Imagine what you will do with AI

If artificial intelligence was your intelligence

Getting ready for AI...

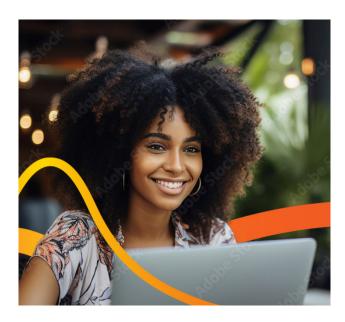# How generative AI can accelerate mainframe modernization for banks

Now is the time to explore your options

Quick summary

- Mainframes have been incredible workhorses for banks in the past. However, they are now costly and complex items to maintain – and becoming more so.

- Banks are moving workloads into the cloud, but only 7% are doing so with core banking apps.

- To make the most of generative AI banks need large amounts of data to be used in large language models. This data is typically found on the mainframe, but it is not in a state to be used by such models – it needs modernizing.

- However, generative AI can also help accelerate and de-risk mainframe modernization. For example, in mainframe conversions today around 70% of effort is focused on testing. Generative AI can drive greater testing automation, speed and accuracy.

- But there areas where it is not suitable, such as comprehensive code analysis or holistic refactoring of a large code base.

- Whether you adopt a cost reduction or future-proofing approach, you have options that can be tailored to your situation. We know this because we have helped banks and insurers all over the world to modernize their mainframe estate safely and securely.

Mainframes are amazing, but …

Mainframes are incredible. They consume 6% of worldwide spending but run [68% of production workloads](#). They provide [99.999% resilience](#) and enjoy the highest level of security certification. They handle [90% of all credit card transactions](#) and host more transactions each day than Google. [95% of ATM transactions rely on COBOL](#) and over 70% of business process transactions run on it. [92% of the top 100 banks](#) and all of the top 10 insurers are reliant on them.

However, …

70% of transactions are processed by programmes that were written over half a century ago – in languages that few people are trained on these days. Often there is little or no documentation and the person responsible has retired (the average age of a COBOL developer is 55). This lack of key personnel is becoming critical and has led to more mainframe outages. 80% of IT budgets are spent on maintaining legacy systems, like mainframes. Making changes to such legacy systems takes time and limits a bank's agility in the market. More than 30 years have passed since mainframes were at their peak, so many banks' core systems are far from being future-proofed. And costs are increasing: MIPS growth continues to outpace revenue growth across major banks.

But banks know this. They've simply made the judgement that the hassle of keeping on the mainframe is (just about) worth the cost and complexity of trying to move off it into the cloud. Or they are trying to do this in small steps rather than a huge, high-risk transition project. Remember: we are dealing with systems that typically look after mission-critical applications. They are complex and difficult to change. And if things go wrong, you don't want to be the executive responsible.

The good news is that banks are moving towards getting mainframe workloads into the cloud. [Accenture](#) research found that 31% of banks have more than 50% of their mainframe workload in the cloud. Over the next five years, that figure is projected to rise to 67%. In ten years, it should reach 82%. In 2022, for those banks [Accenture](#) found that over a third (35%) of enterprise apps and one fifth of data and analytics (20%) were in the cloud. But only 7% of core banking apps were in the same position.

The real risk is to do nothing. Legacy systems constrain innovation and stop banks from moving quickly in response to market disruption. Plus all the knowledge associated with these systems vanishes overnight once the developer retires (if you cannot replace them). But there is another reason why banks cannot delay modernization any longer. Mainframes contain massive amounts of data, which are vital to any generative AI work, including developing large language models. Unleashing all this data to drive generative AI activity has to be a major focus for banks going forward if they wish to stay competitive.

Case study

A large European bank, driven by end-of-life support for its Unisys mainframe, decided an application rewrite was too expensive, risky and time consuming. Our Automated Migration Technology (AMT) solution was selected to provide code transformation while offering maximum flexibility.

This eliminated the risk of finding Unisys engineers required for application support and maintenance. It achieved cost reduction and platform flexibility, and avoided vendor lock-in. The bank closed down end-of-life hardware and we enabled a seamless legacy transformation process for both systems and mission-critical applications.

Generative AI can accelerate and de-risk mainframe modernization

**Generative AI has brought new perspective and opportunity to accelerate and de-risk the journey to mainframe modernization.
An 'AI-first' approach to mainframe modernization can help banks to accelerate mainframe modernization in three ways:**

Code documentation: AI provides the ability to produce documentation and/or architecture information from existing mainframe code, including functional flows through linked programs.

Code modernization: AI can analyze the apps portfolio at volume, identify business functions that can be digitally decoupled and move those undifferentiated items (ledger, accounts transfer, payments etc) to industry standards (COTS, SaaS, low/no-code etc). AI can show which code needs modernizing (customer service, advanced products etc), as not all code does.

Test acceleration: in mainframe conversions today around 70% of effort is focused on testing. Generative AI can drive greater testing automation, speed and accuracy.

Our generative AI mainframe approach consumes legacy code and application insights to produce complete, accurate, readable documentation that informs modernization strategy and automates much of the testing life cycle. A typical process involving generative AI will include:

- Decomposing source files into code headers/blocks (decomposition will vary by platform)
- Individually generate summaries for all modules
- Combine summaries into a knowledge graph
- Identify and summarize application and data flows
- Create test cases for application and data flows
- Create test data for test cases

By leveraging clear technical and functional outputs from generative AI documentation, the largest uplift is realized throughout the testing life cycle, where 70% of the migration effort exists today.

Generative AI is useful for analyzing, summarizing, explaining individual programs and small portions of code. It quickly extracts information/business logic (if the developer knows what sections of the code has business logic). It can technically categorize individual programs and small segments of code and generate implementation with the right prompting and validation. Proper prompting is essential, making this a valuable tool for experienced developers. It can also efficiently generate test cases, test scripts and test data.

But there are areas where it is not suitable. For example, comprehensive code analysis (to understand all the interdependencies) or holistic refactoring of a large code base in one go with multiple programs, dependencies, databases and file structures. Autonomous A-to-Z migration processes, such as the conversion of legacy programming language to a modern language, is not straight forward due to differing programme paradigms. It will not generate reliable outputs without significant validation from a seasoned developer. OpenAI solutions often necessitate a thorough review.
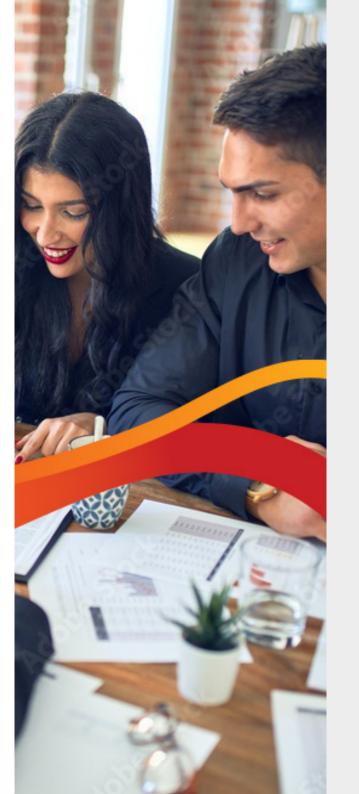
Case study

A North American bank wanted to migrate their legacy mainframe application to modern Windows technologies to improve efficiency and reduce costs. The aim was to remove all mainframe dependencies to allow for decommissioning after project completion, retain the same functionality and performance of the legacy system and use industry standard technologies. The project took 20 months and involved five million lines of code, 26,500 users, 2 terabytes of data and moving COBOL to C#. It delivered reduced TCO, C# development (easing developer recruitment and retention), one technology stack throughout the bank, predictable cost and a fully scalable solution.

Sweet spots for generative AI

Using Open AI tools for AI-assisted modernization will accelerate specific tasks, but not without human intervention and review. Code summarization, explanation, documentation and semantic analysis are good places to start. During migration, code optimization, search and review, infrastructure provisioning and test case generation should be areas of focus. As part of the modernization process, generative AI can help with UI and API generation and code review. During the operational phase, generative AI can help with developing conversational agents, historical document analysis and content QA and search.

The impact of generative AI is particularly high during the design and build and test and deploy phases. For the former, it can generate boiler plate code for target API implementation and set up landing zones. For the latter, it can create unit test cases and scripts, test run prioritization and automate deployment.

You have options

There are many ways to mainframe modernization. But they can be summed up in two approaches:

Cost reduction: which is typically suited for a small apps portfolio. This is usually a single release and provides the opportunity to retain business logic investment. This will accelerate savings and create faster time to market.

Modernization to future proof your apps portfolio, which is typically suited to large mainframe application portfolios. This is an incremental approach and more application-centric, where you would selectively rearchitect to move to a cloud-native environment. This is much more centered on business outcomes.

Application portfolio assessment usually provides the basis to determine the best modernization approach, based on strategic alignment (Does the application provide a competitive advantage?), functional adequacy (How flexible is the application to adapt to product innovation?) and technical suitability (Does the application meet expectations on maintainability, operability and performance?).

There are a number of options that can then be tailored to your specific situation. You can mix and match these elements. We do not have a 'one size fits all' approach:

Retain	Rehost	Refactor	Retire
manage, optimize, and modernize the existing mainframe application	leverage Mainframe as a Service and co-location partners to rehost the existing mainframe application	use digital decoupling techniques, change the application architecture, and rewrite code using modern programming languages	maintain and manage mainframe functionalities until the end of their useful life.

Replace	Replatform	Reimagine
replace the mainframe application with a custom off-the-shelf or SaaS solution which supports the business capabilities/ functionalities	recompile the application using Avanade or another ecosystem and their tools and replatform application outside of the mainframe. Leverage managed cloud services where possible	create a whole new cloud-native solution which provides new business capabilities or supports new business models

We have a range of tools, such as a set of converters that will 100% automatically convert source code, databases, jobs and workflows. Our conversion metric - 80 defects per million lines of code - makes it one of the industry-leading tools in COBOL code refactoring. We can assess application portfolios in terms of complexity, develop target application architecture plans, design enterprise-scale cloud landing zones and manage operations effectively in the new platform.

Apart from industrialized methodologies and assets, we have over 10,000 specialists focused on legacy and host-centric platforms. We recently acquired Asysco, an expert in migrating legacy mainframe applications to the cloud. Along with Accenture – with whom we partner – we are the leading implementation partner for Microsoft Azure and cloud services.

Customer stories

Here are some examples of our work in the financial services sector:

Japanese securities house, Full rehosting of bond trading system (batch, online and data) with Oracle database. Rehosted 7,500 MIPS and saved over 60% on TCO.

Swiss private bank, Migrated core banking applications from Unisys mainframe (1.3mn lines of code (LOC), 1,000 programmes, 750 online screens) to Avanade AMT development platform.

Spanish bank, Reengineering of a batch mainframe application that processes and generates accounting reports for the bank's 80mn customers. 160 Cobol programmes rewritten. Significant MIPS reduction. Reduced batch processing from 8 to 3 hours.

Italian insurer, Full re-hosting. Re-platformed with Microfocus COBOL. 7mn LOC, 1mn Life Insurance policies consuming around 1000 MIPS. TCO reduced by 80%. Reduced CPU consumption and greatly improved elapsed time.

Dutch insurer, Core systems on Unisys mainframes. 15 applications (8 business critical) migrated (Life, P&C etc). 5.3mn LOC. On time and within budget. 70% Opex reduction. New environment is as stable as before. Future-proof system based on standard Microsoft technologies.

US Insurer, Migration of policy administration application from IBM mainframe (3.2mn LOC, 250 GB database) to Avanade automated migration technology (AMT) solution with Microsoft SQL.

Polish bank, 6mn LOC (9k MIPS) converted to .NET resulting in 80% Opex reduction.

Canadian Insurer, 40+ mainframe apps migrated to Azure as cloud-native applications.

Polish bank, Replatform – mainframe simulation. Migrated part of its legacy applications to .NET. Getting off the mainframe led to 70% TCO reduction. Upgrade to a more modern development environment.

Australian bank, Built copy banking architecture on Hadoop and Java microservices and Master Data Management information. Bank built extra services (mobile payment push notification, fraud detection and customer segmentation). 50% reduction of online digital transactions load to mainframe.

German Auto Finance, End-to-end apps portfolio assessment (15k MIPS, 500 apps, 120mn LOC in 10+ countries).
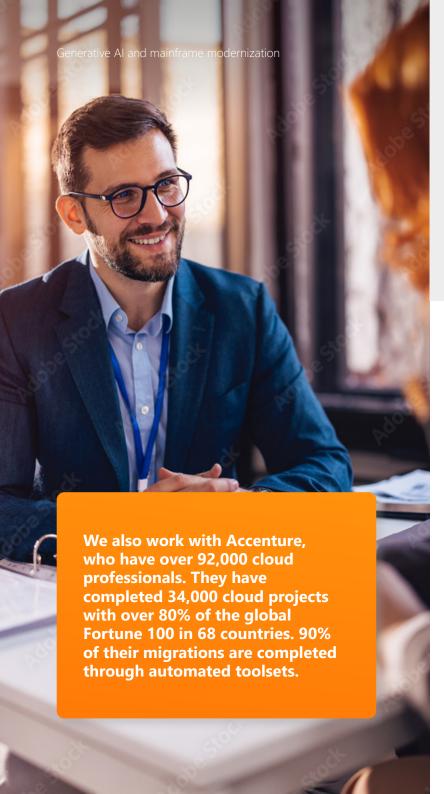
Getting started

We have three simple steps to assess your environment and develop a plan:

1 To begin, we would collect your mainframe estate data (MIPS, lines of code, apps and contracts) and plan for an initial call with our specialists.

2 We have a customer site survey to assess and identify needs and opportunities, usually lasting 6-8 weeks (the first week is onsite, followed by 4-6 weeks analysis).

3 The subsequent site survey report details migration project specifics, including project requirements, timeline and costs.

If you would like to discuss this further, please

get in touch

Why Avanade?

Our modernization expertise

Avanade has over 10,000 people working on legacy and host-centric platforms. We are currently working on 100+ modernization projects. Our discovery service supports 27 languages and we have analyzed, remediated and modernized over 150 million lines of code. Through our recent acquisition of Asysco, we have access to automated migration technology, including a set of converters that will 100% automatically convert source code, data, databases and data files, jobs and workflows. We have unique capabilities to help you quickly ready your people, processes and platforms for AI and to responsibly scale AI to unlock more value and growth.

Our other tools include:

Application classification: to select the optimal path for the application (replatform, refactor, reimagine or replace)

Reference architecture patterns: this includes blueprints, patterns and guidance for target application architecture

Application analysis framework: this includes application complexity analysis, clustering framework and roadmap development

Landing zone templates: we design enterprise-scale cloud foundations (Azure) aligned with various security and availability requirements

Control center: we manage operations effectively in the new platform. i.e., scheduling, security, configuration, processes, and output management

Development studio: this includes functional code development and modernization tools enabling COBOL and Java/.Net application development.

We also work with Accenture, who have over 92,000 cloud professionals. They have completed 34,000 cloud projects with over 80% of the global Fortune 100 in 68 countries. 90% of their migrations are completed through automated toolsets.

Our banking expertise

We work with 13 of the top 20 global banks and over 60% of the top 100.

Advisory

We partner with our clients to drive innovation and digital transformation, accelerating business outcomes and creating pragmatic strategy that can be delivered.

Generative AI

We're helping banks digitize processes to improve customer journeys. We apply intelligent automation and AI to deliver efficiency and deep customer insight. We can help with data management, chatbot development and business modeling.

Digital marketing, sales and service

We've created 360-degree customer views, improved cross-selling rates and identified next best actions. We've improved lead qualification, opportunity tracking, campaign planning, personalization and onboarding.

Security

We've developed expertise across digital identity and authentication, data protection, encryption, secure collaboration, incident response and cyberdefense.

Workplace transformation

We adopt a holistic approach, involving IT, HR and business division heads. If you need it, we've pulled together best practices on remote working.

avanade

Contact Us

Avanade is a recognized leader in delivering Microsoft solutions to financial services institutions. For more than 20 years, we have worked with banks and insurers worldwide developing and implementing solutions.

Contact us today

www.avanade.com/banking

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