The Mainframe Imperative: Migrating to the Cloud

Enterprises want to migrate mainframe workloads to the cloud to increase agility and scalability while also driving cost savings. The roadmap for getting there includes expert help and advanced tools.
Migrating off mainframes has become an imperative for enterprises because such legacy technology is generally not a good fit with ongoing digital transformation (DX) efforts. Increasingly, companies are looking to move mainframe workloads to proven robust cloud platforms such as Azure to take advantage of benefits including cost savings, security, scalability, and more advanced applications.

The question, then, is how best to accomplish the migration. The answer lies in two key areas: taking advantage of experts who have spearheaded hundreds of mainframe migrations as well as tools that can automate key steps in the process, saving time and money.

**Cloud migration drivers**

IT and business leaders have no shortage of reasons for wanting to migrate monolithic applications off of their mainframes. Topping the list is cost, which we’ll examine shortly. CIOs also face an IT skills shortage, as professionals with the required expertise to maintain and operate mainframe workloads are in increasingly short supply as they age out of the workforce.

IT teams are also looking to increase agility as part of their DX efforts, making the cloud a more logical choice for hosting data center infrastructure and enterprise applications. Indeed, many enterprises are embracing a strategy that calls for eliminating or downsizing data centers by moving workloads to the cloud, to take advantage of numerous benefits.

The global pandemic has exacerbated all of these drivers; unlike mainframes, cloud applications can be managed remotely, including by IT staffers working from home.
Economic analysis

A cost analysis makes the case for moving to the cloud quite clear. Costs fall into four major categories:

- Compute
- Software licensing
- Storage
- Operations and facilities

Mainframe compute costs are measured in MIPS. Generally, 100 MIPS can be replaced with a single x86 CPU core. In a mainframe environment, 100 MIPS typically costs up to $100,000 a year. By comparison, 100 MIPS in an Azure environment typically costs up to $10,000 annually.

Upgrading mainframes can also be very expensive. With IBM incentivizing mainframe upgrades every 4-6 years, costs can add up quickly. “Eliminating mainframe hardware is one of the biggest cost drivers for the modern data center,” says Bob Ellsworth, Director, Mainframe Transformation for Azure Applications and Infrastructure Solutions at Microsoft. “With Azure, companies save about 90% vs. mainframe hardware upgrade costs.”
Software licensing can be just as expensive as the hardware itself. Migrating workloads to the cloud means avoiding mainframe hardware and software licensing fees costs – savings that can quickly pay for the costs of migrating to Azure.

Storage will also likely be far less costly with the cloud, especially if customers make the effort to find and remove unused data before estimating cloud storage requirements. In Azure, main storage is a combination of high- and ultra-high-performance solid-state devices – a likely step up for many organizations. Azure storage is typically half the cost of mainframe storage. Maintenance, operations, and facilities are also significant factors, including costs for real estate and infrastructure such as power and cooling.

Finally, moving to an OpEx model, with consumption-based pricing, can significantly reduce CapEx costs – not to mention the lost opportunity costs associated with the limited agility and ability to innovate with legacy mainframe environments.

**Benefits of the cloud**

Beyond cost savings, modernizing legacy mainframe environments delivers a range of other benefits, including greater agility, better application performance, and more robust security and compliance.

Increased agility makes sense when you consider that migrating to the cloud provides access to modern data and artificial intelligence-based analytics tools, including business intelligence, machine learning, and advanced cognitive services in areas including vision, speech, language, decision-making and search.

Leading cloud platforms also support modern development environments such as devops and GitHub along with the latest deployment platforms, including Kubernetes, Docker, and Red Hat OpenShift.
Choose a migration strategy that fits your business needs – and provides a clear path to ROI

It’s important to choose the migration strategy that best matches your business needs – and provides a clear path to ROI. That helps you build the business case for migration. There are three primary options for migrating mainframe applications and workloads to the cloud:

• Redevelop, re-engineer, or refactor the applications, creating modern apps that can take advantage of all cloud benefits

• Lift and shift, which involves redeploying the applications without significantly altering them. This will deliver some benefits of the cloud but not all.

• Retain and optimize, which means encapsulating applications and making them available as-is via an API to a cloud-based platform
The following table provides a comparison of these strategies in terms of cost savings and other benefits:

<table>
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<th>Migration Strategy</th>
<th>Implementation Cost*</th>
<th>Implementation Timeline*</th>
<th>Key Benefits</th>
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| Manual redevelop                    | $35-50M               | 3-5 years                | • Brings in agility  
  • Future-state architecture technology  
  • Design flexibility                |
| TCS MasterCraft-based re-engineer/ refactor | $15-25M               | 1.5 to 3 years           | • Brings in agility  
  • Future-state architecture technology          |
| Lift and shift                      | ~$5M                  | 1-2 years                | • Faster mainframe exit                                      |

* The cost and timeline are derived for medium to complex types of applications with lines of code ranging from 5-7 million

For a retain-and-optimize approach, costs will depend upon the level of optimization and improvements to address technical debt. To retain applications as-is, there is only support cost and no net new implementation cost.

It’s important to determine the right approach for each application or workload you’re looking to migrate off of the mainframe. In some cases, if refactoring provides the same levels of speed and agility as a simpler lift and shift, refactoring is a better option because it provides future-proofing. If neither approach is practical from an ROI or benefits standpoint, rewriting the application may be the best approach.

“Enterprise customers with a large number of workloads will likely need a mix of approaches, depending on the characteristics of each application,” says Vijayalakshmi Gopal, Vice President and Global Head, TCS MasterCraft. “Customers with a small number of workloads will likely have more success choosing one approach and using it throughout the migration journey.”
“Properly sequencing the migration steps is also important to ensuring you get the most benefit from the cloud, so it’s critical to create a realistic roadmap,” says Gopal. “That’s why it’s so important to choose the right partner to help determine the right strategy and implementation approach.”

Finding the right partners

Like any transformation effort, digital transformation with modernization to migration can be very complex and extremely expensive, if not managed and orchestrated in a disciplined fashion, with the help of a seasoned and experienced partner. TCS has more than 30 years of experience in migrating mainframe applications and has automated tools to perform up-front assessments, helping to decide the best path forward for each application.

TCS MasterCraft TransformPlus performs deep code analysis to determine the impact of any change to an application. It also automates remediation to the cloud by optimizing code specifically for Azure, while eliminating any unnecessary code.

TCS MasterCraft automates the data transformation process by mapping source and target attributes along with transformation rules, translating them into target code, and migrating data from the source to the cloud. It also includes automated refactoring capabilities to convert COBOL to Java and help with data migration and modernization while ensuring high code quality and better maintainability.

In short, TCS MasterCraft takes away a significant percentage of manual work, enabling companies to modernize and migrate applications two to three times faster, and with an average cost reduction greater than 50% vs. manual migrations – all with precision and predictability.
Microsoft Azure

Microsoft has many advantages over other hyper-cloud providers, including extensive experience, an extended team that supports these migrations, and cloud technology to deliver the Reliability, Availability and Serviceability (RAS) required for mainframe workloads.

Microsoft established the Mainframe Migration Alliance in 2004. TCS was one of the first members of this alliance. Over the past 17 years, Microsoft and its partners have helped hundreds of customers migrate mainframe workloads to Windows/SQL and Azure. These deep experiences allow Microsoft to become trusted advisors ensuring that the best methodology and solution is chosen for each migration.

Microsoft has an extended team of migration experts across the company, including Mainframe Migration Global Black Belts, Azure Global Legacy Engineering, Azure Data R&D, and Azure Cloud Engineering Services. This extended team engages with customers, helps identify and implement enhancements to Azure to address migration blockers, address complex database migration challenges, and provide interoperability between the mainframe and Azure.

Azure has the technologies to deliver the RAS required for mainframe workloads. In addition, disaster recovery and business continuity can be achieved at a minimal cost. Once workloads are moved to Azure, Azure services can be consumed to continue evolving the workloads. Lastly, modern development tools and deployment technologies can be used to improve business agility and deliver incremental application updates more frequently than on the mainframe.
TCS + Microsoft: A powerful partnership

Together TCS and Microsoft can help you successfully modernize and migrate mainframe applications, including core and legacy applications – so you can take advantage of all that Azure has to offer for your digital transformation efforts, and unlock new value for your business.

TCS Microsoft Business Unit (MBU) conceptualizes and provides Edge to Cloud services and solutions across Azure, D 365 and M 365 cloud, to address customer’ growth and transformation journeys for the entire spectrum of stakeholders.

TCS is a Microsoft Gold Competency Partner, the highest-level in the Microsoft Partner Network community and has best-in-class capabilities to deploy Microsoft business solutions. Additionally, TCS is a designated Microsoft Azure Expert Managed Service Partner, recognizing TCS’ proven expertise in delivering the highest quality of service on Azure.

To learn more, visit https://www.tcs.com/microsoft-business-unit.
TCS MasterCraft is a comprehensive set of products that enable optimization of service delivery processes in development, QA, delivery, digital transformation, component-based application creation, enterprise data quality, and privacy. The suite enables digital platforms to optimally manage IT processes in areas including: Agile, Continuous Application Delivery, Application Modernization and Transformation, Enterprise Data Privacy, and Quality Management. Used extensively over 835 projects, across 325 customers in TCS, MasterCraft products are backed by decades of TCS R&D, defined product management principles, continuous improvement, extensive self-help and SLA based support. MasterCraft™ products are backed by 24x7 support and professional services, with toll free call-in lines available in multiple countries. MasterCraft™ Academy delivers training services and certifications on product capabilities.

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