

Mainframe Modernization in the Age of AI



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01 Reframing mainframe modernization around business value

As AI accelerates traditionally complex infrastructure tasks, two distinct perspectives on application modernization are emerging across the market. We see some clients seeking to move applications off the mainframe. At the same time, others view the advent of IBM's Telum II mainframe processors with on-chip AI, IBM Spyre AI inferencing accelerator card, continued innovation and the system-level skills investment in the Z platform as signaling a resurgence of mainframes - bridging high-throughput transaction processing with AI-enabled real-time analysis. As is often the case, the truth is simultaneously somewhere in between and "all of the above."

Today, two of the world's leading technology companies, Accenture and IBM, are coming together in a deliberate, fit-for-purpose approach built around a single conviction: the organizations best positioned to win in the AI era are those with the discipline to evolve, invest in new skills, and intentionally leverage their core systems as strategic assets. Success will come from creating greater value from the intersection of trusted data, mission-critical transactions, and AI-driven decision making.

This is ultimately about the synergies created when data, transactions, and AI work together as a cooperative system: the legendary core data that has powered enterprise operations for generations, and what becomes possible when that data is connected intelligently and seamlessly to agentic workflows, AI inference layers, and real-time decisioning engines that define the future-ready enterprise. For large enterprises that depend on the mainframe, its continued relevance is rooted in enduring strengths such as security, resiliency, performance, and scalability. For many of the world's largest organizations, the emerging consensus is not that the mainframe will be replaced, but that it will continue to evolve as a core platform for enterprise AI and modern digital architectures.

Fit-for-purpose starts with a foundational question: not simply where a workload should run, but what the data and applications are worth, and how we unlock that value while preserving the resilience, security, and trust the business

depends on every day. Modernizing the mainframe for this new era is a journey. Yet too often, modernization efforts begin with location decisions rather than business value. They are framed primarily as technology migration exercises before a full assessment of business value, risk, resiliency, cost to achieve, and desired outcomes have been completed. In this new world of AI-everything, the question should not simply be how to move mainframe data to other platforms. It should also be what role the mainframe needs to play in the future enterprise, including how it can remain at the heart of critical business processes that are themselves being transformed by AI. Large-scale modernization initiatives can introduce significant operational and business disruption, particularly when they are not grounded in application-level decisions around value, risk, and resiliency. As a result, leading organizations are reframing modernization through the lens of value creation, ensuring that the right applications run in the right environment and deliver the optimal balance of innovation, cost, risk, performance, and resiliency.

Simply put, where data, transactions, and technology reside is not the primary consideration. The priority is enabling them to work together across the digital core to drive business value, in whatever way delivers the greatest combination of cost efficiency, speed, and security.

The answer to this challenge is unique to every organization.

Modernization decisions are rarely driven by a single factor. Cost, architecture, data, risk, operations, and workforce skilling considerations all influence how organizations evaluate the future of their core systems. Looking at these dimensions together provides a more complete understanding of where value is created today, where constraints exist, and where modernization investments can deliver the greatest return.

At the core of every enterprise are applications that deliver varying levels of business value, operational support, and customer impact. In other words, not all applications are created equal. Some support mission-critical processes such as payments, claims, and transaction processing. Others enable differentiation, fuel growth, or improve operating efficiency. Modernization decisions should begin with an understanding of the role each application plays in supporting the business, the value it creates, and the potential impact of changing or disrupting it.

Start by Asking:

- What business value does this application deliver?
- What happens if this application fails or is unavailable?
- How quickly must it evolve to support future business needs?
- Is it a source of a competitive differentiator or a commodity capability?
- What is the cost and complexity of maintaining, modernizing or migrating it?
- Which deployment model delivers the best balance of ROI, resiliency, performance and agility?
- How could AI transform the business processes that this application supports?
- What are the security needs of this application?

The answers to these questions can help organizations determine where resiliency is non-negotiable, where greater flexibility and speed are required, and where mainframe modernization efforts can create the greatest business value. Frontier AI models are accelerating both innovation and threat discovery, reducing the time between vulnerability identification and exploitation. As a result, organizations need a clearer understanding of which applications require the highest levels of security, resiliency, and operational protection. If downtime occurs, what is the business impact? Which applications demand the greatest levels of protection and availability? And where should each application reside to achieve the right balance of security, resiliency, performance, and cost?

The risk is broader than downtime alone:

- Direct financial loss and service disruption
- Long-term damage to brand trust
- Increased exposure to security threats (expanded vulnerabilities, emerging AI risks)

Some of these risks have a dollar sign attached to the consequences, but things like brand reputation are hidden costs that take years to rebuild. At the same time, some modernization approaches introduce inefficiencies, such as unnecessary data movement, that increase cost, latency, and risk without clear business return.

Assign Applications to the Right Platform

When evaluated through a business-value lens, platform strengths matter.

For many Systems of Record, the mainframe continues to provide differentiated value:

Resilience – near-continuous availability for mission-critical operations

Security – integrated, enterprise-grade protection

Performance at scale – consistent, high-volume transaction processing

02 The Advantages of a Fit-for-purpose Approach

Gartner reports, “Clients are increasingly focused on integrating emerging technologies into their mainframe environments and future-proofing these platforms for the next decade.”¹ Stable, mission-critical applications with long life spans, high security requirements, and extreme transaction volumes are ideal for the mainframe. In contrast, elevating customer experiences with cloud-native services across geographically distributed applications will benefit from hosting on public or private cloud.

The point is flexibility and application portfolio optimization. Every application should reside where it can create the greatest combination of business value, resiliency, performance, and economic return.

The outcome is dependent on more than cost alone. Modernization decisions should consider the broader role an application plays across the Digital Core, including economics and transparency, infrastructure and architecture, data and applications, risk and compliance, DevOps and tools, and talent and skills. Looking across these dimensions provides a more comprehensive view of business value, resiliency, performance, and long-term return on investment.

This multi-dimensional perspective helps organizations evaluate multiple modernization paths, assess tradeoffs across value dimensions, and identify the approaches that best align with their business objectives.

The outcome is dependent
on more than cost alone.

The Mainframe Transformation Flywheel

Economics & Transparency

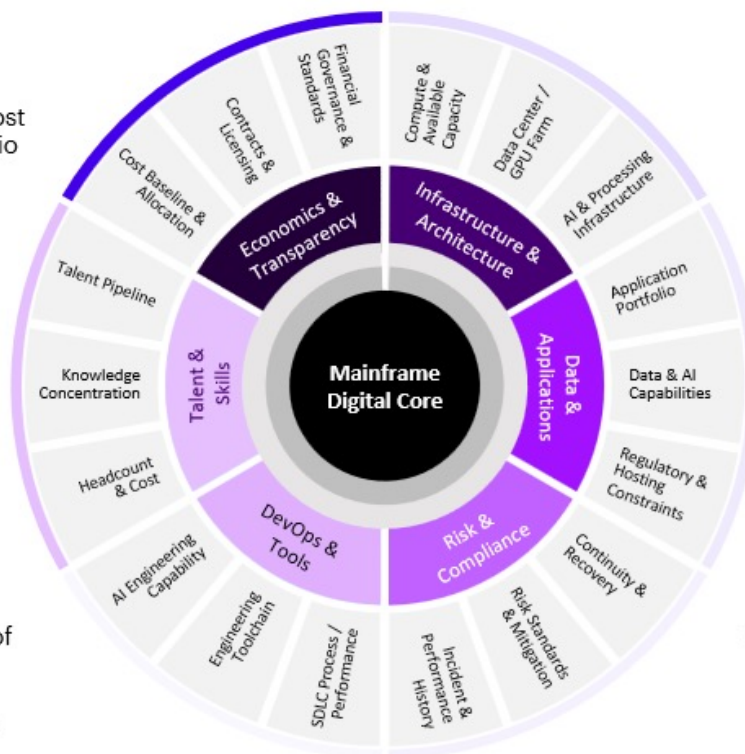
Produces the traceable cost baseline that fuels scenario modeling

Talent & Skills

Provides justification for talent investment to enhance skills and capabilities for a new transformed AI-driven world

DevOps & Tools

Produces a clear picture of 'how fast' and 'at what cost' change can occur, and the value of investing further in operations



Infrastructure & Architecture

Produces basis for target workload location and required infrastructure investment

Data & Applications

Produces dispositioning logic and future TCO for all potential transformation pathways including estimated costs

Risk & Compliance

Produces a quantified risk profile that is embedded into the transformation roadmap and investment

The Mainframe Transformation Flywheel provides a structured view of the capabilities required to modernize the mainframe estate as part of the broader digital core.

The Mainframe Transformation Flywheel identifies the strategic criteria for fit-for-purpose modernization. It evaluates the mainframe digital core across six interdependent dimensions.

Together, these dimensions help organizations understand current-state cost, application placement, application disposition logic, risk exposure, operational speed, and workforce readiness. The output offers a clearer modernization roadmap by determining which workloads should modernize on platform, which need to be optimized, which are ready to transform, and which should be retired, replaced, or relocated.

This turns mainframe modernization into a continuous value exercise. As business priorities, AI opportunities, risk conditions, and technology capabilities evolve, organizations can refresh the criteria, reassess options, and reprioritize investments.

03 A Decision Framework for Action

Modernization frameworks are useful tools for making more informed decisions, but executives must also understand the impact those decisions will have on performance and cost. This is where Accenture's Mainframe Reinvention Value Index Navigator "MaRVIN" comes in. MaRVIN is designed to quantify what it costs to change, what an organization stands to gain by doing so, and the expected value of different modernization paths at the most granular level of the enterprise: the application and workload. MaRVIN was purpose-built to go deep into the workload layer, examining each application not simply as a technology artifact, but as a node within a living business workflow. This workload-level transparency often includes [IBM Apptio Mainframe TCO](#), which provides an entry point to a clear, quantified understanding of how applications connect to business workflows, how those workflows scale, and where the most significant levers of enterprise value creation reside. The objective is not only to determine where an application can run. It is to understand which workloads create the greatest long-term business value, where modernization investment can have the greatest impact, and how to preserve resiliency and trust in the process.

The combined methodology creates a repeatable decision process:

1. Classify the workload
2. Assess business criticality and consequence of failure.
3. Evaluate economics, modernization value potential, resiliency, risk.
4. Determine the optimal modernization action.
5. Sequence modernization investments based on ROI and risk.

This transforms modernization from a technology exercise into a business investment discipline. Accenture's MaRVIN framework, combined with IBM's AI and modernization tooling, is designed to help turn what has historically been a subjective transformation discussion into a quantifiable, multi-dimensional assessment of economics, resiliency, risk, architecture, and modernization value. Accenture and IBM jointly demonstrate to clients how to make fact-based investment decisions rather than relying on assumptions.

04 The Unique Value of the Mainframe in the AI Era

Modernization in the AI era is not about consolidating onto a single platform. It is about enabling seamless, intelligent integration across the digital core, with the mainframe serving as a critical node in that architecture rather than a legacy endpoint. The workflows that drive the most consequential business outcomes, such as real-time payments, fraud detection, claims adjudication, and risk decisioning, are not single-platform workflows. They span systems. They require the transactional integrity of the mainframe alongside the agility of cloud-native services. They depend on data that originates in systems of record and must flow in real time to AI inference layers, customer experience platforms, and the agentic systems increasingly orchestrating enterprise operations end to end. As AI reshapes enterprise priorities, IBM Z's expanding API surface, hybrid integration capabilities, and AI acceleration features are designed for precisely this reality. Together, they position the platform as an anchor for agentic, future-ready enterprise workflows, supporting highly sensitive, data-intensive, and transaction-heavy workloads at scale.

The fit-for-purpose architecture delivers across four critical dimensions:

Trusted Data Foundation

Mainframes power critical systems of record, providing accurate, governed, real-time data for AI.

Takeaway: AI advantage is driven by the trust, quality, and immediacy of core customer data.

Real-Time Intelligence at Scale

Purpose-built for high-performance transaction processing, mainframes enable AI-driven decisions within transactions.

Takeaway: Competitive advantage shifts from delayed insight to real-time intelligence.

Resilience & Security by Design

Built for availability, fault tolerance, supporting mission-critical operations and evolving AI-driven risks.

Takeaway: Resilience and security directly support growth and customer trust.

Cost Efficiency & Hybrid Integration

Mainframes provide compelling economics for high-volume transaction processing while integrating with modern digital environments through APIs and hybrid architectures.

Takeaway: Value is maximized by aligning applications to best-fit economics while connecting core systems with AI innovation layers.

AI is helping organizations unlock additional value from mainframe applications and data by accelerating software development through AI-assisted coding and testing, improving IT operations with automated insight and remediation, strengthening security with advanced threat detection, and simplifying application and data management for more real-time decisioning.

This means faster innovation without sacrificing the resilience, security, and trust that underpin the business.

05 From Strategy to Execution: What Clients are Solving

Organizations today are under increasing pressure to optimize their use of AI, enabled in part by the mainframe's evolving capabilities. The evolution of IBM Z is helping organizations keep pace with this trend through capabilities such as AI acceleration and real-time inferencing on transactional data. At the same time, understanding the forces driving this shift is critical for organizations seeking to modernize highly sensitive, mission-critical workloads while positioning themselves for future innovation.

Several forces are converging to make continuous modernization more achievable than in the past. IBM Z continues to play an important role for organizations looking to modernize and continuously innovate around highly-sensitive, mission-critical workloads, but broader forces are changing how modernization gets done.

Cost pressure is forcing organizations to fund transformation from within, creating a need to maximize the value of existing technology investments. For many enterprises, this includes modernizing long-lived core systems while continuing to innovate through AI, automation and hybrid architectures.

Brand trust and risk pressure have also elevated the importance of resiliency and operational continuity. Failure can be more visible, more immediate, and more damaging than ever.

Knowledge transfer pressure is powering AI-enabled execution and is changing how modernization gets done. AI accelerates application understanding, simplifying knowledge transfer with IBM COBOL Elevate, improving code transformation with Bob Premium Package for Z, and automating operations - making modernization faster, more predictable, and less dependent on scarce skills.

Process pressure is increasing as organizations are looking to transform the application development processes versus the applications themselves. Modern DevOps tools and processes such as GitHub are increasingly being adopted to support mainframe applications.

Accenture and IBM are uniquely positioned to address these pressures for clients through their deep collaboration. Accenture receives advanced insight into IBM's modernization roadmap, enabling both companies to align methods and offerings ahead of the market. IBM has built dedicated enablement programs for Accenture consultants, including [IBM watsonx Code Assistant for Z](#) and [Bob Premium Package for Z](#), creating modern mainframe skills at scale. When additional expertise is required, Accenture teams have direct access to IBM Technology Expert Labs and product engineering resources to accelerate problem resolution and delivery.

These capabilities reflect a broader reality: modernization is no longer a one-time transformation event. It becomes a continuous, value-driven capability that provides a low total cost of ownership embedded into how the business evolves.

Organizations are increasingly modernizing on and around the mainframe to unlock new sources of business value.

For example, Accenture and IBM collectively helped a wealth management firm optimize mainframe engineering and operations - delivering \$12 million in savings over 3.5 years, reducing development effort by 30%, and improving testing efficiency by up to 90%.

European banking group, UniCredit, tapped Accenture and IBM to modernize their core banking platform across the 13 markets in which they serve to help deliver long-term growth and deliver exceptional experiences for their clients.

Accenture's strategic hub, AFAST, helps deliver a complete core banking platform for Tier 2 and Tier 3 banking institutions. The platform has evolved to provide greater scalability, resilience, and operational continuity. This is all built on next-generation mainframe infrastructure, with the upgrade to IBM z17 providing enhanced CPU performance and supporting the scalability, resilience, and performance required for a modern core banking platform.

The objective of AFAST is not technology change for its own sake, but to increase business value while reducing operational and transformation risk. The hub is evolving its application architecture toward a fully decoupled, AI-ready model, with more than 1,200 APIs in the catalog, microservices running on Kubernetes, and a DevSecOps approach that ensures security by design, modularity, and accelerated time to market.

Additional details: <https://newsroom.accenture.com/news/2026/unicredit-accenture-and-ibm-collaborate-to-build-europe-s-next-generation-banking-platform>

Bottom Line

Accenture and IBM have spent more than 20 years building a partnership specifically designed to help our joint customers accelerate technology modernization, while reducing risk and maximizing the outcome for our customers. What makes this partnership unique is not only the alignment on client discussions and engagements, but also the joint, focused investment in assets, skills, and delivery capabilities the partnership brings to the table.

At the heart of this collaboration is the belief that modernization is not about the mainframe itself. It is about making deliberate, value-driven decisions about where applications belong and how they should evolve to create business value, resiliency and long-term strategic advantage.

Gartner predicts, “By 2030, fewer than 10% of organizations that own a mainframe will consider a mainframe exit.”¹ Though mainframe modernization will still be a common activity, it will be driven by business value. The companies that succeed in the age of AI will not be those that build the largest architectures or undertake the biggest applications.

They will be those that create the greatest value from their data and applications while preserving the trust their customers place in them every day.

¹ [The State of the IBM Mainframe in 2026](#).

