EBOOK | APPLICATION MODERNIZATION

Rewards — and Risks — of Mainframe Modernization

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Mainframes have always played an integral role at the crossroads between industry and technology. Whether healthcare, manufacturing, financial services, transportation or government, every industry has benefited from its widespread, behind-the-scenes use.

The Digital Revolution — commonly referred to as the Third Industrial Revolution — has ushered in technological advancements that have IT leaders questioning the role the still widely used mainframe should play in the future of their organizations. Key business drivers point industry leaders to one goal: modernization. Rising operating and maintenance costs, limited scalability and agility, and the need to glean insights more easily from collected data have outpaced mainframe capabilities.

Adding to that, professionals with mainframe experience are at or near retirement age. Even though mainframes still widely use COBOL, the next generation of technologists aren't learning it. Their focus is the cloud, automation and smart technologies, to name a few. In fact, the shortage of legacy skillsets is so pronounced that in 2020 New Jersey Governor Phil Murphy made it an urgent mission to secure COBOL programmers to help overcome the state's inability to process unemployment benefits.[1] And the issue certainly isn't limited to New Jersey. It's estimated that over 220 billion lines of COBOL are currently in use.[2]

However, it's not easy to retire what has successfully driven business for decades. But beyond the associated retiring workforce, mainframes often generate technical debt that squeezes budgets, squelches modernization initiatives and directs funds away from what drives every industry — innovation.

The need for modernized architectures has never been more pressing. Making it an "I'll get around to it" proposition isn't an option. Your organization must move these initiatives front-and-center to remain competitive in the marketplace, bring products to market faster, and maximize spend and technological advancements.

We'll help you evaluate the risks and rewards of mainframe modernization through the six Rs — retiring, resourcing, rehosting, recoding and rewriting, and re-architecting.

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Retiring

We're approximately 25 years into the Digital Revolution, and it's just getting started. That fact isn't lost on IT leaders, regardless of their industry. Among IT decision-makers, 80% believe we'll see a century's worth of technological advancements in the next five years.[3] In healthcare, technology makes it easier for patients to access medical care. Financial services firms use automation to replace time-consuming and error-prone tasks, bringing security and peace of mind to customers. Technology helps government agencies process documentation faster, getting benefits into the hands of citizens sooner. Artificial intelligence and the use of sensors and smart technologies help make the transportation industry safer, more efficient and environmentally friendly.

To keep up with technological advancements and enjoy what they (and future options) offer, your organization must upgrade existing architectures. Right now, that means leveraging the cloud, smart technologies, internet of things (IoT) and other cutting-edge technologies. Mainframes can't deliver what you need to remain competitive in today's marketplace; the target moves too fast.

Although it can mean different things to different organizations and industries, everyone agrees that modernization is necessary. Many organizations are modernized to varying degrees, but most still struggle with the concept of modernization — and wonder which systems to retire and which to keep running. Then there are the risks and financial ramifications of modernizing legacy systems.

Adding to the challenge are a host of other complications that vex even the most dedicated CIOs. Many entrenched infrastructure systems are mission critical and must remain functional even as new replacement systems are designed, built and deployed. This lengthens many modernization projects, some of which can take years to complete.

Yes, modernizing your organization's infrastructure is complicated, but you'd be hard pressed to find an IT professional who hasn't thought that it's time to retire the mainframe.

Risk

Mainframes and other outdated applications represent considerable risk. These systems limit agility, scalability and responsiveness. And don't forget the cost of maintaining them. It's estimated that as much as 80% of IT budgets are spent on maintaining and operating existing IT investments.[4] This means a limited amount of money is available to spend on modernization and innovation. Technical debt reduces expenditures on innovation and prevents your organization from leveraging new applications, technologies and cybersecurity measures.

We're in an age when data is king; being unable to easily glean insightful information from the massive amounts of data you collect is the cardinal sin of today's IT organization. In a 2021 survey, 75% of manufacturers stated that data mastery will be essential for future competitiveness.[5] Without question, it's a critical element for every organization to master.

Reward

Saying goodbye to the mainframe will help your organization realize both hard and soft savings in time, resources and dollars, while benefitting from everything that modernization can offer.

Unemployment systems — mainframe shame

Many Americans experienced first- hand the limitations of geriatric mainframes during the global pandemic. The surge in unemployment claims caused many state mainframe systems to buckle under the demand. These outdated systems couldn't keep up and left as many a 10 million Americans waiting for their benefit checks.[6]

Resourcing

Many talent resources who are familiar with the code, patches, nuances and languages required to run aging systems are at, or nearing, retirement age. And they're taking their empirical experience with them out the door. Organizations that still rely on several-decades-old systems are now trying to find young talent who understand COBOL, but it's like giving a modern driver a Model A Ford — they wouldn't know how to start it. Working on ancient code has little appeal to younger programmers, which adds to the current technical labor shortage. For those trained in C# or Java, working on a COBOL mainframe is like fixing that Model A. You can learn it, but why, when legacy systems aren't going to drive your organization into the future and spur innovation through IoT, cloud services, smart technologies, autonomous operations and augmented reality?

If you're looking for developers familiar with COBOL, that process will be exacerbated by all the other challenges every industry has finding talent. Consider the manufacturing industry. Among the manufacturers surveyed in the Manufacturers' Association's latest annual "Manufacturing Wage & Salary Report," 88% found it difficult to hire new employees, especially skilled, hourly workers.[7]

The need to modernize affects most organizations across all industries. Unless a company was founded within the past few years, there's a good chance any sizable operation has, or currently relies on, mainframe systems and architectures.

Risk

Systems and those who service them are both aging. Soon, the talent to fix and maintain these systems may not be available, which puts any organization relying on them at considerable risk.

Reward

Moving to new technologies, infrastructures and applications opens the door to adding new talent, capabilities and security to your organization. Talented resources are now available for more pressing modernization tasks and to implement newer technologies. And that gives the IT leaders responsible for providing the services these mission-critical systems deliver peace of mind.

UniKix mainframe rehosting

- Lowers annual IT operating costs
- Reduces migration risk, time and complexity
- Simplifies IT environments to accommodate growing workloads and new demands
- Provides a native, mainframe-compatible processing environment on open systems
- Delivers a proven platform for evolving technologies, such as cloud computing, mobility and virtualization

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Rehosting

One of the first steps your organization can take toward modernization will likely involve moving applications to the cloud. The quickest, easiest way to accomplish this is through rehosting your existing applications to the cloud, also called re-platforming or lift and shift.

You redeploy existing applications and data in a like-for-like fashion; in other words, you retain the existing source code and functionality. Lift and shift typically migrates on-premises applications to the cloud with little or no changes to them. Many organizations consider rehosting the easy way to move to the cloud; it can happen quickly and with minimal disruption and planning.

A lift-and-shift approach solves many scalability concerns and is often the best first step in a modernization initiative. But by no means does this option represent a fully modernized cloud-native solution that CIOs can leverage for the features and functionalities they require to meet the organization's demands and challenges.

If you rehost, it's imperative to select a vendor with experience moving applications to the cloud. Your organization must establish the business rigor it takes to maintain Amazon Web Services (AWS), Microsoft Azure or Google Cloud Mainframe competency and be confident that your chosen vendor has the experience to deliver it, as well as a proven track record of success.

Rehosting assumes that your applications satisfy the needs of the business. Often, savings from this approach can offset the cost of future modernization. Rehosting applications may involve a small amount of up-versioning. In this case, your organization should consider an application architecture diagram or an on-premises application. When rehosting, it's best to begin by reviewing the application's architecture and determining — for each application tier — what can be replaced with a cloud-native service.

Risk

With a comprehensive plan and an application roadmap, there's little risk to beginning your modernization journey when rehosting to the cloud. Although rehosting doesn't leverage cloud-native benefits like elasticity and cost optimization features, it's a step in the right direction.

Reward

With rehosting, your organization can unlock immediate savings in hardware costs and software licensing fees. Organizations that re-platform often see higher uptime, lower maintenance, better performance and labor savings. At NTT DATA, we typically see organizations save up to 30%–70% by merely rehosting. We also recommend adopting DevSecOps practices and processes, such as continuous integration/continuous delivery pipeline support, while migrating workloads to the cloud.

Recoding and rewriting

When evaluating your IT environment for modernization, recoding and rewriting go hand in hand. Both have benefits once applications are operational in the cloud. And many organizations choose an all-in approach to modernization by recoding or rewriting applications at the same time they move to the cloud.

Recoding converts legacy code to a more modern language, such as moving from COBOL to Java or C#. Typically, this approach retains functionality and results in code that's easier to maintain and enhance. Automated software tooling can help, too, by converting one programming language to another while retaining functionality.

Rewriting an application means starting from scratch using traditional methods. Many organizations attempt to rewrite legacy systems through traditional waterfall and agile methodologies. Both effectively gather requirements as if for a greenfield development project prior to attempting to rewrite the systems.

Risk

The challenge with recoding and rewriting is to maintain and enhance the results. Code conversion generally replaces the existing source code asset on a line-by-line basis. This implies that a COBOL program converted to Java retains the procedural aspects of the COBOL program, but is now written in Java syntax. The resulting solution will require skills in both COBOL (to understand the program process flow) and Java (to understand the syntax). Syntax changes sometimes fail to take full advantage of the benefits of the new language. In addition, many organizations that take this approach spend several years rewriting converted programs into a more elegant, or perfect, form of Java or C#.

Projects that involve rewriting applications often fail, experience huge delays or result in major cost overruns because the requirements gathered don't represent all the functionality the original system provided.

Reward

The benefits of code conversion are similar to rehosting. You quickly leave the mainframe behind, eliminate expensive software license fees and implement a more modern infrastructure. And the solution is easy to enhance and maintain in the future. On the bright side, rewriting can produce crisp code that leverages features in the new language and the cloud. The new application includes all the desired features and functionalities.

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Re-architecting

Re-architecting extracts legacy knowledge by matching or enhancing functionality through the advanced tooling and best practices you use in developing a modern architecture.

Sometimes referred to as refactoring, re-architecting retains the best features of the original application while removing unnecessary functionality. Inherent to this approach is upgrading to a more robust programming language like Java or C#. Re-architecting takes full advantage of cloud-native benefits such as security, scalability and speed.

Using low-code/no-code tools will help you introduce a new, modern front-end for application services. Your organization can benefit from a user-friendly interface that helps ensure user satisfaction while reducing the application's resource drain.

While each organization's portfolio will have a mix of options and workloads, we recommend conducting a thorough analysis before you begin. This will help your organization assess the right path for each legacy application.

Risk

Re-architecting takes time and requires a comprehensive, future-state architecture and strategic plan to achieve. In many cases, this can be the longest path to transforming existing mainframes. It extends exposure to two of the greatest risks to success — security vulnerabilities and the ability to accommodate budget constraints, which linger because mainframe costs aren't reduced until the later stages of the project.

Legacy systems represent a significant security risk. Older applications and systems simply don't have the security protections and protocols you need to prevent today's sophisticated attacks.

Bad actors target weaknesses, as well as old architectures and applications, all of which can expose critical infrastructures and broaden attack surfaces. This puts not only organizations but millions of customers, vendors and supply chains at risk. Re-architecting can help you build a system and a solid defense.

Reward

With re-architecting, your organization can maximize the inherent cost savings of the cloud, as well as create a platform for digital innovation and operational excellence.

This approach requires a greater upfront investment, but the benefits include the security features of an immutable infrastructure, autoscaling, greater elasticity and more.

Unlike many mainframe systems, which often have outdated technologies and known vulnerabilities, a cloud system is updated continuously to protect against the latest threats. And the shared responsibility model assures that your cloud provider will deliver basic cloud functionalities. Cloud providers also help ensure security best practices and guideline compliance. AWS and Google Cloud, for example, maintain responsibility for security from the host operating system (OS) and virtualization layer. Users are responsible for everything from the guest OS up to, and including, the firewall.

U.S. Air Force modernization success

The United States Air Force (USAF) needed to modernize its 50-year-old legacy mainframe supply chain platform to reduce operating costs, improve system agility and ensure full mission readiness of its bases around the world.

Throughout a partnership spanning nearly 20 years, NTT DATA and the USAF have worked together to modernize software development methods, re-platform a complex proprietary system and pivot a mission-critical enterprise logistics platform to the USAF cloud. The result:

- Supports $18 billion in inventory for over 100,000 direct and indirect users worldwide
- Accelerates platform modernization with transition from waterfall to agile
- Transforms the USAF system from customized COBOL on a Unisys platform to Java on Red Hat Enterprise Linux
- Migrates a hierarchical database to an Oracle relational database
- Eliminates the footprint on a cluster of five legacy mainframes
- Migrates a production environment with more than 120 servers and 5 terabytes of data to AWS GovCloud/USAF Cloud One
- Saves $25 million annually on hosting costs
- Expands to monthly software releases using an agile delivery model
- Ensures future agility with security through DevSecOps practices

Conclusion

To build the organization of the future, modernization efforts need to happen now. You simply can't rely on applications and infrastructures of the past. If you want to win the Tour de France, you don't pedal up to the starting line on a 1969 Schwinn 10-speed. The rapid advancement of technologies, coupled with increasing customer demand for digital services and an enhanced user experience, means you must accelerate your organization's modernization efforts; there are consequences from putting it off. These include:

- Slower time to market because new releases and resultant revenue are put on hold
- A young workforce, without mainframe experience, hired to replace retiring talent resources
- Growth of crippling technical debt from hardware, software and maintenance costs
- High total cost of ownership due to the resources spent supporting and maintaining obsolete, antiquated technologies
- Inability to rapidly launch workloads that support innovative products, services and features

The idea of modernizing your mainframe infrastructure may sound daunting. Change isn't easy, especially when so much depends on success. But with a careful strategy and planning, weighed against the risks and rewards, you can pave the road to modernization.

Dereck Magill, executive director of the Association of High Computing Professionals, provides sound advice to CIOs struggling with legacy systems: "Gather internal knowledge, obtain the appropriate technology and process skills, and determine the best path for your specific monolithic application based on cost-benefit analysis, and you will be ready to start the journey to monolith modernization."8

Mainframe modernization is doable. More than that, it must be done. It's time to take that first step.

Let's get started

If you would like to start your organization's modernization journey, visit nttdataservices.com to learn more.

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