in loss of business opportunity. In other words, businesses must have a firm idea about why they are migrating to ensure that the process is targeted and worthwhile.

When determining what to migrate, start by conducting application assessment and mapping. A number of factors should be considered when undertaking this assessment, such as:

» **Application dependencies**

» **The age of the hardware and software**

» **The application's interoperability with other business systems**

» **Whether your legacy system supports your business process model**

» **The hardware failure rate**

» **The overall performance of the system**

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How Modernization Delivers TCO, OPEX, and CAPEX Benefits

It's true that staffing expertise, potential data loss, and application refactoring are all potential roadblocks to legacy mainframe modernization. However, the benefits of digital transformation, business competitiveness, and innovation often demand the change.

The legacy mainframe often weighs down organizations with an outdated approach to IT, and modernization poises the business for unconstrained digital transformation. Moving an application to a contemporary hardware and software infrastructure has many benefits associated with it:

» A migrated system is more amenable to change, enhancing the agility of the organization

» Software licensing costs are dramatically reduced

» Hardware infrastructure costs are reduced

» Integration with other systems becomes less costly and easier

» Application runtime performance is enhanced—which can deliver large productivity gains

» Access to more productive development tools

» Access to a larger skills pool

» Increased business agility with rapid application development and deployment

» Reduced costs of running your business-critical applications

» Improve your rate of return

» Leverage the cloud for your applications
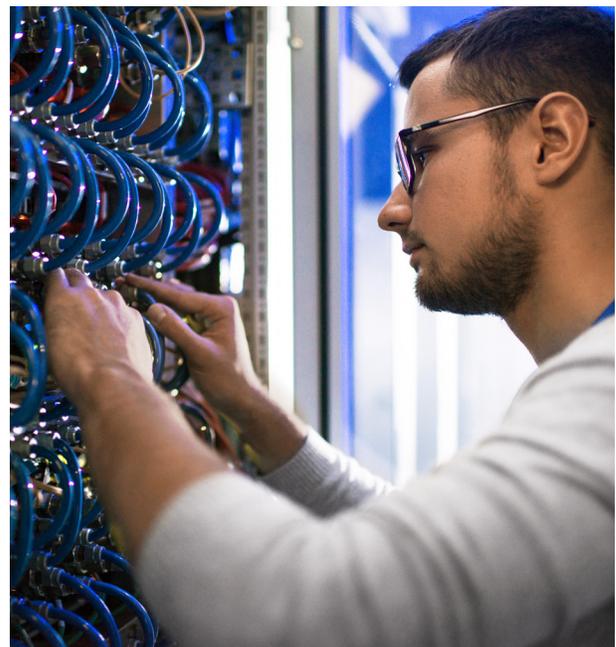
Modernization or migration should begin with an assessment of the data center IT infrastructure. The idea is to create a roadmap for achieving improved performance, operational support, and cost management. It is important to examine the potential risks and costs associated with disrupting the current applications on the system by evaluating the time, effort, and knowledge capital required for the project.

With application dependencies mapped, the organization can make determinations about which applications to migrate to the cloud based on compatibility and if they require refactoring on a code level. Since refactoring for cloud readiness is often the case with legacy mainframe applications, the decision can be made based on the complexity of the process and the mission-critical nature of the application.

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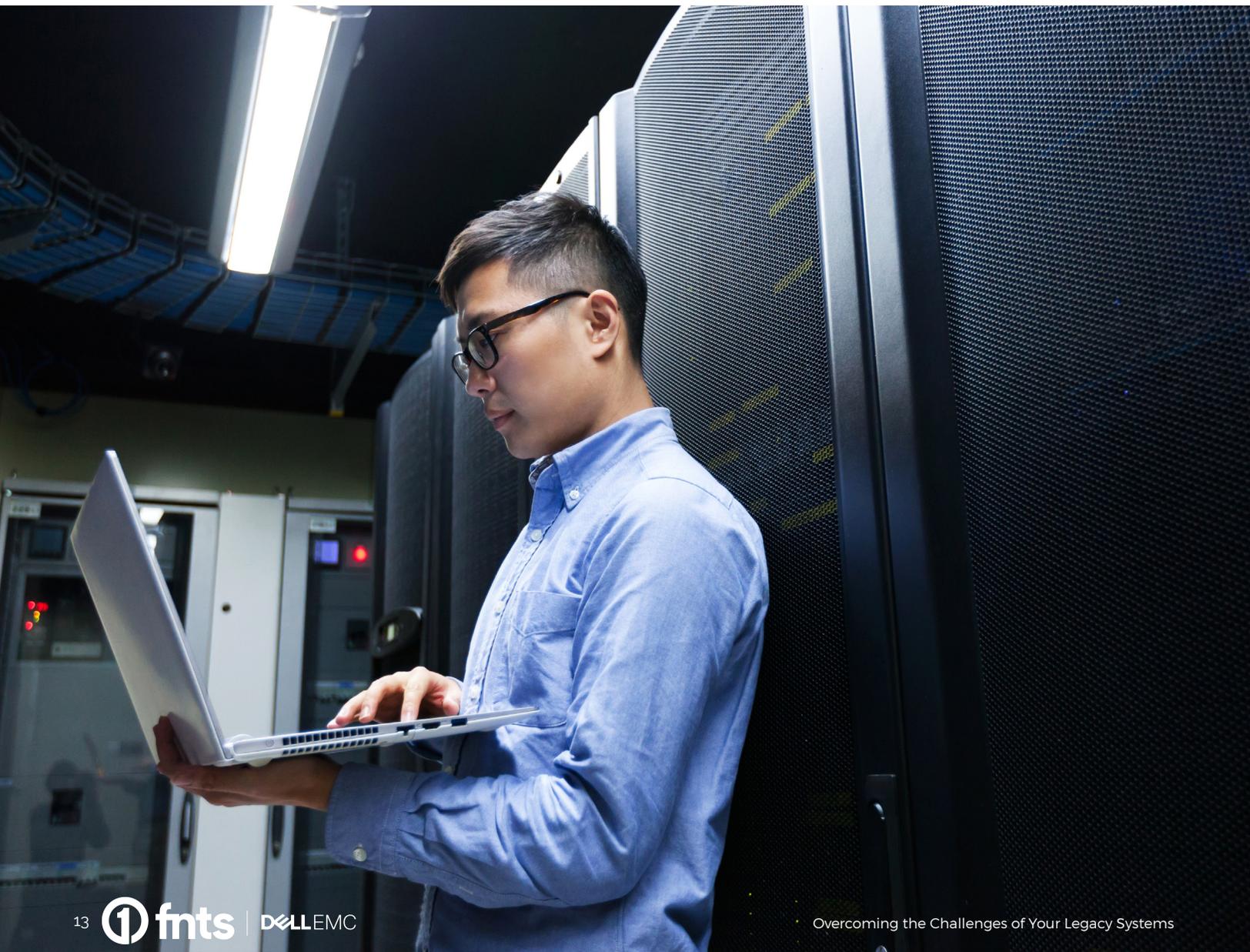
The Benefits of Hyperconvergence in Virtualized Environments

While virtualization is foundational to digital transformations, organizations need solutions that are extremely agile to meet the evolving needs of disparate branch locations, IoT, Big Data, and the vanishing network edge. Hyperconvergence, which combines storage, computing, and networking into a single system, is proving to provide the needed reduction in data center complexity and increase in scalability.

With solutions like the Dell EMC VxRail Appliance family powered by VMware vSAN, along with Dell

EMC VxRack Systems and XC Series, organizations can get plug-and-play appliances that make agile and simple hyperconvergence a reality for:

» **Expanding enterprise application needs (data-demanding applications such as OLTP, in-memory databases, OLAP, CRM, and ERP)**

» **Meeting database growth and management needs**

» **Hybrid cloud and multi-cloud approaches**

» **Network segmentation**

» **VDI and more**

The pursuit of the software-defined data center (SDDC) and software-defined networking (SDN) *is* dependent on compatibility across virtualized systems. With Dell EMC HCI solutions fully compatible with VMware vSphere 6.5 and VMware vSAN, organizations get the agility, scalability, security, and adaptability that they need for true digital transformation.

By utilizing Dell EMC solutions in conjunction with VMware to handle cloud-ready apps, organizations can take advantage of agile and cost-effective approaches, such as containerization, microservices, and more. The result is that workloads reside in the best place for cost and performance so that the organization gets the maximum benefits in terms of strategic agility and security.

For example, a hosted private cloud utilizing VMware is ideal for migrating from legacy infrastructure due to increased:

» **Regulatory compliance control**
» **Application performance**
» **More agile and accurate provisioning**

One of the most important benefits of private clouds involves applications on legacy infrastructure that aren't engineered for the cloud. These might include monolithic applications such as legacy ERP systems and other applications with complex dependencies.

Moving these applications to the cloud in a secure way that maintains their performance often requires complex rearchitecting or even replacement. That can make it difficult to ensure the application will work in the same way or better than before the migration. Rearchitecting or refactoring are expensive and time-consuming options with uncertain outcomes, but with VMware and vCloud, legacy apps can often be migrated from on-premises legacy infrastructure to a hosted private cloud as they are rearchitected and/or refactored.

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Mainframe migrations are often a combination of modernization deployments and partial migration projects. Depending on a number of factors, the ROI of a mainframe migration can be significant and can come rapidly after migration completion.

Moving legacy technology to newer platforms can deliver significant cost savings, but it's not without potential complications. These complications can be mitigated through automation and orchestration tools that can perform data conversions, VM rightsizing, and cloud optimization. There are also tools to convert the code from one platform to another in order to be either compiled or interpreted.

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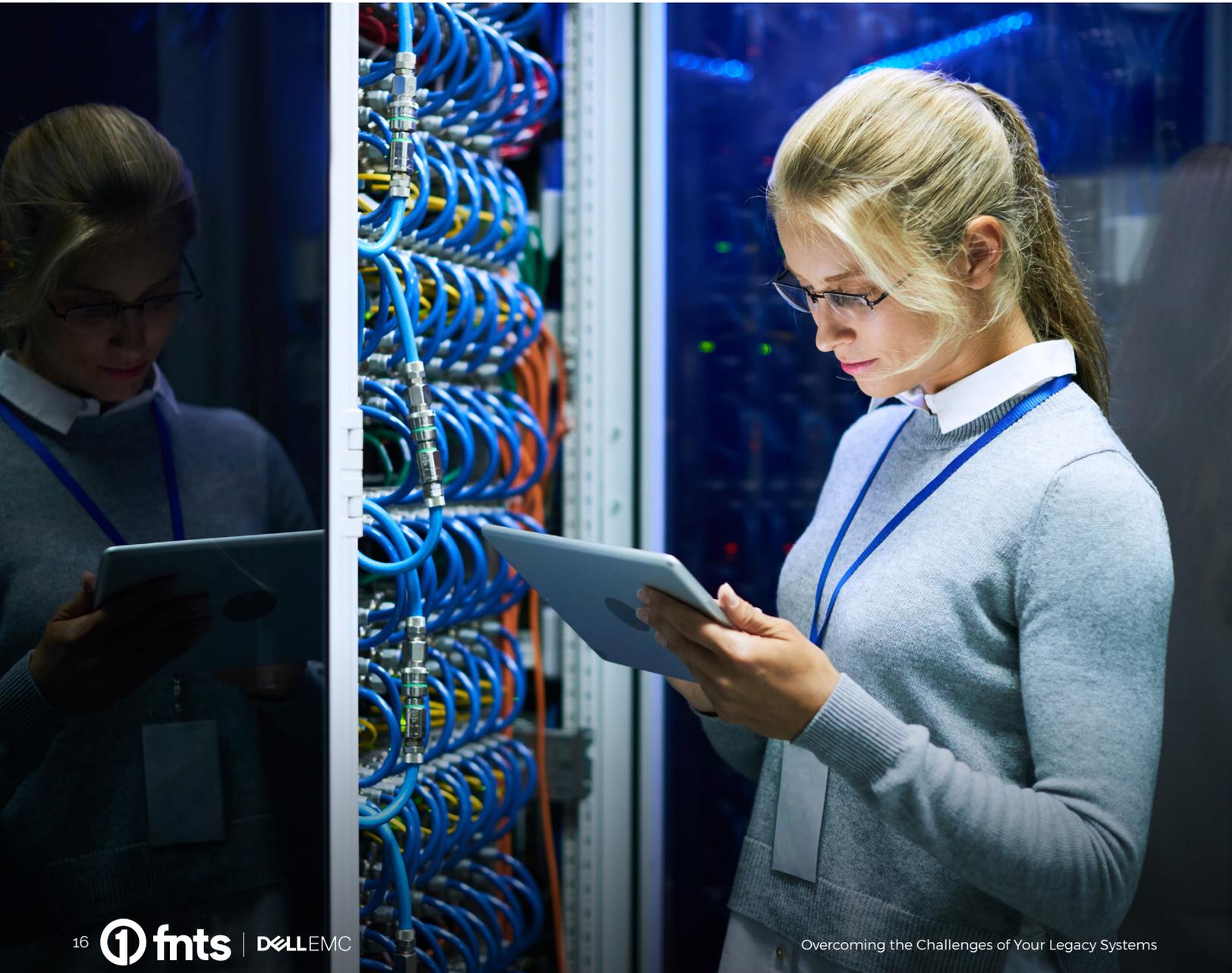
Servers and Businesses Need Evolution

Migrating mainframe applications to modern platforms can deliver significant short- and long-term CAPEX and OPEX savings. Equally important is how migration positions the business for faster time to market and digital transformation.

Organizations face a great deal of complexity in making the decisions surrounding how to move mainframe applications to the cloud. Most businesses will look to a hybrid cloud model approach, because mainframe costs are much higher than those of commodity hardware used for VMware, vSphere Hypervisor, and vSphere for the cloud.

Also, virtualized environments in the cloud have a more consistent and shorter hardware refresh cycle than is possible with legacy mainframes. Moreover, VMware in conjunction with vRealize automation can free the modern enterprise in terms of CAPEX, OPEX, and agility constraints. It can also facilitate DevOps, mobility, and much more, through solutions like the vRealize Suite.

The ability to look to an integrated solutions provider for end-to-end hybrid cloud, networking, and storage solutions can both simplify planning and implementation and reduce CAPEX and OPEX. For example, Dell EMC Enterprise Hybrid Cloud dramatically simplifies the deployment of a VMware-based hybrid cloud platform, which speeds digital transformation while eliminating risks, costs, and integration issues.

The Importance of Strategic and IT Staffing Through Outsourcing

Legacy mainframe maintenance and modernization, as well as application migrations to virtual cloud-based platforms, are all complex decisions and processes that require advanced expertise. Internal IT teams are already overburdened with other infrastructure maintenance and development projects. With only so many hours in the day, they cannot be expected to devote such large blocks of their limited time to legacy mainframe maintenance or the platform upgrades that are required.

In addition, the challenges of mainframe expertise and planning the best approach to ensure that the business doesn't experience downtime or disruptions are also major concerns. Having the support of strategic IT staffing through an outsourced MSP can overcome these challenges in a time-, expertise-, and cost-effective way. The benefits of this approach include:

» **Specialized skills on demand**

» **Legacy system and new technology integration**

» **Process strategy development for mainframe migration and implementation**

» **Cost reductions (personnel and hardware)**

» **Leading manufacturer partnerships and certifications**

» **Long-term IT strategy development (networking, public and private cloud, and so on)**

Internal IT teams are already overburdened with other infrastructure maintenance and development projects.

An important fact to consider is that, for most businesses, mainframes will continue to play a vital part in the IT infrastructure for some time to come. Skilled and versatile MSPs can provide managed mainframe services that do more than just keep the mainframe running.

It can be a complex and challenging process to integrate mainframe applications and data with the rest of the IT infrastructure. Moving information from mainframes to commodity servers brings its own challenges due to the differences in their respective hardware and software environments.

While there are tools available to handle these processes, they are often complex and require a high degree of expertise in mainframe and virtual systems. MSPs can therefore help companies deploy mainframe integration solutions or build new ones.

With the mainframe skills shortage, MSPs can deliver mainframe services to companies that rely on legacy systems but lack the expertise to effectively support them. This broadens business operational possibilities in ways that go beyond the mainframe to encompass a comprehensive, long-term IT strategy.

Digital transformation is about more than technology integration, maintenance, or modernization. Having the right MSP as a consultant and integration expert, along with the best technology vendor partnerships, can position a business to meet evolving business needs and opportunities in a global digital business landscape.

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