

Legacy application modernization: From mainframe to cloud



Abstract

Over the years, enterprises across industries have been thinking about how to modernize their mainframe workloads and transform them into cloud-native services for building the digital foundation core. This paper provides an end-to-end approach for executing mainframe modernization and delivering cloud transformation to enterprises. Moreover, it provides strategic guidance for organizations to achieve an accelerated path to business value while addressing risk and change at enterprise scale.

Evolution of the mainframe ecosystem

Mainframe-based workloads are still alive and humming - 71% of Fortune 500 companies have their core business applications hosted on mainframe platforms. This means that millions of business transactions involving online processing workloads and high volume of batch jobs requiring huge volumes of data are being executed on mainframe platforms.

New processors and chipsets in the mainframe hardware platform, in conjunction with native virtualization technologies, have been leveraged to support the hosting of contemporary application workloads. From the market adaptability, modernization and open-source adoption standpoint, mainframe has evolved over time with container technologies for hosting containerized application workloads. Lastly, there are products in the market that integrate the mainframe workloads and data with the digital systems of engagements hosted on premise and public cloud environments. This evolution has enabled enterprises to create a hybrid ecosystem for extending real-time access rapidly to business partners, suppliers and agents in the end-to-end value chain with the existing investments on mainframes.

On Mainframe

- 45 of the top 50 banks
- 8 of the top 10 insurers
- 8 of the top 10 telcos
- 7 of the top 10 retailers
- 4 of the top 5 airlines

Source

Repurposing mainframe assets

All these advancements in mainframe computing and software stack continue to drive the need for enterprises to integrate mainframe and open systems continuously. For repurposing mainframe assets enterprises are leveraging:

- Integration solutions to allow system of engagement APIs on cloud to access the mainframe data as part of the data liberation and API adoption initiatives. Another important benefit of leveraging such integration solutions is to avoid replicating master data across mainframe and distributed systems and maintain a single source of truth across the enterprise.

- Messaging solutions to allow message exchange across mainframe applications and services hosted on cloud through industry standard protocols.

These allow enterprises to extend the digital hybrid ecosystem and systems of engagements for providing real-time access to business partners and supporting a new set of business capabilities and processes.

One of the key implications of repurposing mainframe assets is that it will invoke millions of API calls to access mainframe services and data that would result in the increase of compute processing power (millions of instructions per second - MIPS consumption) on the mainframe side. This could lead to rising operational costs which calls for implementing optimization levers.

At an operational level and as part of tactical initiatives, mainframe utility pricing models, license models, repurposing and processing through APIs will always trigger the enterprise to continuously invest in the optimization effort of mainframe application workloads and resource (CPU, memory, disk) utilization. This effort is needed on a continuous basis to improve the overall operational efficiencies of mainframe footprint and to reduce mainframe operational expenses.

Implications of a hold-back strategy

Many organizations having mainframe footprint with legacy application portfolio are now in a dilemma about how and when to get incremental business value of cloud for their mission critical systems. Businesses that continue to run with aging legacy technologies are now held back by those same technologies that limit growth and are at a competitive disadvantage versus organization born or thriving on cloud.

Today, legacy portfolio hosted on mainframe infrastructure are experiencing limited business model innovation and minimal leverage of ecosystems:

- **Long time to market:** It takes months to release and integrate new revenue generating features and functions. New cloud-native applications are also constrained as the mainframe stack is slow to catch up in integrating with ecosystem of digital application services.
- **Inadequate skills are a business risk** due to an aging workforce with legacy competencies and limited entrants willing to enter legacy skill pool.
- **Total cost of ownership (TCO) continues to increase** as the alternate options are very limited and involved with significant amount of risks.
- **Inflexible** to rapidly launch experimental workloads for supporting innovative business / service models, products, and features.

Organizations that are considering whether to reset their approach to risk should remember that embracing risk brings a wide range of tangible and intangible benefits, including higher productivity, stronger business sustainability, faster time-to-market, and lower operating costs. In addition, demonstrating openness to embrace risk also enables organizations to operate with business agility.

Transitioning mainframe portfolio to cloud

Mainframe application modernization and cloud transformation opportunities across industries can be jointly addressed by market ecosystem players including cloud vendors, independent solution vendors, service providers and system integrators.

Enterprises that are ready to embrace risk can adopt multiple horizons to successfully modernize mainframe legacy application portfolio to hyper-scaler public cloud platforms.

Horizon 1 initiatives

- **Rationalize** mainframe business application workloads.
- **Repurpose** mainframe workloads and data to integrate with the ecosystem of digital systems of engagements. For example, banks can open access controls to their credit check partner's credit check API systems for leveraging their mainframe data store data about their customer's loan history details through OpenAPI banking initiative.
- **Optimize** mainframe resource consumption through optimization effort. For instance, retailers can optimize application design, database access calls, SQL tuning, batch and online transaction tuning, compiler upgrades, and so on for handling seasonal sales workloads.

Repurposing assets and optimization of mainframe consumption will benefit enterprises while embarking on modernizing and migrating applications to a public cloud during Horizons 2 and 3.

Horizon 2 initiatives

- **Rehost** by leveraging vendor's mainframe rehost solutions in market and refactor mainframe workloads into cloud platform as part of quick win strategy.
- **Replace** mainframe COTS with the appropriate and equivalent SaaS solutions.

Horizon 3 initiatives

- **Re-architect** mainframe workloads and transform into cloud-native solutions by leveraging serverless, containers, microservices, APIs and PaaS technology solutions.

Use case scenarios for considering modernization

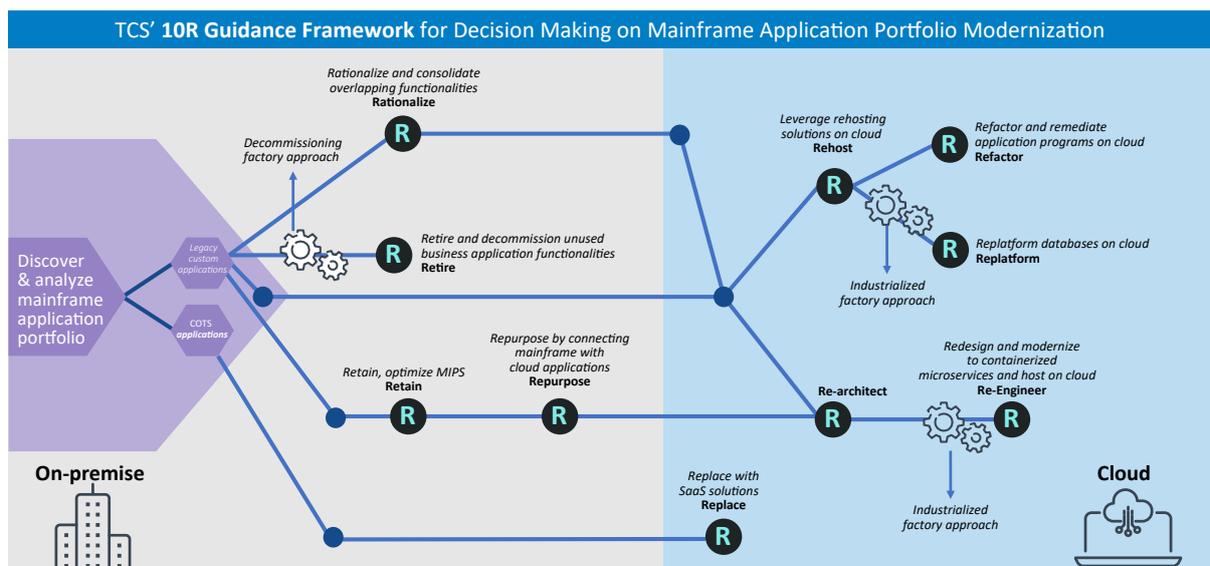
- In general, mainframe capital and operational expenses contribute to a significant portion of overall organization's IT cost budget. Costs involved in periodic upgrade of mainframe hardware and software stack are significantly high. Enterprises can consider initiating cloud transformation as a clear case when they are supposed to execute such costly refresh cycles soon.
- Enterprises can consider modernizing their workloads during merger and acquisition scenarios.

10R guidance framework for mainframe modernization

As part of the decision-making process about the disposition of legacy applications, a comprehensive 10R guidance framework can help enterprises to apply best practices and categorize the mainframe application portfolios that are required to be:

- **Rationalized** and consolidated for eliminating overlapping and redundant functionalities
- **Retained**, optimized, and repurposed so that its components (service, data, etc.) can be leveraged by other digital and cloud application systems (SaaS, IaaS and PaaS)
- **Retired** as per application roadmap plan, technology obsolescence state or legacy status and unused business application functionalities
- **Replaced** with SaaS solutions
- **Rehosted** to public cloud leveraging mainframe rehosting and emulation solutions (for instance, Micro Focus solution on AWS and Azure cloud platforms) as an immediate measure in the short and medium term. Reporting workloads with less technology dependencies of the mainframe ecosystem will be eligible for rehosting path. This will preserve the business functionality of the application
- **Re-factoring** and remediating application code with minimum effort
- **Re-platforming** databases on cloud platform
- **Re-architected, re-engineered** and **re-designed** into loosely coupled microservices and containerized modules coupled with APIs, which needs to be deployed on cloud leveraging IaaS and PaaS solutions.

10R guidance framework works on key input parameters such as mainframe business application portfolio's business value, technology obsolescence, application life-cycle stage, application roadmap plan and business criticality levels, and enables decision with respect to application disposition path.



An approach to mainframe portfolio modernization

Strategic advisors, systems integrators and service providers jointly work with enterprise CXOs in their mainframe modernization and cloud migration journey. They have:

- The required expertise, capabilities and skill sets in maintaining their legacy workloads on mainframe machines and legacy technology stack for decades.
- Significant number of person years' experience, skill sets, capabilities, well-defined approach, methodologies, and solution assets in handling public cloud transformation engagements.
- Proprietary 10R guidance framework, tools, and accelerators with capabilities for automatically discovering, analyzing and developing insights, reverse and forward engineering functionalities from modernizing and migrating mainframe application workloads to public cloud.
- Strategic partnerships with major cloud hyperscalers as a premium partner for their respective mainframe modernization and migration competencies, practices and solution offerings.

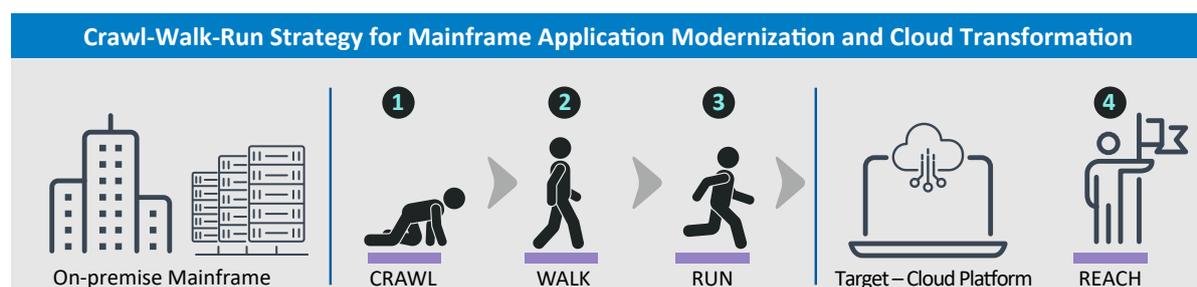
Approach to deliver mainframe modernization and cloud migration should cover end-to-end phases such as advisory, consulting, strategy definition, discovery, assessment, engineering, architecture, design, foundation, transformation, migration, factory execution and change management.

As part of advisory and consulting services and a key stepping stone for mainframe modernization journey, systems integrators and service providers should work jointly with key business, IT, and finance stakeholders of enterprise for creating:

- **A business case** which contains tangible benefits, intangible benefits, value drivers, cost benefits (ROI, payback period, break even period, etc.) of various transformation options for migrating mainframe application portfolio to cloud platform through a set of migration waves. Systems integrators and service providers work with enterprises in defining self-funding model as an investment strategy for mainframe portfolio modernization and cloud migration. Self-funding broadly indicates the cost savings realized through execution of MIPS reduction, portfolio rationalization and decommissioning initiatives of the mainframe platform which can be secured and positioned as investments for mainframe modernization and cloud transformation initiatives.
- **Value measurement framework** for tracking the business value realized through a series of mainframe modernization and cloud migration initiatives.

From the practitioner's standpoint, an overarching Crawl-Walk-Run approach can be applied for delivering successful mainframe application modernization and cloud transformation programs.

- **Crawl:** Execute the pilot application modernization and migration for a less critical applications.
- **Walk:** Execute the first wave of business-critical application within line of business (early adopters).
- **Run:** Establish and run the industrialized factory model for modernization for executing parallel projects for cluster of mainframe applications across line of business and business segments.



Conclusion

To put it in perspective, opportunities in the mainframe application modernization and cloud migration need to be addressed by service providers with an overarching strategy, decision guidance framework and tailor-made approach specific to industries. Automated discovery, migration and design tools, coupled with industrialized factory approach, are the need of the hour to address the scale, complexity, and volume of application components for accelerating the delivery of legacy application modernization and cloud transformation. Tracking business value realization through value measurement framework is the key to measure the success of application modernization and cloud migration initiatives.

With this approach in mind, finding the right partner to drive the complexity of the enterprise transformation is key for accomplishing business objectives. Evolving legacy application workloads from mainframe to cloud with a risk-adjusted approach enables the enterprise to thrive as they meet their purpose-led growth business objective.

About the authors

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K. Vaidyanathan is a multi-cloud advisory consultant, with more than 23 years of experience in mainframe optimization, enterprise IT architecture, IT infrastructure, cloud strategy, cloud transformation, cloud design and cloud cost optimization. He has led multiple engagements in defining strategy, implementing innovative solutions, executing large modernization and transformation programs across financial services, retail, life sciences, hi-tech and manufacturing. He is a certified cloud architect across multiple hyper scaler cloud platform solutions and technologies. Vaidyanathan holds a Masters degree in Computer Science from one of the premier institutions of India.

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Ted is the head of the Cloud Strategy and Transformation practice for the Americas in TCS. He has more than 25 years of experience in helping Fortune 500 companies shape and drive business transformation, portfolio rationalization and cloud modernization initiatives. Ted played a pivotal role in the transformation strategy and large-scale cloud adoption programs of key clients by shaping and leading their multi-phase cloud transformation initiatives including assessment and business case, foundational build and early trials, operating model development and rollout, as well as migration execution. Ted holds a Masters degree in Science in Electrical Engineering from Rensselaer Polytechnic Institute (RPI).

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