Mainframe Application Delivery and Deployment—A Fresh Approach

Game-Changing Technology to Support Core Mainframe Systems
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Introduction

Mainframes Mean Business
Mainframe environments have historically been the natural choice to run the mission-critical business applications that enterprises rely on. Over time, developments in processor technology have meant that Linux, UNIX, and Windows Servers have become able to deliver mainframe equivalent performance at a fraction of the cost. They can, therefore, offer more options to respond to change required by the business while delivering the appropriate Reliability, Availability and Serviceability (RAS).

The IT strategy and platform choice options open to the enterprise are also shaped by the existing technology footprint of the mainframe environment. The most prevalent mainframe languages, COBOL and PL/I, remain valued and critically important components of many organizations’ mainframe environments. Yet organizations using them can feel trapped, believing they have no choice but to develop, test, and deploy every application on the mainframe and simply accepting this as the cost of doing business as there is no viable alternative.

This paper looks at the options available to mainframe application decision-makers who are looking to map their mainframe IT strategy to their next generation of business needs.

Where Is the Mainframe Going?
Recent research has shown that today’s CIOs are questioning the role that the mainframe will play in the IT infrastructure of the future. A recent survey by Standish Group\(^1\) showed that while 70% of CIOs consider that the mainframe is a central, strategic platform at present, none consider that it will play as strategic a role in 5–10 years time.

<table>
<thead>
<tr>
<th>Currently</th>
<th>Central or Strategic Role</th>
<th>Average Role</th>
<th>Minor Role</th>
<th>No Role</th>
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<tr>
<td>70%</td>
<td>15%</td>
<td>15%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Over the next 5 years</td>
<td>15%</td>
<td>41%</td>
<td>37%</td>
<td>7%</td>
</tr>
<tr>
<td>In 5–10 years</td>
<td>0%</td>
<td>7%</td>
<td>33%</td>
<td>59%</td>
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Standish Group survey of CIOs in Fortune 1000 companies, March 2010
Despite the results of this survey, it’s highly unlikely that within 10 years no organizations will consider the mainframe as strategic, especially in the organizations with huge mainframe capacity. It’s also difficult to believe that in 10 years more than 90% of the organizations using mainframes today will no longer use them at all or only use them for a minor role.

The survey is, however, a good indicator that the perception of the mainframe is changing. It looks increasingly likely that the mainframe will be part of a more diverse environment within an evolving, hybrid data center. Some business functions will be performed on the mainframe, but many others will be performed on alternative environments, including mobile devices. In fact, rather than being pushed down an on-mainframe or off-mainframe route, enterprises will determine their own platform infrastructure based on the configuration that makes most sense for the business. For many, the mainframe will continue to play an integral role, but not all applications will remain mainframe-based.

Enterprises face a number of challenges when planning the future strategy for their mainframe-based applications:

- Growing business needs have to be met by increases in production system capacity and performance
- Being forced into a decision to move from unsupported mainframe environments to continue operations and meet new performance levels
- An upgrade requirement every 1–3 years at a cost of between $2–10 million per upgrade
- The growing shortage of mainframe skills and an aging population of mainframe developers

How these systems evolve will be a critical IT decision and the decision criteria must consider all aspects of cost, risk, and flexibility.

The Mainframe World

There is no standard definition of ‘the mainframe organization’ as no two mainframes are the same. With so many variables in play—in terms of horsepower in millions of instructions per second (MIPS)—the provision of applications, infrastructure, cost model, development, testing and support staffing, skills, language, and system software choice—the array of possible ‘mainframe environments’ is vast.

Pervasive Languages

Business systems that are homegrown, rather than being vendor-supplied, remain typically constructed in one of two third-generation languages: COBOL and PL/I.
COBOL also became very popular on just about every other platform and there are a host of COBOL vendors offering excellent COBOL development tools on all of today’s popular Linux, UNIX, Windows and even cloud environments.

Many organizations have also built mainframe-compatible technologies used by COBOL applications to offer mainframe COBOL-centric IT organizations the opportunity to migrate and deploy these applications on alternative platforms.

PL/I was introduced in the mid-’60s as a multi-purpose mainframe-based programming language and, while variants have been produced for other platforms, its popularity remained steadfastly on the mainframe environment.

Both COBOL and PL/I are entrenched across industry, in particular financial services, banking, insurance, utilities, and manufacturing. These organizations share a continued reliance on the mainframe due to the tremendous value built into their applications over time and the robustness of the mainframe as a platform.

Other aspects are less positive:

- They continue to endure relatively high costs for developing, testing, and running all of their core applications on the mainframe
- Many mainframe applications only exist because there are no packaged applications that can provide the same sophisticated functionality on alternative platforms
- Organizations cannot afford to take on the costs or risks of rewriting or replacing the applications

This inflexibility is a growing concern to the CIO, who wants to be free to make technical decisions based on business merit rather than historical legacy or on the existing supplier.

Concerns surrounding the continued reliance upon mainframe applications include:

- The ongoing operating cost associated with these systems and the environments in which they run
- The growing need to provide more flexibility and innovation in IT to support changing business demands and the difficulty of supporting this with existing mainframe systems
- The continuing demands of niche technical skills to maintain and support critical systems and the growing fear of a skills shortage
- The ever-changing IT landscape and concerns over the strategic ‘fit’ of older systems in terms of platform, architecture, and data management
Whether the investment in mainframe applications represents critical, core business systems or whether the functions they perform are peripheral or discrete, the ongoing effort and cost to support and maintain them needs to be measured against longer-term value and organizational suitability.

What Can Be Done?
As organizations look to address the increasing IT debt caused by years of tight budgets and cost reductions, addressing legacy mainframe applications effectively is a critical success factor. The fact that these applications are still used underlines their business importance, and often there is a high level of intellectual capital embedded within the systems.

As organizations consider their future IT strategy, CIOs are presented with the following options they can consider for each mainframe application in the portfolio:

<table>
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<tr>
<th>Option</th>
<th>Description</th>
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<tr>
<td>1. Retire</td>
<td>Find and remove redundant mainframe programs or applications; i.e., locate those that are no longer used and delete source code and related executable modules from the mainframe.</td>
</tr>
<tr>
<td>2. Retain</td>
<td>Keep the applications and continue to maintain and improve them while the back-end applications continue to run on the mainframe and consume resources on z/OS.</td>
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<td>3. Rewrite</td>
<td>Recreate existing application functionality in a different language, either from existing specifications or by automatically converting the existing COBOL or PL/I code. Once the initial rewrite is complete and tested to ensure it is delivering the same level of functionality the current mainframe applications deliver, future improvements will be made in the new language.</td>
</tr>
<tr>
<td>4. Replace</td>
<td>Implement a standard commercial, off-the-shelf (COTS) package to replace: Applications that deliver no differentiation or IP &lt;br&gt;Future improvements will come from the package application provider. &lt;br&gt;Applications that do provide differentiation and uniqueness. &lt;br&gt;In this scenario once the package is implemented, the unique intellectual property (IP) would be added back into the package to deliver the unique differentiation again.</td>
</tr>
<tr>
<td>5. Rehost</td>
<td>Rehost the applications to lower cost, gain more flexible platforms, and use the operational savings to fund ongoing application modernization and increased innovation. &lt;br&gt;This approach is commonly referred to as &quot;Modernization&quot; as the process improves the current system but on a new platform—as opposed to rewrite or replace, which requires completely different systems.</td>
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Let’s look at each of these in a little more detail.

Retire
The first option is to look at discontinuing applications without putting anything in their place. This requires accurate up-front investigation to determine that the applications are truly redundant. Typically, long-standing functionality is performing some task required by the business, even if no one is quite sure exactly what it is or what business processes continue to use it.
In many cases, therefore, retirement without some “replacement” is not regarded as a viable option. This is not to say retirement should not be explored; it should be, as it has the potential for significant cost savings. However, it is vital that a software tools-based approach is used to analyze the complete mainframe portfolio to verify that any mainframe program is not called or accessed from any other system on the mainframe. Doing this manually is neither efficient nor accurate enough to support such a major decision: if a wrong decision is made, a key business function could be brought to a standstill.

**Retain**

Maintaining the status quo in terms of platform, processes, and tooling will be considered as an option in most cases, simply because this is how the code has been maintained and delivered in the past. The path of least resistance and upheaval will be seen as viable to some because it is a proven path.

However, in considering this option, it is important to identify the true cost of this approach. These systems require ongoing operating costs to maintain them, especially in the context of growing budget pressures and cuts. There is also a potential cost of the business impact of continuing to rely on inflexible applications, unresponsive development processes, and sparse subject matter expertise.

**Rewrite (or Reengineer)**

Rewriting application aims to replace existing functionality written in one language by equivalent functionality written in a different, more ‘modern’ language. The rationale behind what is a complex project usually revolves around people: The difficulty in finding skilled COBOL and PL/I staff; the difficulties of training new college graduates who have never been taught the languages; the inability to attract and retain staff to work in them; the lack of COBOL and PL/I support on new strategic platforms; more abstract reasons like better ‘fit with technology strategy’ or other perceived benefits. There is seldom any business programming function available in more modern languages that the mainframe languages, COBOL and PL/I, do not support. Once a favored approach, history has shown that the majority of rewrite (or reengineering) projects either failed completely or were delivered years late and over budget. Today, this is seen as a high-risk approach, and should be considered a highly complex challenge for what are likely to be extremely sophisticated, high-performing mainframe-based applications.

The rationale behind what is a complex project usually revolves around people: The difficulty in finding skilled COBOL and PL/I staff; the difficulties of training new college graduates who have never been taught the languages; the inability to attract and retain staff to work in them; the lack of COBOL and PL/I support on new strategic platforms; more abstract reasons like better ‘fit with technology strategy’ or other perceived benefits.
Replace

Package replacements are big business. The basic premise when replacing applications with standard packages, however, is that organizations are compelled to do business in the manner dictated by the package's functionality. The alternative is spending significant amounts of additional time and money customizing the package as part of the implementation. There is a risk of losing workflow that is fundamental to the way a business operates, and this approach invariably involves costly, complex data remodeling and retraining. Given the complexity and inherent intellectual property buried in many legacy systems, the task of modeling this in any package would be considered extremely difficult, and beyond what a package might typically expect to support.

Many package implementations are also either never fully completed or are significantly late and over budget.

Panorama Consulting’s 2010 ERP report\(^2\) highlights that a significant number of ERP implementations fail to deliver anything approaching the anticipated benefit or value. More than 40% of companies surveyed failed to achieve at least half the expected business benefits, and 22% of ERP implementations failed to deliver any measurable business benefits.

Additionally, More than 40% experienced major disruption after the implementation went live—from being unable to ship products to an inability to close the books.

This approach can, therefore, carry the significant risks of budget over-spend and loss of key intellectual property. For non-business-critical applications, however, this approach could be considered.

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Rehost (or Modernize)

Rehosting is the process of moving application workload from one platform to another, without significantly changing the underlying application. Rehosting is often referred to as application migration or an approach to application migration. Applications can be migrated in their entirety or partially, depending on the nature of the portfolio and the long term modernization strategy. With more investment being made in rehosting solutions, the amount of code changes required is decreasing year on year. Rehosting results in improved productivity, reduced costs, increased focus on innovation, and improved time-to-market as IT is unshackled from the constraints of existing infrastructure and tooling. So the platform, applications, and tools used are all modernized, which is why this is often referred to as Modernization, because it involves keeping the core system intact, reusing existing code, and building on and improving it, rather than replacing it or rewriting it.

Assessing the Options

The current status of a core system must provide business context for the options given above. Outright retirement of aged and moribund systems pre-supposes the business functionality provided is either totally redundant or has already been superseded by another IT capability. In such cases, and where appropriate impact assessments have been concluded, retirement may be viable. For core systems, such a relatively straightforward approach is typically very unlikely.

Continuing to maintain and improve existing systems in their current form, on their current environment, may be deemed perfectly suitable as an option. For high-value core systems, continuing to run on a mainframe platform may be seen as strategic and fit-for-purpose, and it makes sense to pay a premium price for this. However, economic pressures and lower TCO opportunities in the marketplace may change this. Typically, all but the exceptional cases are right to consider a plan B, and if some applications must be deployed on the mainframe, it makes sense to identify some contenders to operate on lower cost platforms, to help manage mainframe costs, and avoid unnecessary growth.

A Fresh Approach

Setting up a new branch in China forced Standard Chartered Bank to comply with regulations to host all Chinese customer data on the mainland. Rather than incur the expense and inconvenience of creating a new mainframe environment in China, SCB moved over 3,000 COBOL programs and 800 screens onto Linux. Chinese legislative requirements were met while the original applications continue to reside on the mainframe in Hong Kong.
Effectively, this leaves the CIO with three key options to consider when deciding how to evolve IT systems to meet future needs while taking advantage of more contemporary environments to help reduce operating cost, increase flexibility, and improve service delivery. When comparing the options of implementing a package, rewriting or modernizing the existing business-critical system, the CIO of Tesco—the largest retailer in the UK—found that modernization proved the most effective solution across a number of key considerations.

**A Fresh Approach**

Tesco replicated its Continuous Replenishment system running on an IBM mainframe in the UK to AIX servers to serve new territories while decreasing MIPS utilization on z/OS. Read the full story at: [www.microfocus.com/media/success-story/tesco_tcm6-2083.pdf](http://www.microfocus.com/media/success-story/tesco_tcm6-2083.pdf)
A Fresh Approach
A business process outsourcer migrated a client’s complete life and pensions application from the IBM mainframe to Windows Server with no loss of functionality or precision, cutting operating costs by 70%. Other clients’ systems that continue to reside on the mainframe benefit from the MIPS freed up by the redistributed workload. Read the full story at: www.microfocus.com/media/success-story/insurance-business-process-out_tcm6-203084.pdf

The results were clearly in favor of modernization as the best overall option. In each of the four key criteria of cost, risk, time-to-value, and competitive advantage, modernization scored higher than alternative approaches and gave the organization confidence to move ahead with this strategic modernization project.

Rehosting and Modernizing Mainframe Systems

Effective application migration seeks to avoid unnecessary risk during the project while moving applications to an environment that supports business agility for the future at a far lower operating cost than is possible today.

In order to avoid as much risk as possible, it is therefore vital to ensure the solution can:

- Minimize the amount of changes required to systems that are to be migrated
- Deploy to a variety of low-cost server platforms to provide choice and freedom in the future
- Match or exceed performance levels required to support the business
- Provide the infrastructure that enables the Reliability, Availability, and Serviceability (RAS) and security levels demanded by the business
- Provide an architecture that enables IT to rapidly respond to new business demands

The Micro Focus Solution

The value of the mainframe cannot be overestimated. Historically, it has been the backbone of business IT. Getting maximum value from your IT investments drives changes to technology across businesses, which can include the redistribution of workload onto the platforms that make most sense to the business. Redistribution can be whole or partial, including development and testing activities, to the deployment of individual applications or the entire application infrastructure.

Micro Focus® COBOL has been used in more than 600 successful migration projects, and Micro Focus’s IBM mainframe migration products have been used in more than 250 projects to help rehost applications that were consuming a combined total of over 65,000 MIPS on the IBM mainframes on which they were originally hosted.
Micro Focus has recently added PL/I language support to its mainframe migration products so it can now offer the same low-risk rehosting option, which was previously only available for mainframe COBOL organizations, to organizations with PL/I portfolios.

The mainframe migration products offer:

- The ability to rehost PL/I and COBOL applications with minimum change to Linux, UNIX, or Windows
- Migration of mainframe DB2, IMS-DB, QSAM, and VSAM data to alternative databases and file systems available on Linux, UNIX, or Windows
- Support for online CICS and IMS applications
- A batch environment to support the move of existing jobs, job control, and batch utilities.

Micro Focus has worked with hundreds of mainframe clients over the years and used these experiences to continuously evolve and improve its technology.

Micro Focus Enterprise Server is part of a mainframe-centric technology product set that provides state-of-the-art mainframe application tooling to maximize the effectiveness and performance of applications on the mainframe to free mainframe capacity for applications that must reside on z/OS.

Figure 3 outlines the choice now available to distribute mainframe workload by testing and deploying mainframe applications on low-cost server platforms rather than on expensive mainframe processing power.
Micro Focus's migration capabilities have delivered business transformation to customers who have embarked upon an enterprise application modernization journey, starting with a rehosting project.

![Mainframe Deployment and Open System Deployment]

**Fig. 3**

Mainframe application deployment options

Micro Focus customers have experienced substantial benefits including:

- Operating cost reduction of up to 90% per annum
- Expansion into new countries that could not bear the cost of mainframe data centers
- Reduced time-to-market through development productivity improvements of up to 40%
- Increased customer satisfaction via improved system performance and quality

IT has delivered improved competitive advantage through application modernization initiatives that were funded by savings in operating costs secured with successful migration projects.
Often, there are operational needs to upgrade a mainframe or renew licenses within the next one to three years, or where CIOs require a strategy to implement a replacement for unsupported mainframe environments. On such occasions, application migration offers an ideal opportunity to review the effectiveness of applications running on the mainframe and determine the return each application is delivering, taking the premium pricing of the mainframe into account.

It may be appropriate to move some applications onto distributed platforms because it makes sense to do so for individual applications as it does not require significant upfront investment. This then establishes the distributed architecture and infrastructure for application delivery and deployment on platforms other than on the mainframe.

With this new generation of architecture established (see Figure 4), it then provides options to better manage overall operating costs through business growth or decline and ensures the expensive mainframe processing costs are reserved for applications that must remain on the mainframe.

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A Fresh Approach
Intersistemi helped a leader in the private banking sector in Italy move a single suite of account administration and market analysis applications from the parent group’s mainframe to a Windows Server, in order to save an estimated €3 million in charges over the next three years.

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Fig. 4
The Micro Focus Reference Architecture for delivering and deploying mainframe applications on Windows
What Business Benefits Can You Expect?

The benefits of this approach fall into four main areas:

**Cost Containment or Reduction:** Moving development, testing, and deployment to a low-cost platform avoids or reduces the need for investment in expensive mainframe MIPS. Not only are the ongoing hardware costs (maintenance or leasing) reduced, but more importantly mainframe software costs that are typically much more expensive can also be avoided, reduced, or contained. This can be part of a wider MIPS management plan and this can be instrumental in delaying or even avoiding future mainframe upgrades to add processing power.

**Reduced Risk:** With change comes risk: any deviation from the status quo has the potential for adverse impacts. As such, minimizing risk is paramount. By effectively retaining the intellectual property (and competitive advantage) within existing systems, application migration aims to reduce the amount of change, and therefore risk, to a manageable level. The risk levels compared with alternatives such as rewrite and replace are significantly smaller, which is why very few rehosting projects are ever cancelled or significantly overrun. This is not the case with rewrite or replace projects.

As the projects complete typically within 6 to 18 months, real value is delivered relatively quickly in terms of reduced operating costs or a pragmatic cost-containment strategy. It is these real savings that can then be used to pay for additional modernization initiatives, typically related to making user interfaces more efficient or improving reporting and business intelligence.

As one CIO explained after a successful migration:

“We loved what we could not see the back-end code that implements our unique business process that keeps us ahead of the competition. The costs savings from migration we then ploughed into modernizing the bits we hated—which was everything we could see—the screens and the reports.”

—Rick Mears, CIO, Owens and Minor.

**Improving Quality, Time to Market and Removing Skills Issues:** A wide variety of benefits related to quality, improved delivery, and internal skills challenges can be realized:

- With more efficient and effective tooling, future application releases can be provided quicker, at lower cost, reducing the ongoing delivery costs related to maintaining these systems
- Development teams are 40% more productive and produce better quality code using modern tools and dedicated workstations rather than relying on mainframe processing power
Testing bottlenecks can be removed, as processing power to help complete test cycles is more freely available, and additional processing power to do more testing is now affordable.

Both these are instrumental in improving time to market but also in mitigating one of the biggest perceived risks related to keeping applications in COBOL and PL/I: The skills issues.

The inability for development and testing staff to get fast reliable response times at any time of the day combined with the need to use antiquated tooling is instrumental in organizations finding it difficult to retain and attract new talent to work on mainframe applications.

Moving to a more modern environment puts state-of-the-art technology at the fingertips of IT staff and enables organizations to cross pollinate skills and attract the new talent that they are desperate to find, as their existing experts near retirement. Developers use familiar IDE frameworks and get instantaneous response times just as they would if they were programming in C or Java. In this environment, COBOL and PL/I become other powerful language (and a very sought-after skill) that developers can quickly learn and add to their résumés.

The same issue applies to attracting QA and Testing skills, as the mainframe tooling and response times frustrate young IT professionals in this area. Tackling these environmental issues allows a more positive job description to be promoted.

With these issues addressed, the IT organization is able to look at rejuvenating the talent pool by providing an environment for application development and delivery that is consistent with other systems.

Business Alignment and Flexibility: Application migration provides new levels of freedom, flexibility, and innovation.

First, moving to a contemporary environment not only improves the overall TCO immediately, but it also provides a springboard for future platform deployments as necessary to support new channels, lines of business, etc. Effectively, you are building in future portability to your application portfolio.

The second aspect is the new-found improvement in delivery timeframes enabled by a highly productive and efficient toolset. No longer does application maintenance consume 80% of all resources. With the productivity benefits gained by reducing lengthy maintenance and delivery cycles, IT can focus more on making the improvements and innovation the business demands.

Finally, innovation typically costs money, and organizations cannot afford to innovate as much as they would like. By dramatically reducing operating costs through application migration, IT can effectively buy itself the time and budget to transform its innovation capacity and business alignment.

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A Fresh Approach
Kansas City Southern Railway Lines moved five mission-critical applications, which consumed around 1450 MIPS from z/OS, to Red Hat Linux—eliminating 90% of its annual maintenance costs. Read the full story at: www.microfocus.com/media/success-story/kansas-city-southern-lines_tcm6-203716.pdf
In moving the delivery and deployment environment off the mainframe, Micro Focus is changing the game—revolutionizing how COBOL and PL/I applications and key IT services are delivered.

Conclusion

The Micro Focus Enterprise product set enables organizations to redistribute the mainframe application workload to deliver maximum benefit from the mainframe. In moving the delivery and deployment environment off the mainframe, Micro Focus is changing the game—revolutionizing how COBOL and PL/I applications and key IT services are delivered. By retaining the existing IP, by reducing the amount of change and therefore the risk, and by taking a huge amount of operating cost away, organizations are able to create an application infrastructure that is fit to deliver value for years to come. Micro Focus’s solutions support the modernization of core mainframe applications through the Micro Focus Enterprise product suite. For more information, visit: www.microfocus.com