
Digital Vision for Mainframe



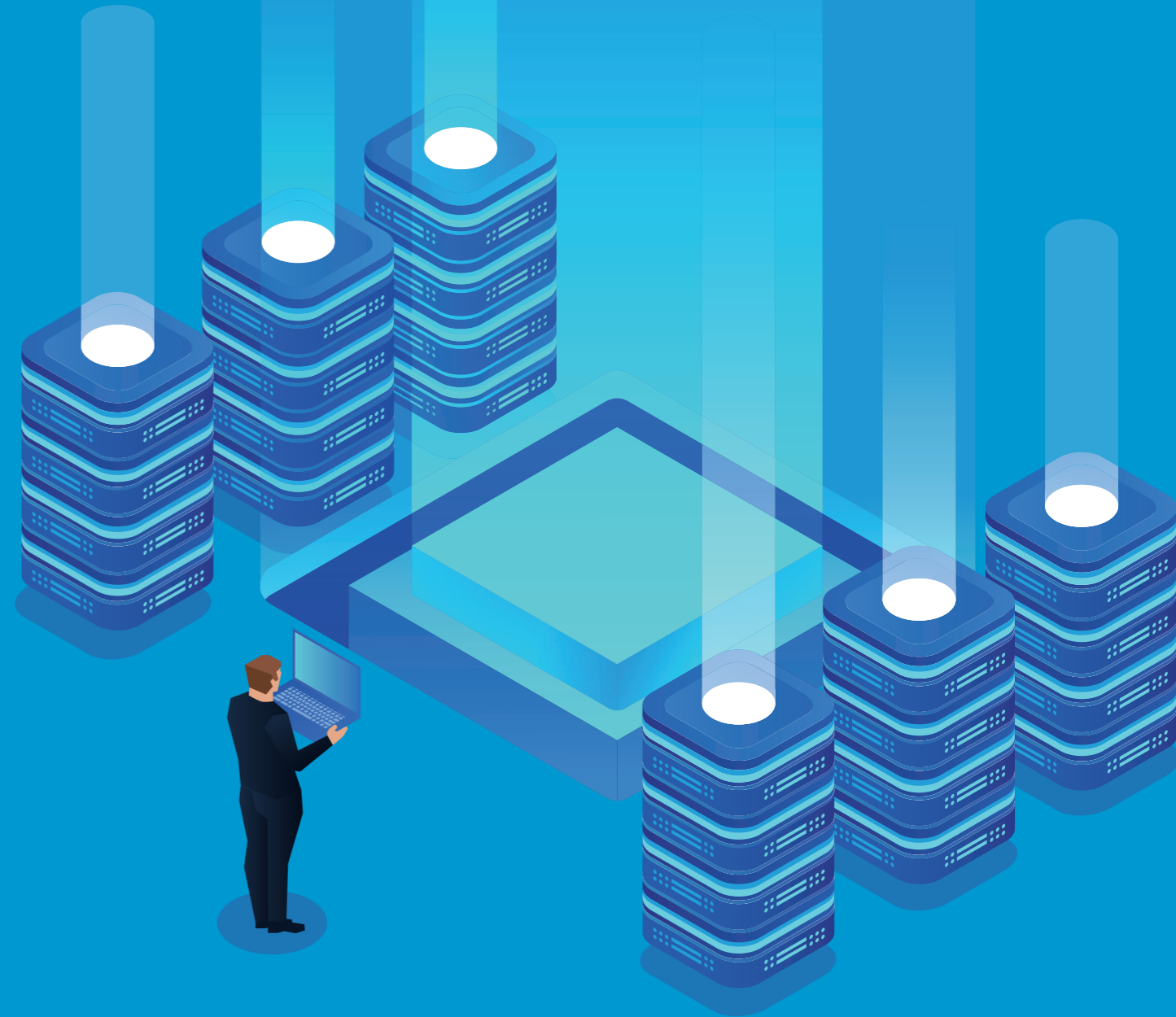
Trusted partner for your Digital Journey

Atos

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We would like to thank all of the contributors.
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Foreword

For more than 50 years, mainframes continue to be the foundation for business-critical applications. Together with today's evolution to cloud applications, mainframes form part of digital transformation. Mainframes can also be part of the hybrid cloud architecture by adapting tooling and modern ways of working to fit in with agile ways of working and distributed application landscapes. This makes the mainframe platform attractive for young professionals while at the same time contributing to cost reduction and decarbonization challenges.

As part of the core IT foundation and alongside the hybrid cloud platform the mainframe provides a robust platform for critical (cloud) applications. The orchestration of these applications relies on unified hybrid platforms to create and manage policies within your IT landscape, enabling the best usage with consistent governance, compliance and security. Transformation and modernization of mainframe applications is not an easy or quick task, it requires a well-prepared journey, starting with a digital strategy, a sound business case and excellent professional resourcing.

It is Atos' mission to support customers in the overall transformation and transition of complex legacy applications into cloud using agile and top modern methodologies without losing the reliability and security of mainframes. Moreover, we support our customers in embedding the mainframe services into the hybrid cloud architecture. In doing so, we offer them the benefits of mainframe such as reliability, security and processing power as a platform for critical business applications.

There is no question that transformation to cloud underpins the digital transformation strategy within the enterprise. A successful transformation will keep organizations competitive and differentiated in their markets. Atos is there to help customers through each step of this decisive journey with highly experienced professionals and a track record in mainframe applications and infrastructure operations, skills, competences and knowledge needed to make this a successful joined journey.



Some key figures



25 quintillion

25 quintillion (that's 30 zeros!) bytes of data being created every day¹

90%

of all existing data was created in the prior 2 years²

175 zetabytes

(175 billion terrabytes) will be produced by the world every day by 2025

72%

of customer-facing apps are completely or very dependent on mainframe processing³



67%

of Fortune 100, the platform of choice is mainframe⁴

50%

of workloads already run on hybrid cloud today

31% vs. 22%

executives are significantly more likely than techs to see new technologies available as a strength. Executives' perspectives show a shift away from cost control alone toward the implementation of new technologies and the value mainframe modernization brings to their organizations³

49%

of Techs see Staffing/Skill Shortage as an obstacle³

¹ Longscale number definition

² Forbes

³ BMC Mainframe survey 2019 among +1,100 executives and technical professionals

⁴ Derived from IBM internal data

The modern Mainframe : reliable platform and stable foundation for incremental modernization

“Over 40 years legacy of success”: that’s how the role of the mainframe in our ICT history can be summarized. Mainframes have been in use from the very start of organizations’ ICT strategies, and they are still very much alive and kicking¹. The continuous advancements in technology have kept mainframes relevant even today: they still play a crucial role in overcoming business challenges created by ever evolving local and global scenarios.

Mainframes are renowned for their unwavering and relentless processing power, huge storage capacity, and unparalleled levels of reliability. They can process large numbers of simultaneous transactions and enormous I/O data traffic without slowing down. A mainframe typically maintains peak performance even when approaching full load capacity. The high RAS (Reliability, Availability and Stability) is a distinguishing feature of the mainframe. Add to this its highly secure design and the extremely configurable hardware resources, and you can easily understand why the mainframe has been a platform of choice for world’s major businesses and Fortune 500 companies for decades.²

From ‘close to the exit’ to ‘core of the IT strategy’

Mainframes have often been called ‘closed systems’ and therefore no longer suited for today’s needs in an era that is focused on open standards. But even if this reputation held some ground of truth at some point in time, nowadays this label of ‘closed system’ is no longer applicable. The modern mainframe has opened up considerably, allowing integration with modern workloads, and it is much more extensible. Mainframes can simultaneously run multiple operating systems and software applications.

It is not surprising then, that the mainframe is still very much alive today, despite talk about ‘exiting’. Most large mainframe customers continue to plan initiatives around scaling up and modernizing their mainframe environment. Mainframe is still at the heart of their IT transformation strategy. If organizations decide to turn to alternatives, this decision is often made from an applications point of view, not because they question the mainframe as a platform.

Counter-arguments countered

Admittedly, there have been factors such as mainframes’ high running cost which have led businesses to consider a mainframe exit.

But recently these concerns have been significantly moderated through the introduction of marginal or no charges for modern workloads.

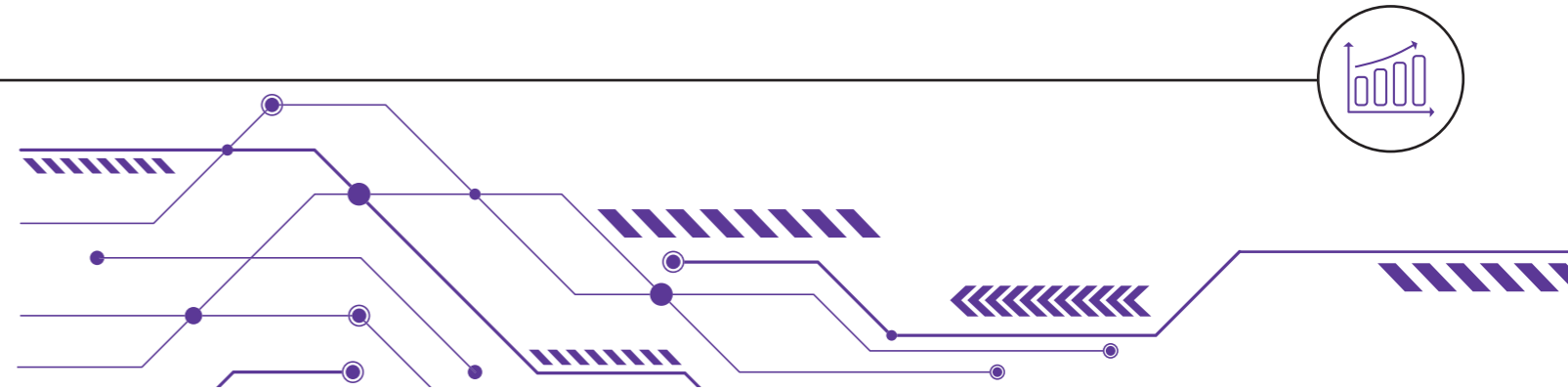
For any MIPS -intensive business - with over 15,000 MIPS (Millions of Instructions Per Second) - the economies of scale will still be higher when staying on the mainframe platform. Besides, successfully migrating from a mainframe environment to a different platform is lot easier said than done³. Research indicates that a significantly high number of such attempts face enormous challenges caused by a poorly executed exit scenarios, leading to high cost and a long duration of the entire mainframe exit process⁴.

Mainframe critics also refer to the mainframe’s inadequacies with respect to vertical vs horizontal scaling⁵. This is an obsolete debate, as this can be addressed via the creation of hundreds of virtual machines (VMs) on a single mainframe logical partition (LPAR); not much different a private cloud environment.

Remaining issues

So far, we have focused on the positive aspects of continuation of your mainframe environment. However, there are some aspects inherent to mainframe that may tilt the balance in favor of moving away from this platform. Leading among these issues are **skills shortage, technical debt**⁶, and agility of applications/time to market.

Amid the Covid-19 situation worldwide, the ‘SOS’ call for help from COBOL programmers⁷ launched by the Governor of the state of New Jersey (USA), is a striking example of how acute the skills shortage became. Programmers skilled in this sixty-year-old language are in huge demand, because many applications running on the mainframe are written in COBOL, but skilled resources are hard to find in the marketplace. This is the same for many mainframe languages and databases: the skills to maintain these applications are rapidly diminishing.



Next, there is the mere observation that applications on the mainframe have been created many years ago, and frequently modified throughout the years. This has resulted in layers of procedural code, assembler and non-optimized application stacks, which are not inherent to mainframes but rather the result of ageing poorly. The technical debt we observe in these applications stems from a sizeable amount of bespoke alteration over the years, resulting in dead, duplicate and obsolete code in the applications. Many of these legacy applications were written at a time when modern design principles were not defined. Consequently, the applications’ technical debt also hinders the adoption of the newer business models that customers demand. And the effort/cost to apply any incremental change in such heritage applications is high compared to modern turnkey applications.

Finally, there are many customers who have moved part of their business functionality to distributed or cloud environment to meet the requirements for rapid change and better user experience. However, since the ‘core’ system of records runs on the mainframe, they are still facing release timeframes of months, if not quarters. Such **impact on time to market and agility** is unsustainable in the current competitive market where agility and responsiveness are key watch words⁸.

Summarizing, one can say that the problems are predominantly caused by legacy applications making it difficult to meet the modern business demands and efficiencies. The mainframe as a platform, on the other hand, proves to be surprisingly modern and dynamic.

So, what should you do?

While there is no silver bullet that will suit all mainframe customers, each can adopt an appropriate strategy to get the best from the platform and associated innovation for their application landscape. There are many solutions available within the mainframe platform. The right approach will depend on your portfolio.

Small mainframe estates, can consider moving to a mainframe hub, creating economies of scale, and then consideration to gradually transform legacy applications towards new platforms.

For large mainframe installations, platform owners may also consider moving to mainframe hub getting benefit of economies of scale, while incrementally transforming of mainframe applications, moving them into modern technology stacks such as Java or .Net, while continuing to run on the mainframe platform exploiting the highly resilient operating system and processing technology utilizing modern frameworks.

Atos offers the full spectrum of solutions for mainframe customers: mainframe hub hosting, mainframe application management, mainframe performance optimization, modernization, transition and transformation and mainframe migration to the cloud. Our wide range of patented IP, accelerators and assets provide faster, better, cost-optimized and de-risked solutions.

¹ Why the mainframe is more relevant than ever <https://www.datacenterdynamics.com/en/opinions/why-mainframe-more-relevant-ever/>

² Who uses mainframes and why do they do it? https://www.ibm.com/support/knowledgecenter/zosbasics/com.ibm.zos.zmainframe/zconc_whousesmf.htm

³ The Case for Teaching Legacy Systems Modernization <https://ieeexplore.ieee.org/abstract/document/5945242>

⁴ Industrial Perception of Legacy Software System and their Modernization <https://dspace.library.uu.nl/handle/1874/306443>

⁵ A Challenge in Improving the Consistency of Transactions in Cloud Databases - Scalability <https://pdfs.semanticscholar.org/f2e6/046cd73f51af2b0a8db067cae44f4666a87.pdf>

⁶ Why is legacy tech a problem and how do we fix it? <https://hermaes.com/2019/03/04/why-is-legacy-tech-problem-and-how-do-we-fix-it/>

⁷ <https://www.cnn.com/2020/04/06/new-jersey-seeks-cobol-programmers-to-fix-unemployment-system.html>

⁸ The data center evolution from Mainframe to Cloud https://www.researchgate.net/profile/Nikola_Zlatanov3/publication/298217471_The_data_center_evolution_from_Mainframe_to_Cloud_links/56e75deb08ae85e780d0015d.pdf



Mainframe-as-a-Service: reliability & continuity meet cost-efficiency

When insurance company P&V had to renew their mainframe contract in 2016, they wanted to find a partner who could do more than just keep the mainframes running. The new contract would be assigned to a partner who is mainframe-centric not only ensuring continuous operations but also flexible enough to help P&V to safely migrate towards 'new technology' platforms. Ultimately, they opted for Atos. Here's why.

The Belgian insurance company P&V, much like any other financial institution, mainly relies on mainframes for its core applications. For quite a few years, this mainframe activity had already been entrusted with a partner who provided them with the mainframe in an IaaS (Infrastructure as a Service) model.

In 2016, when they had to renew the contract however, they decided to go out and look for a partner who could also help them optimize the mainframe activity while moving an increasing amount of applications toward new, non-mainframe environments. "The reasoning behind the move away from the mainframe was very rational and economic", explained Maurice Van Caillie, IT Service Delivery Manager at P&V: "There is a growing trend of packaged applications in our industry, and these are mainly written for non-mainframe platforms. Also, the number of available mainframe experts keeps on shrinking.

It became obvious that P&V had to look for a partner with the right scale and the right skills in order to secure the continuity of the mainframe environment, not only the hardware but also the engineering support of the systems and databases.

Gradually moving away from the mainframe is therefore a common practice in the financial and insurance sector, not only in Belgium but worldwide."

Cultural fit and open communication

Meanwhile, however, P&V still needed a highly reliable mainframe partner, one who could take on mainframe-related activities, including monitoring and maintenance, while helping them migrate towards other platforms safely and reliably. The quest for this partner eventually led them towards Atos. There were several reasons for this choice, said Karel Vanwijck, Head of Service Management at P&V: "Firstly, they have always communicated very clearly and correctly on their approach. Secondly, they offered the most attractive and realistic perspective on the future of our mainframe environment. Thirdly, Atos was very constructive in finding the best possible configuration for P&V at any given moment in the migration timeline. Last, but not least: there was a very tight cultural fit between P&V and Atos: both companies are trusted organizations boasting many years of reliable partnerships and structured approach, while remaining very flexible and agile to adapt to new circumstances. This was very important to us: without a cultural fit, you shouldn't embark on such long and intensive partnerships."

The mutual flexibility came in very handy in the course of the contract, when it transpired that the initially planned migration timeline could not be maintained. "There were several setbacks in setting up the target system and in launching applications in the new environment", commented Maurice Van Caillie, "this had nothing to do with Atos, but fortunately we could rely on them to provide continuity, even when this project was intended to move away from the mainframe platform. They helped us ensure a flawless service towards our customers throughout this temporary setback."

Mainframe Cost-Efficiency.

Meanwhile, one of the objectives of the new contract has been fully realized: a predictive evolution of the TCO (Total Cost of Ownership) of the mainframe environment. This was partly due to the new type of contract: P&V no longer pays a fixed monthly fee, regardless of the usage, but their 'pay per use' contract provides them with a fairer and eventually lower invoice, due to capacity decrease and software vendors contracts optimizations.

Additionally, the mainframe environment has changed significantly as well, continued Karel Vanwijck: "Atos has inherited the mainframe configuration as it was when we left the previous contract. This was far from ideal, because the configuration wasn't optimized at all, neither for Atos nor for us. Meanwhile they have managed to move towards a configuration allowing them to manage and maintain our environment on their standard, up-to-date, fully secured platform, with their standard approach, which will, in turn lead to an even more cost-efficient result."

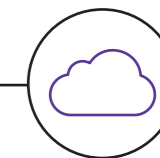
In the end, P&V hasn't moved away from the mainframe at the desired pace, and the mainframe remains more important than expected. But thanks to the lower price tag attached to the mainframe's TCO and given the excellent collaboration between Atos and P&V so far, the partnership can be called a success. To everybody's satisfaction, one might add, the overall customer satisfaction rate exceeds the average by far, and Atos is dubbed the #1 IT partner by P&V.

Description of the P&V Group

The P&V Group is a Belgian insurance group that markets its products under a multi-channel and multi-brand distribution. Specifically, this means that insurance products are offered through various possible channels (brokers, independent advisors and direct) under different brand names.

The main brands of the group are:

- P&V Insurances: uses a network of independent insurance agents which present products in exclusivity for P&V. There are about 380 independent agents spread throughout Belgium
- VIVIUM: through this brand the products of the company are distributed throughout the classic broker channel. Unlike independent agents, brokers are free to place their portfolio of insurances within the companies of their choice.
- Actel - Affinity: Is our direct (without intermediaries) distribution channel. These activities are conducted primarily via internet or phone. Actel also provides the «affinities» channel. This is a channel mainly known by automobile manufacturers that offer also insurance needs. (eg. D'leteren, PSA, etc...)
- The P&V Group employs approximately 1,300 staff people spread across the various branches in Brussels (2 locations within a radius of 200m) and Antwerp (1 location).



Today's innovation imperative: bring mission-critical to the cloud

Leadership in today's marketplace is no easy task. You have to outpace others in most areas to stay on top—from being client-centric and agile, to optimizing your IT infrastructure, and everything in-between. You can count on it that competitors, even the ones you're not aware of yet, are working to outperform and take your market share.

Now, take a deep breath and ask yourself: how are you leveraging technology to innovate? Staying ahead of the innovation curve is key to delivering better client experiences. But where do you begin?

No one doubts the importance of the cloud in an innovation strategy. At the same time mainframes are at the core of many business. But, as the world is moving to hybrid environments to get new offerings and services to market faster, this key question pops up on companies' radar: The key question for many companies is 'do mainframes and cloud mesh?'

I am convinced that the answer to this question is the key to reaching the next horizon. It ties directly to what I call the innovation imperative. Bringing 'mission-critical' to the cloud is about delivering higher resilience, greater efficiency, and essential security to your cloud. When mainframe is part of your cloud, it's a better cloud.

Connecting mainframe applications and data with those on the cloud or other platforms is by no means new: it has been a common practice for years. Nowadays, however, by virtue of API-enabling mainframe solutions, cloud and mainframes can work together more seamlessly. This enables new levels of integration and automation, which means your operations run better and faster and pave the way for new innovation opportunities.

Enhancing your cloud is realized in three primary ways:

1. Integrating Mainframe with the cloud using APIs.

Mainframe in your cloud environment opens up new possibilities provided those mainframe solutions are exposed via RESTful APIs. What you get is a mainframe integrated and managed in the cloud, without platform-specific differences.

For example, a large global services provider built a self-service dashboard using ServiceNow to speed up the provisioning of and access to mainframe resources, resembling the self-service portals which are common among cloud providers. One of the supported capabilities is for a developer to refresh test data before testing an application change.

This elegant example completely illustrates the need to involve a mainframe system administrator, providing the self-service experience one experts in a cloud environment. Furthermore, using a single, common call to the API ML for all mainframe services preserves the high level of security expected of the mainframe by ensuring that all connections to APIs are secure, audited, and authorized.

2. Including Mainframe in multi-platform CI/CD pipelines.

One may also prefer using the same tools cloud developers use. Thus, you can break down unnecessary silos and automate formerly manual co-ordinations, resulting in higher quality and faster time to market.

As an example, cloud developers at a global financial services firm are working with tools like Jenkins and Git to tie the mainframe into their existing CI/CD pipeline for their consumer-facing wealth management application. To do so, they leverage Zowe, the first open source framework for z/OS providing a Command Line Interface that allows for scripting like any other cloud tool, without any special skills required.

3. Unifying Mainframe and cloud talent pools.

Eliminating mainframe-specific skill requirements, as illustrated above, one can more easily bring the cloud and mainframe teams together and have them collaborate on projects. Such collaborations will undoubtedly make multi-platform innovation even more attainable.

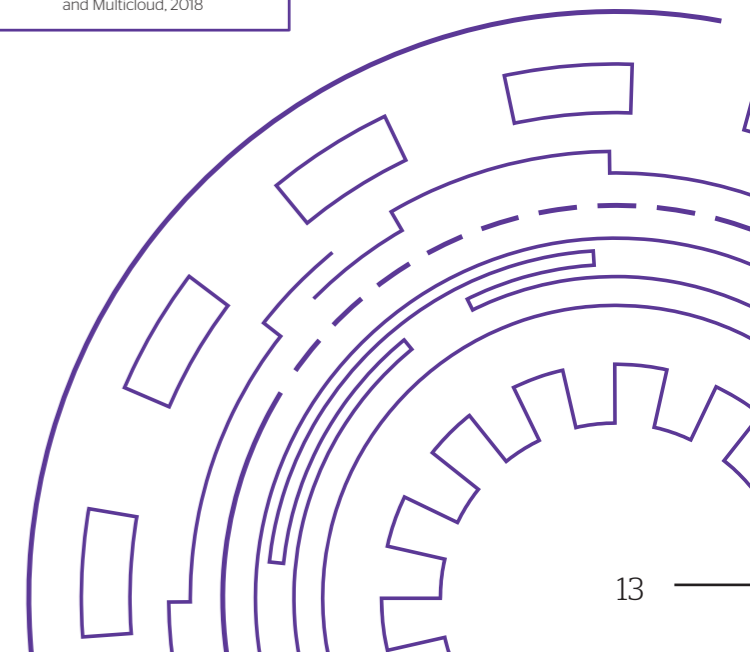
For instance, a team of cloud developers within a large enterprise technology firm was tasked with updating a mainframe app using standard mainframe tools. They found it was possible to work with their tools of choice by simply leveraging the Zowe CLI to invoke REST APIs on the mainframe—starting with z/OSMF. So, they made their updates, delivering as required.

Zowe is now inspiring thousands of new developers worldwide to work more closely together because they can work with the mainframe using the tools they use for other platforms as well.

Making the right choices can make the difference between delivering industry-defining innovation and falling behind the competition. To move your cloud strategy forward, it's time to adopt an open framework that supports tools of choice, to leverage APIs that enable high degrees of integration and automation, and to foster collaboration among teams.

At Broadcom, we're partnering with customers to unleash new strategic value from their mainframes by embracing open standards and environments, exploiting APIs and treating the mainframe just like any other platform or cloud.

That ultimately leads to a tight integration between mainframe and cloud, allowing you to leverage the best of both worlds. Ultimately, when your mainframe is part of your cloud, it's a better cloud.





A bright future ahead for heritage

IBM Mainframe has reinvented itself several times in the course of the last decades. But throughout this continuous journey towards innovation and customer excellence, one focus has never shifted. Up to today and for a long time coming, the mainframe is and will continue to be a cornerstone in IBM's enterprise strategy. Not surprisingly, considering the many unique values delivered by this platform.

The mainframe delivers some unparalleled value propositions when it comes to meeting business critical transactional workloads, high I/O and superior security and encryption demands. Further, there is no other platform that can guarantee the highest resiliency and data consistency over the complete technology stack. These are the building blocks in the mainframe's DNA that customers value and need for their core business IT.

IBM has invested significantly in maintaining mainframe's role as an integral player in modern IT architectures, enabling the platform to provide up-to-date technology while protecting customers' investments. Without compromising on reliability and security, the mainframe has continuously been extended and upgraded, to allow an ongoing transformation and modernization of the core applications that customers have invested in and are relying on.

The Red Hat OpenShift container platform is a very central component to achieve an integrated hybrid cloud across all platforms from public cloud providers to private platforms. Customers build their application artefacts once and may deploy them anywhere. IBM Z was the first non-x86 platform that was supported.

Bridging heritage and future journeys

Most organizations have embarked on a journey towards the cloud. Each will follow their own path, with a specific combination of private and public cloud, depending on the heritage they bring from past decades. In most cases, organizations still heavily rely on these applications residing on the mainframe, for various reasons. On the one hand, the mainframe is best in class when it comes to manageability of complex IT topologies, reliability and latency required for truly committed transactions. On the other hand, the level of security and data governance offered by mainframes is often the best and most efficient way to meet the highest regulative requirements.

IBM Cloud uses the IBM Z technology for purposes that can't be fulfilled by other technologies. The crypto facilities of IBM Z, for instance, are first in industry and can be used via the IBM Cloud as a Service as well as databases that are not accessible even by privileged users like administrators. These technologies can be found in the IBM Cloud Hyper Protect portfolio.

Bringing analytics close to the data

Integrating the mainframe into a modern, (partly) cloud-based application landscape offers unique advantages. IBM has invested massively in the integration of IBM Z and in cloud native technology.

Regarding modern IT architectures, there are many ways to integrate the mainframe and the core business data stored on the mainframe. The principle of "Data Gravity", for instance, which aims to bring analytics to the data instead of the other way around, is translated into analytical solutions residing close to the data on a mainframe. IBM has enhanced the IBM Z Platform with the Analytics Accelerator for Db2 on z/OS to facilitate complex analytical SQL queries to be executed transparently from within a mainframe application. This is even possible within business transactions in real time and without involving the Mainframe CPU. The well-known Watson Machine Learning was available for mainframes as first on-premise platform, and meanwhile this technology has already fuelled many innovative applications and middleware on the mainframe. Other analytical scenarios may benefit from the data virtualization features that allow direct access to mainframe-based data, be it Db2 relational databases, IMS databases, VSAM datasets, SMF data, Adabas databases etc.. Other application scenarios may require data replication to various targets, incl. Kafka data streaming technology. There's hardly any requirement in analytics and data processing that cannot be met with existing mainframe technology.



Just another container workload, with benefits

Using mainframes as an integral player in hybrid cloud infrastructures provides many benefits. Since Red Hat OpenShift is supported on mainframes, it can run Kubernetes-managed container workloads the same way as on any other platform. Non-functional requirements like latency, data proximity, highest security, encryption, resiliency, vertical and horizontal scalability make the deployment of containers on IBM Z a logical choice. In addition, there's technology to access existing application functionality "as a Service" like any other REST-enabled service. Finally, mainframe-based services can be managed by Kubernetes as if they were cloud-native services, and developers select those services from a catalogue as they would with any other service.

The key enabler for mainframes being an integral part of state-of-the-art IT architectures is the availability of sophisticated DevOps technologies. Mainframes are a full-featured member of modern CI/CD pipelines and agile development with mainframes as target for development artefacts is a reality.

So, it is highly recommended to consider mainframe technology in future IT strategies to secure investments, protect valuable assets and have a platform alternative for best fit-for-purpose workload deployment.

The IBM Z platform will remain essential for first class enterprise requirements and IBM will continue to expand the technological leadership further by investing strongly into the platform.



67%

Of the Fortune 100, 44 of the top 50 banks, and 8 of the top 10 insurers use IBM Z¹



72%

of customer-facing applications are completely or very dependent on mainframe processing²



65%

Mainframes are central to these organizations' businesses, with an average of 65% of their revenue running or touching their mainframes³

¹ IBM: Leveraging IBM z for hybrid cloud

² BMC: Mainframe Survey Results 2019

³ IDC: The Business Value of the Transformative Mainframe 2019



Is cost-cutting justifying the move away from mainframe?

KPN, the leading Dutch telecommunication and ICT provider, has decided to modernize its entire ICT infrastructure. Part of this 'modernization' endeavor led to the decision to replace mainframes with cloud-based infrastructure solutions. This move away from mainframes was mainly for cost-cutting reasons. But, as Sjaak Visser, KPN TECHNiUM, Manager Collections at KPN, puts it: "One may be comparing apples to oranges." Meanwhile, the mainframes are still up and running, and in good shape, partly thanks to Atos' expert services.

As a leading telecom provider, KPN handles invoices with detailed consumption data for millions of customers. No surprise, then, that they have always relied heavily on a mainframe-based architecture for dealing with these huge amounts of data and transactions. Especially for the simultaneous processing of all usage data and the creation of the resulting invoices, the mainframe's capacity to manage huge workloads comes in handy.

But, not unlike many other organizations nowadays, the KPN management has increasingly become convinced that the mainframe platform can be considered old-fashioned and expensive. KPN has therefore decided to move all workload to a standard, cloud-based environment.

The cost argument, however, may not be as convincing as initially expected, remarks Sjaak Visser: "They compare the mainframe's TCO to that of a comparable server offering in the cloud, and conclude that a cloud solution is far less expensive. Understandably so, because the figures do differ significantly. But they fail to realize that the mainframe

offers additional functionalities which lead to other forms of cost-savings. When moving from the mainframe to a cloud-based environment, you risk spending a lot more on additional connection and integration costs. These costs do not occur when you remain within that one robust integrated environment." Moving from the mainframe to a fully cloud-based solution may even lead to a higher TCO, Visser adds: "I've spoken to many colleagues from other organizations who have admitted that the new environment costs them more than the mainframe-based environment they've moved away from."

The other frequently used argument in favor of leaving the mainframe platform is that you're forced to use 'old-fashioned' technology, which would make the platform uninteresting for the younger generation of ICT experts and there increasingly hard to support. A valid argument, but far from entirely true, replies Sjaak Visser: "It's true that one can still find a lot of Cobol code on the mainframes, but one can also use web services, XML and even Java with the current mainframes, so there's no reason to scare the younger generation."

A reliable partner makes the difference.

KPN is currently still using the mainframe for three financial applications: the invoicing of all fixed-net customers, the payment and debt manager application for the follow-up of service-related invoices, and - to a lesser extent - the central debtor system. The mainframe platform for these applications is being hosted by Atos, which also provides 24/7 support in case of problems or downtime. "Not that we ever needed support for the last scenario: the mainframe hasn't ever been down since Atos has started hosting the platform", adds Sjaak Visser. Additionally, Atos is in charge of the mainframe batch processing and assists KPN in finding innovative solutions for the remaining mainframe applications, even though this is not specifically included in the current terms of the contract. A highly appreciated addition acknowledges Visser: "We are still far from shutting down all mainframe applications, so any time- and cost-saving innovation is very welcome. Only recently, they have helped us in realizing an improvement in some data handling processes, which has reduced the elapse time from several hours to merely 3 minutes."

A reliable partner does make a huge difference for any mainframe customer. "And when it comes to reliability, Atos is surely one of a kind", adds Sjaak Visser, "we have been partners for over ten years, and throughout this period it has always amazed me with their mainframe expertise. They have helped us connect the mainframe to the outside world, and the transition to the cloud may benefit from the Atos expertise as well."

Mainframe: the future of ICT?

Even though KPN is currently moving away from the mainframe environment, Sjaak Visser is convinced that the mainframe itself is not going away anytime soon. On the contrary, he believes: "As the world gets increasingly digital, ICT architectures need to become more and more reliable, and able to cope with huge amounts of data. Exactly those two characteristics are defining traits for the mainframe. It is only a matter of time before companies realize this and will start considering mainframes, or rather the next evolution of mainframes, say "Mainframe 2.0"

But before that can actually fully happen, Sjaak Visser has some advice for the mainframe builders: "They really need to get rid of those black screens with green letters. They add to this image of old-fashioned technology dating from the previous century. If they replace these interfaces with a modern GUI, people would be much less intuitively adverse against mainframes."

And for those organizations who are still considering whether they should move to cloud environments or stay loyal to their mainframe platform, he adds this one well-known adage: "Carefully consider and question what the cloud providers are offering you: if it sounds too good to be true, it probably is."





Modernize your mainframe using automated mainframe intelligence

Data used to be an afterthought. Today, it has become inescapable

In 2018, research demonstrated that an astounding 2.5 quintillion (that's 18 zeros) bytes, or 2.5 exabytes, of data were being created every single day, and 90% of all existing data was created in the prior two years. And that's just the start of the data deluge. Raconteur's "A Day in Data" infographic illustrates that the world will produce an incredible 463 exabytes every day by 2025. So, the zettabytes and yottabytes are already warming up to become the more practical terms for discussing the daily data growth.

For the companies that can make sense of the data to their business advantage, the potential is enormous. According to a 2018 study from the McKinsey Global Institute, digitization, automation, and AI could contribute some \$13 trillion to global GDP over the next decade. You can slice a \$13 trillion pie into quite a few pieces, but the companies that hope to earn a share must first demonstrate an ability to handle the amount of data being generated. For some 70% of the Global 500, the platform of choice is the same one it has been for decades—'Big Iron', as the mainframe is lovingly called.

The first mainframe was booted up on April 7, 1964. The System/360 cost \$5 billion to produce, but it set the wheels in motion for a computing revolution. By the 1970s, IBM had released the System/370 along with the pinnacle of processing at the time, the 64 kilobyte RAM chip. Fortunately, as data demands have skyrocketed, the mainframe has kept up with the times.

Innovation Explosion on the Modern Mainframe

The latest development in IBM's long line of Big Iron, the z15 is capable of processing as many as one trillion secure web transactions each day. Offering up to 190 configurable cores, 40 terabytes of memory, and the mainframe's legendary reliability with 99.999% uptime, the z15 and its predecessors are empowering the biggest enterprises in the world to scale their way into the future.

The modern mainframe is far from disappearing, quite on the contrary: it is seeing increased demand brought on by digitization. The release of the z14 saw IBM's strongest mainframe sales cycle in a decade, and revenue from IBM's Z segment was up by 63% in the company's first full quarter of z15 sales.

According to a study by Compuware, a BMC Company, 89% of CIOs report more and varied mainframe workloads, and 78% see the platform as an important innovation driver. Other figures corroborate these findings, and mainframe CPU resource consumption is projected by many analysts to increase by 15-20% annually. In order to keep up with demand, however, enterprises will have to overcome a major obstacle—the ever-present skills gap.

Helping Mainframers Do More With Less

As mainframe hardware is updated to the latest and greatest, the individuals who have been responsible for running big iron are ready to retire or already have. A study from Forrester Research found that 23% of mainframe developers retired between 2013 and 2018, and BMC's 2019 Mainframe Survey found that more than a third (37%) of the mainframe workforce was between the ages of 50 and 64. In other words, the existing skills gap is going to grow, and yet the IT infrastructures that power big business are expected to carry on as usual.

End-to-End Intelligence for Your Mainframe

BMC's Automated Mainframe Intelligence (AMI) solutions cover all four major facets of the mainframe, helping you effectively manage the Security, Ops, Capacity and Cost, and Data of your most valuable IT asset.

Security is a cornerstone of the three latest iterations of the Z systems, z13, z14 and z15, at a time when threat actors have more weapons at their disposal than ever before. That's why BMC AMI Security helps you detect and respond to threats in real time. When there is an issue, immediate remediation can commence.

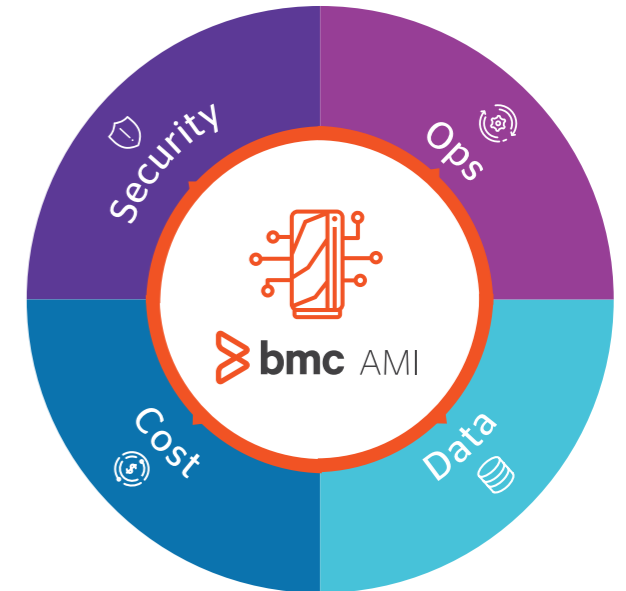
When it comes to operational issues, BMC AMI Ops is there to enable a proactive approach to system integrity. By monitoring and detecting problems ahead of time and improving performance within your organization's SLAs, and by providing central administration over your mainframe personnel, BMC AMI Ops helps ensure that your mainframe is operating smoothly to within expected tolerances.

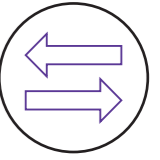
Mainframes run 68% of production IT workloads around the world, yet they account for just 6% of the costs. While they're incredibly efficient, BMC AMI Capacity and Cost aims to minimize what can be the most significant and varying line item in any enterprise computing budget. With predictive analytics informing future costs and workloads and automation that can enact changes to keep costs under control, businesses can stay within budgetary constraints.

BMC AMI Data provides a set of modern data management solutions that accelerates the delivery of new and updated applications to the market. Through intelligent policy-driven automation, IT can manage growing amounts of data with ease while providing full application availability.

From firefighting to value-add: the future of mainframe

When applying intelligent automation to your mainframe management with an encompassing solution such as the BMC AMI suite, you take your mainframe into the future. By implementing these solutions, our customers have enabled their IT staffs to work on high-value projects instead of firefighting, allowing them to squeeze more value out of their mainframes than ever before.





Avoiding the Perils of Digital Transformation

Too often, people conflate 'mainframe' with the legacy applications that run on the platform. But experience has taught us that 'mainframe', 'legacy' and 'technical debt' should not be considered as synonyms. We have seen 5 year old, heavily maintained Java applications groaning under a load of technical debt as bad as if they were 30 year old COBOL applications.

Getting to Java (or C#) is not a panacea by itself, just as extending your legacy applications to the cloud by itself will not capture the benefits of digital transformation or insure you against future technical debt.

In order to fully reap the benefits of digital transformation, you should first and foremost distinguish between business logic and technical logic in your code. Most programmers push back on this distinction, because to them all the logic is technical. But by changing our thinking, we can reach insights that translate into hard business benefits.

We define business logic as decisions made using only external data, i.e. data from an input message or from a database. Next, the changes to data that result from each decision are also stored externally. Everything else is technical logic.

This is a critical distinction, because the business logic changes when the business processes themselves change. Technical logic changes when the application changes in some way, such as transforming a COBOL application to Java and re-deploying it on the cloud. By fully acknowledging this distinction, we can better manage the risk to the transformation project itself as well as the risk to the business.

Two-pronged approach

A digital transformation is a modernization project that incorporates digital technology wherever possible to increase productivity. We want to change the technological implementation to modern standards, and we want to change the business process to fully leverage the opportunities of digitalization. However, changing both at the same time is a recipe for excessive project cost, delivery overruns and for functionality shortfalls - or even outright project failure - especially if your business is one that runs on complex business logic.

This distinction provides a potential solution to this conundrum, implementing the digital business vision without taking on the risk of failing to deliver a fully functional system on time and on budget. The only complete and correct specification of that intricate business logic upon which your business depends is contained within those mountains of legacy spaghetti code. All subject matter experts combined will be unable to specify all that logic to a 100% standard. It is simply too complex, sometimes mind-numbingly complex, and has built up over the lifetime of the application. It was never completely written down.

But in a modernization project, we care very little for the technical logic. That is mostly or entirely to be replaced, so we don't need to understand very much about it. Since technical logic can easily be 80-90% or more of your legacy code base, business rule extraction that can largely ignore the technical logic proceeds at a rapid pace. Once we have the business rules, and we have them 100% complete and 100% correct as delivered by our patented dynamic business rule extraction, then we can change them to support the new business process design without incurring the risk penalty discussed above. The cardinal rule is: first do no harm.

Parallel tracks

The secret here is to conduct the design for the new digital business operations in parallel with the business rule extraction process, so that they both finish at about the same time. New transactions and new user experience can be rapidly constructed with modern tools, especially if using a combination of a rules engine for the business logic with a drag-and-drop low-code or no-code system for programming the technical logic. Getting a project ready for delivery has much less to do with developing the new system than it does with getting the results of the new system correct in all cases, but this problem has already been solved by dynamic business rule extraction.

Business rule engines and low code platforms assist, but are not necessary, to fulfill this modernization approach. The goal is to separate business logic and technical logic - and to keep them separate in the future. These benefits can be captured with a coded solution (e.g., Java, Python, etc.) with microservices encapsulating the business logic, as well as with a low-code/no-code solution that essentially eliminates code in its entirety. Regardless, both solutions fully mitigate the primary risk of a digital transformation, while ensuring fully correct business functionality in the new system.





Six paths from mainframe to Azure

While the mainframe remains a pillar of reliability, availability and serviceability, many customers are considering if their needs can also be covered in a cloud environment, such as Microsoft Azure. They should know that there are many roads to reach the cloud, and they can determine the pace in which they get there

Thinking about mainframe modernization paths is not new. Microsoft led the industry in mainframe migrations with the creation of the Mainframe Migration Alliance in April 2004. This alliance included an ecosystem of systems integrators and migration tool providers who delivered the services and tools to migrate from the IBM z/Series servers to the Windows Server platform. Customers wanting to reduce costs, increase agility and address an impending skills shortage embraced the Windows Server platform which delivered the Reliability, Availability and Serviceability (RAS) they required to run their mission critical workloads. Over the next decade, thousands of customers migrated (all or part of) their workloads from their mainframe servers to the Windows Server Platform.

With the Microsoft Azure cloud becoming widely accepted for its Reliability, Availability and Serviceability, there has been a new wave of customers considering mainframe migrations. The Microsoft Azure cloud is becoming the platform of choice for mainframe migrations.

A mainframe migration can be viewed as a journey with several stops along the way. Selecting the best method for performing a migration requires an understanding of the customer's business requirements and workloads. An analysis of each workload will determine the best strategy.

Options to be considered include:

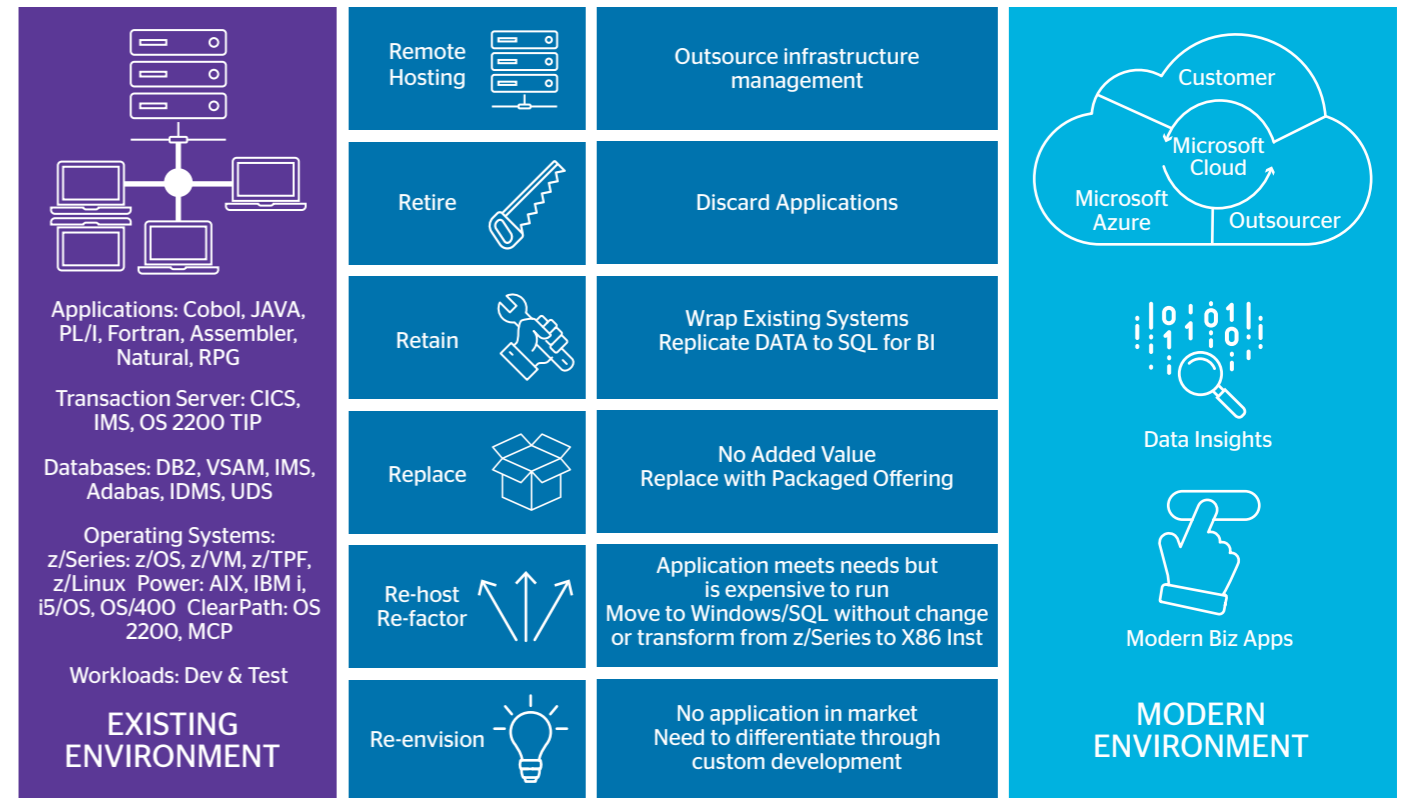
1. the remote hosting of the infrastructure to reduce cost and increase efficiency, the retirement of workloads that are no longer required
2. retaining workloads but accessing the data from a more agile platform
3. the replacement of workloads with a Commercial Off The Shelf (COTS) packaged applications
4. the re-hosting of workloads which is meeting the business requirements on a lower cost platform
5. the re-envisioning, re-architecting or re-writing of workloads which is not satisfying the needs of the business (see picture across page).

For some workloads and databases, the mainframe is an excellent platform which is delivering great business value. In those cases, the data can be accessed from a lower-cost, more agile platform which allows better access to the data for analysis and action. This can be accomplished by accessing the mainframe database or transactions through tools like the Microsoft Host Integration Services of IBM Websphere MQ. The mainframe database can also be replicated to SQL Server or the Azure SQL Database so that the data can be better analyzed through systems like R Server or the Cortana Intelligent Suite. This strategy would be categorized as a Retain strategy.

If a workload is meeting the needs of the business but is expensive to run on the mainframe, re-hosting or re-factoring to a lower cost platform is a good choice. Re-hosting and re-factoring technologies and options have improved significantly over the past decade. Re-hosting and re-factoring are preferred for some workloads as it can be performed at a lower cost and lower risk than Re-writing the workload.

When migrating a workload, the decision must be made whether it is best to continue maintaining the native language, to transform the source code to a new language or to extract the business logic from the source code and manage it in a vendor-provided Integrated Development Environment (IDE). If there are a sufficient number of programmers available to support the current language, re-hosting the original language but supporting it in a more modern IDE, like Visual Studio, is a good choice. If it is becoming difficult to find or retain a programming staff, then Re-factoring the source code to a new language would be a better choice. These choices are not mutually exclusive: once the programs are managed in Visual Studio or Eclipse, components can be re-written in C# or Java rather than staying in the original language. This strategy would be categorized as a Re-host/Re-factor strategy.

Regardless of your specific needs and environment, there is a modernization path available that will meet your exact requirements.



BUSINESS INITIATIVES DRIVE MODERNIZATION



Google wants to help mainframe owners throughout their journey to the cloud

Press and public used to see Google as the archenemy of mainframes. The recent acquisition of Cornerstone, however, puts Google's strategy of recent years in a different perspective. Google doesn't want to fight mainframe-centric organizations, but rather help them reap the benefits of modernization, regardless of how advanced they are right now.

Whenever I'm asked how many mainframes we run at Google datacenters, I reply: "it depends on your definition of mainframe". If they define 'mainframe' as a platform running applications that are mostly written in Cobol and sporting outdated technologies, I can safely say we don't run any mainframes at all. Using such technologies not only puts you at risk from a technology perspective - because it will become an increasingly important obstacle for innovation - it will also dramatically decrease your appeal with new talent. And talent acquisition will become key to success and even survival in the digital era, as we have all understood by now.

If, on the other hand, you define mainframe by the main qualities it is supposed to deliver - reliability, accessibility, serviceability and speed - we might argue that all of Google's servers are mainframes. Google has been known from the start to create its own servers, with custom-built chipsets, strong-encryption, servers, storage, and game-changing cooling technology. Each of these adaptations to existing designs leads to a higher cost- and energy-efficiency and limitless scalability. You could call these mainframes, but there is one major difference: everything we have created is also designed to drive modern, open source architectures. This enables an environment that allows modern development techniques and that can interact with any hardware or software, provided that they are built with the same focus on openness and integration.

Meeting customers wherever they are

Google has become one of the leading cloud platform providers worldwide largely due to our focus on innovation and openness. We believe that we can help organizations by allowing them to move to this open, scalable and secure environment that the (public) cloud has become. And we further believe that organizations that still heavily rely on mainframes, can most particularly benefit from such move. That is one of the reasons that we have bought Cornerstone, a Dutch company that specializes in helping enterprises migrate their legacy workloads from mainframes to public clouds while ensuring operational excellence and connectivity throughout the process.

Does this mean Google intends to move all workloads from mainframes to the (Google) cloud as soon as possible? Not quite. Our strategy is to help organizations modernize at their own pace, supporting them with their legacy workloads whenever necessary and helping them migrate towards a modern digital architecture whenever possible. We don't expect customers to struggle their way towards the cloud before helping them, instead we meet them wherever they are. From that point onwards, we jointly develop a gradual migration path towards an environment where they can fully focus on innovation rather than on maintaining costly legacy environments.

Fully hybrid multi-cloud strategy

Google is ideally positioned to fulfil this ambitious promise: we are the only provider who can offer a fully hybrid multi-cloud strategy, offering organizations the choice between on- and off-premise, as well as between private and public cloud, regardless of the cloud provider. This is largely due to Google's unparalleled openness and flexibility, allowing organizations to run almost any operating system or application on Google Cloud, from Linux and Windows up to IBM's AIX.

Google thus creates a huge value proposition: by enabling customers to gradually migrate towards more open and cost-effective environments at their own pace, we help realize a maximum cost-saving and risk avoidance while ensuring a minimum of downtime and interruption in the daily operations, regardless of the source environment.

Conclusion

Google can no longer be viewed as the enemy of all things mainframe, in spite of (or rather: thanks to) our acquisition of Cornerstone. This strategic purchase allows us to help organizations with mainframe-based architectures even better than ever before. And we will gladly help customers gradually modernize their legacy. But until that day we will support any organization in their journey to innovation and the cloud, regardless of how far they have advanced on this journey.





Our vision on the mainframe in 2020

The Mainframe as a Service (MaaS) era has well and truly taken off. It is at the core of the digital transformation for many large customers that Atos supports on a daily basis.

Much like most innovations in the automotive industry that have originated from research and development within the Formula 1 arena, the **standardised x86 mainframe-class machines** that we build today are the result of our long experience in the domain of supercomputers. Yes, we are leaving the mainframe era, but that is not an end in itself. Atos doesn't aim to replace on-premise machines with cloud alternatives. Our aim is to guide our clients in their application transformation towards an architecture that is both more robust and less expensive, thanks to open source and standard technologies.

A successful example of such transition is the project we have undertaken at the Belgian National Registry, replacing the former mainframe-based architecture in 2019 with a new one based on mainframe-class x86 servers. This was a drastic transformation indeed: the legacy mainframe architecture has been completely switched and entirely replaced. Since then, the modernisation of the National Registry has proved its worth at various levels: faster response times, less dependency on third-party software vendors, less expensive test environments, and simplified system maintenance. The overall TCO has decreased by no less than 70%.

In order to reach such target, it is essential that you can rely on a sufficient amount of high-level mainframe talent to ensure the **transformation of legacy applications**, which remain a fundamental asset within the enterprise. We have enough resource capital available to preserve this heritage while reducing our customer's TCO. One basic rule prevails: the engineering resources are always the starting point. Together with our customer, we will analyze and discuss the various options based on the human dynamics. This will lead to one of the two following scenarios.

In the first scenario, **we replatform the mainframe**. This scenario requires a sufficient amount of developers experienced in mainframe languages such as Cobol, and their long-term availability within the enterprise platform. They thus become the main resource, on top of which you will need new talent which can transform and adapt the existing code to the cloud.

In the second scenario, we make use of a **MaaS pay per use model**. This requires drawing up an inventory of the application layer, in order to define the business logic. In this scenario, the required rewriting will be handled directly by a new team, charged with developing more modern application layers. This will lead to a gradually diminished usage of the mainframe. This team will drive the decrease, and the previous team no longer needs to focus on Cobol, allowing them to take on new challenges.

In both scenarios, the digital transformation basically amounts to a **human transformation**, even before it becomes a technology shift. When relying on Mainframe as a Service for your transformation project, you are guaranteed to enjoy the following crucial advantages:

1. **service continuity**, throughout the various transformation phases;
2. **cost control** and optimisation (pay per use);
3. the best possible path towards **modernisation** and "cloudification".

Our partnership with numerous enterprises has enabled us to build a renowned digitalisation strategy, as acknowledged in Gartner's Magic Quadrant. It involves application modernisation and replacing the historical mainframe infrastructures with a mainframe-class x86 standardised appliance, which results directly from the HPC innovations. This transformation will lead to a **significant reduction of both the exploitation costs and the energy footprint**.





The reasons behind the successful digital transformation of Belgium's National Register

In October 2019, Belgium's National Register of natural persons announced that it was putting the finishing touches to an ambitious plan of migrating its long-standing mainframe to an open source architected system. This upgrade lays the foundations for the register's digital future.

The migration started in 2016 and ended when the mainframe was switched off on 31 July 2019.

I am used to saying that an operation of this magnitude is a success if nobody noticed anything, and that is exactly what happened. If we take a look back at the process, I think it was a serious gamble, because everything was working perfectly with the mainframe in terms of performance and quality of service. So why were we determined to change it? Because we wanted to upgrade our infrastructure and ensure that it would be open to the competition... and future fit.

It was vitally important for us to guarantee some form of service continuity and offer superior flexibility. That is why it made sense to keep the same supplier, namely Atos. Abandoning the mainframe did not generate any extra costs. For the same financial outlay, we now have a system that is much faster. Performance levels have increased tremendously.

"I am used to saying that an operation of this magnitude is a success if nobody noticed anything, and that is exactly what happened."

The migration

We had to break away from a highly centralized system and allow our IT infrastructure to embrace cloud computing and the latest technologies. Therefore, we started by migrating to a relational database used by the mainframe, and the resulting reduction in running costs helped finance the migration process without any need to invest.

Specifically, the migration process required us to carry out a complete inventory of the infrastructure, and a defining moment was how we gradually switched over to the new system. We began with the "batch" section to avoid any impact for the users. During the cutover phase, both systems were running at the same time. Everything happened without our users noticing the slightest change.

Linux and open source

We wanted to become less dependent on software vendors and maintenance providers. Open source was the solution. We now have a perfectly standardized and open IT infrastructure featuring an x86 server. It combines a Linux system based on PostgreSQL and the Liber suite developed in Java. For example, this approach has allowed us to maintain our legacy applications and core system (written in Cobol) alongside Java and C++. I cannot say which programming language will replace Cobol, but we have prepared for the future and can now think about migrating and managing resources in a private cloud with greater confidence.

The cost-performance ratio

In terms of raw functional performance, our new system is clearly more powerful and twice as fast, meaning that we can add extra service layers. As for costs, the benefits are in the region of 50 to 60% for maintenance expenses. Admittedly, we may need to bring extra skills on board to manage the new developments, but the costs are offset by the lack of software licences thanks to the open-source infrastructure. I believe that the situation is ideal, i.e. an open system with an easy learning curve for our employees. We are capable of incorporating new services on our own without any outside help. Upgrading to an open source system has simplified this change and laid the foundations for a future migration to the private cloud.





Atos' Mainframe Service: redefining the mainframe in today's computing environments

For over 50 years Mainframe computing has played a defining role in the evolution of our increasing digital business and even in our daily lives. It is not about to disappear, quite on the contrary. Our service department dedicated to this robust and reliable platform, supports customers redefine and optimize their use of the mainframe.

The mainframe platform has written an incomparable success story. It began in 1964 with the first production-ready IBM mainframe on the market, and its success continues to this day. Throughout this period, the mainframe has consistently been developed using the most up-to-date methodology and technology, and it is unfathomable to imagine the global market without it.

The requirements in the IT world have grown exponentially over the years, and many new computer generations have been created. Numerous times, there have been predictions that the evolution of the mainframe would make it impossible to keep playing a significant role in the market. But time and again, the mainframe architecture has proved itself as the most reliable infrastructure choice, especially for large companies with vast transaction rates. Most notably in the financial sector, insurance, manufacturing and retail, organizations rely on the mainframe to maintain the mission critical applications and data in a highly secure landscape.

More than 70% of all business IT operations take place on mainframes. Even in the highly flexible digital age, the mainframe continues to be the platinum platform for fast and transaction-intensive orders. It is still the preferred engine for many core processes, now and for future IT generations.

Services as reliable and advanced as the platform

Atos, as an IT service provider and integrator, is convinced that services related to mainframe technology, with its security, scalability and speed, will continue to play a principal role in the processing of business-critical data in the future. With the continuous expansion of mainframe hubs, particularly in the USA and Europe, Atos demonstrates that these services will be offered long term and will be further developed in line with companies' ongoing strategy and requirements.

Atos Mainframe Services not only focuses on offering stable global mainframe operation but is in many respects also highly innovative. As a core element of the global mainframe strategy, youthful and highly motivated teams of mainframe IT specialists are trained worldwide to meet the requirements of the outsourcing market and the demographic change of mainframe experts. Furthermore, Atos Mainframe stands for the expansion of innovations on this platform. Together with its partners and customers, Atos addresses such areas as Data Analytics, Economy/Automation, Hybrid Cloud Enablement, Security, Tiered Storage Automation, Digital Transformation and Workload Consolidation to break new ground and to develop the mainframe platform in the most efficient and technically advanced way to individually meet each organizations' specific needs.

Over 100 successful transitions and transformations

Atos' customers say that the mainframe platform must be stable and unwavering, and that availability, speed and capacity must be guaranteed at all times. This starts with ensuring a perfect transition from the current infrastructure to a highly flexible and cost-effective mainframe service. The Atos Mainframe practice has demonstrated its ability to provide the mainframe environment, supported at all times by a global team of experts and talents. Atos has successfully realized over 100 smooth mainframe transitions and transformations, which were meticulously prepared together with the customer and always worked perfectly at 'go-live'. All Atos mainframe experts are very proud of this track record and with their decades of experience, they are convinced that every new mainframe customer can migrate to Atos' hub environment with a high level of expertise.

Customers were asked by Gartner what strengths and capabilities were particularly noticeable with Atos Mainframe. The answers were "empathy, responsiveness, commitment, competence, business understanding" we couldn't agree more with these reasons they cited to fully rely on the Atos Mainframe Service.

We continue to look forward to a successful future of the mainframe platform with our customers and current and upcoming mainframe partners. Together we are breaking new ground with innovative and strategic ideas based on the dynamic mainframe technology.

Safe passage to the cloud

It is only natural that every organization investigates which elements of the infrastructure might benefit from moving away from the "firm and resilient" mainframe workloads towards elastic microservices in the cloud. The Atos mainframe organization is ready and able to contribute and to manage the transition to a cloud-based application landscape with various secure data porting methods.

Starting with pure code translation, e.g. COBOL to JAVA, up to hybrid solutions with Docker on z/OS using the mainframe's ecosystem and applications via API interfaces or using encrypted Secure Service Container on IBM Z, Atos can ensure operation and porting at the same time.





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About Atos

Atos is a global leader in digital transformation with 110,000 employees in 73 countries and annual revenue of € 12 billion. European number one in Cloud, Cybersecurity and High-Performance Computing, the Group provides end-to-end Orchestrated Hybrid Cloud, Big Data, Business Applications and Digital Workplace solutions. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, Atos|Syntel, and Unify. Atos is a SE (Societas Europaea), listed on the CAC40 Paris stock index.

The purpose of Atos is to help design the future of the information space. Its expertise and services support the development of knowledge, education and research in a multicultural approach and contribute to the development of scientific and technological excellence. Across the world, the Group enables its customers and employees, and members of societies at large to live, work and develop sustainably, in a safe and secure information space.

Find out more about us

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Let's start a discussion together



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