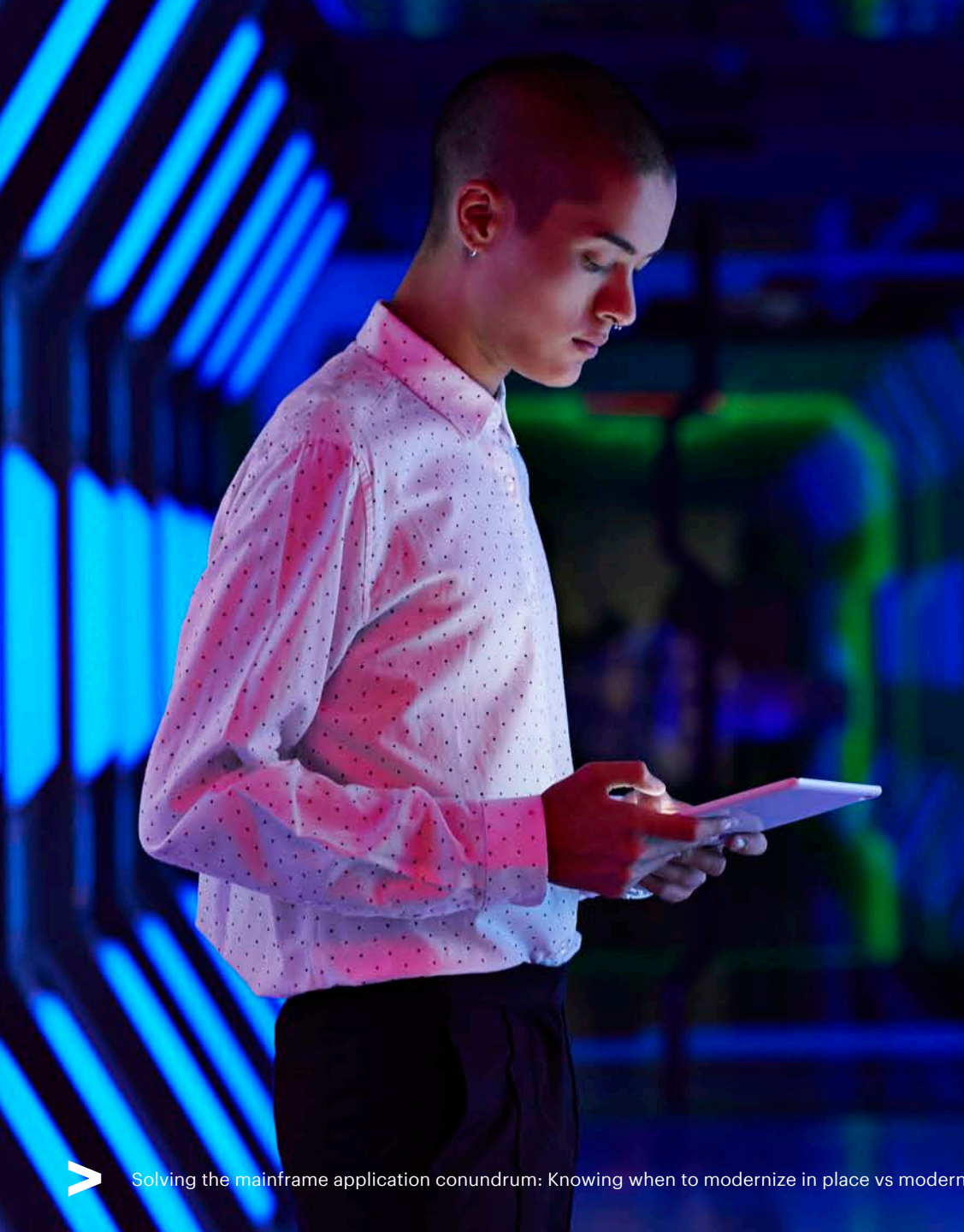


A hand holding a pen is positioned over a server rack. The scene is illuminated with a strong blue light, creating a futuristic and technical atmosphere. The background shows rows of server units with various lights and cables.

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# Solving the mainframe application conundrum

Knowing when to modernize in place vs modernize to public or private cloud



## “What should I do with my mainframe applications?”

This is a question we get daily from companies worldwide and across industries. Public cloud providers have matured to a point where they can reasonably handle scale, performance, and resiliency of applications that have long lived on the mainframe platform. But challenges around mainframe application and platform support were laid bare during the pandemic, motivating many organizations to move off mainframes. Accenture’s 2022 Global Mainframe Modernization Survey<sup>[1]</sup> found that 93% of companies using mainframes are already migrating or considering moving some mainframe applications to the cloud.

While moving to the cloud may be the right approach for many applications, having the right plan can make a material difference in outcomes. **Nearly 60% of companies moving application portfolios to the cloud haven't achieved the full expected value from their cloud migration journeys, according to [our Cloud Outcomes research](#) with "complexity," "app modernization" and "security" identified as the primary reasons.** Many companies are left with portfolios in a prolonged interim state, balancing critical business functions across public cloud, private cloud and some on-premises infrastructure. Specialized infrastructure cases such as Internet of Things (IoT) and edge computing confound the centralization of compute on the cloud. And that reliable mainframe workhorse is laden with applications that are not easily decoupled.

With concerns around complexity, app modernization and security, the public cloud providers acknowledge that not all workloads will go to public cloud immediately and this decision is even more relevant with mainframe applications. Deciding how to modernize your mainframe requires understanding the benefits of public cloud, private cloud and the mainframe, and recognizing that hybrid cloud can be a sensible approach.



# Mainframes are powerful, but often misunderstood

Now that public cloud is so prevalent in many companies, the mainframe is often overlooked. Because it has been around for 80 years, the mainframe is often viewed as an old technology, with many people predicting its demise for the last 40 years. In fact, an MIT professor referred to the mainframe as a dying platform in a [New York Times article](#) from 1984.

Lest we think of mainframes as “ancient”, IBM releases new mainframes every two or three years adding new capabilities and continually raising the bar for high performance computing, resiliency, and security. The new IBM z16 features the most powerful chip on the market, AI accelerators, strong sustainability credentials, and support for quantum encryption. But the modernization conversation is rarely about the hardware capability, and nearly always about the applications running on that venerable platform.

Yet today, many businesses are still running their business-critical applications and data on mainframes. For instance, mainframes still support:



of the  
**Fortune 100**<sup>[2]</sup>



of the top 50  
**Banks**<sup>[3]</sup>



of the top 10  
**Insurers**<sup>[3]</sup>



of the top 10  
**Telcos**<sup>[3]</sup>



of the top 10  
**Retailers**<sup>[3]</sup>



of the top 5  
**Airlines**<sup>[2]</sup>



# The challenges with mainframes

Although mainframes offer several key strengths, they also come with three main challenges:

## 1. Costs

Many companies view mainframes as expensive, though some studies suggest that a fully loaded mainframe is a very cost-effective compute platform.

## 2. Talent

It's increasingly difficult to find the skills to keep mainframes running, as many people familiar with COBOL and other older programming languages are retiring.

## 3. Agility

business agility is poor, typically due to complex and tightly coupled applications. Integrating new applications with legacy applications increases difficulty and creates long release cycles.

These challenges are turning legacy mainframes into bottlenecks that are slowing down innovation. With so many organizations heavily relying on mainframes, and the need for low latency access to data residing there, bringing applications closer to the mainframe is critical – limiting their ability to move some applications to the cloud.



# An urgent need for change

The issues around legacy mainframes aren't new, but recently they've become much more acute. **The pandemic has been a real tipping point.**

A few years ago, many companies felt they couldn't justify the expense of moving off the mainframe. But when Covid-19 struck, the business case changed overnight, because the cost of doing nothing skyrocketed.

Companies needed elasticity to handle increased demand. Companies couldn't find developers to urgently update mainframe code to adapt to the sudden change in business needs, generate new revenues and keep up with competitors. In other words, companies realized that heavy reliance on legacy mainframes was severely damaging their business agility.

What's holding up progress? To migrate apps off the mainframe, you first need to modernize them. And that's not easy.

Our Mainframe Modernization Survey found companies often struggle, because:

- It's costly
- It's time-consuming
- It requires specialist skills that are hard to source
- It requires a clear roadmap

This leaves companies facing some tricky questions:

- What modernization approach should we take?
- How can we weigh the options?
- How do we decide what to do?



## The modernization solutions

First, we need to understand the modernization solutions a company can use. Application modernization offers several key advantages. According to our Mainframe Modernization Survey, those most cited include:

**70%** better integration with other platforms

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**59%** increased agility

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**57%** reduced maintenance costs

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# When companies decide to go down the modernization path, they must identify the best option to suit their business.

There are several approaches available, including:

## 01

### Replatforming

Replatforming existing mainframe applications, which are often written in COBOL and other older programming languages. In some cases, this is quite a straightforward option. For instance, CICS and IMS Transaction Manager have multiple solutions for running existing code largely untouched on modern commodity hardware platforms with Windows and Linux. Some independent software vendors (ISVs) like Infor have rewritten their COBOL applications to run on .NET. And solutions from Micro Focus help Companies move COBOL apps to the cloud – dramatically cutting infrastructure costs.

## 02

### Clean slate

The “clean slate” approach of reimagining the business and creating a new application that drives innovation. This might seem like a great opportunity to make a fresh start. But the reality is often more complex, as any new app will likely need to retain the decades of business logic, special rules and corner cases that have been driven by customer demands and are still required for customer loyalty.





# 03

## Code transformation

Code transformation solutions emerged in the days of the Y2K challenge. They began as line-by-line syntactic translators. Now, they're robust semantic translators that use abstract syntax trees to let engineers modernize application code via refactoring. They enable companies to keep their legacy business logic, while moving to a modern language that's more popular among today's developers. For instance, there are tools that convert COBOL to Java, which is much more familiar to younger generations of developers. Although these solutions can make life easier in the short term, application teams must be prepared to change the code, language, logic structure, and even the data access methods over time. Organizations will also need to determine the impact to their existing developer skillset mix.

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# 04

## Rehosting

Rehosting is another option. It's often called mainframe-as-a-service, and it involves moving your mainframe to an outsourcing provider who will manage it for you, typically with the latest mainframe models. This approach is becoming increasingly popular, because it enables companies to continue using the mainframe while moving to a more flexible financial model (you usually pay per MIPS). But even mainframe-as-a-service rarely offers the seamless scalability provided by public cloud. This also does not solve the talent and agility challenge.

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# The modernization enablers

No matter which approach you take, there are two key enablers for success:

## Digital decoupling


Digital decoupling is an emerging option that offers a middle ground – building new while harvesting the strength of the old. It involves moving application code to the cloud (either through re-platforming or converting to a modern language), while leaving the data on the mainframe to meet regulatory requirements around where data resides. Although this option doesn't entirely remove reliance on the mainframe, it does help accelerate innovation. And it still leaves the door open for companies to fully move off the mainframe at a later stage.

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## DevOps

DevOps has often been forgotten for mainframe applications, and as a result, mainframe applications have fallen behind in agility and speed to market. But many modern DevOps tools are available for mainframe applications and can address both issues. This could also help attract talent, since the developer will be using some of the latest tools in the market.

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A woman with her hair in braids, wearing glasses and a light-colored polo shirt, is looking at a tablet in a server room. The room is dimly lit with blue light from the server racks.

## Modernize in place vs modernize to public or private cloud

Except for rehosting, each of the previously mentioned solutions can be run on either public cloud or private clouds, offering organizations options. But this often means they must make hard decisions.

Companies can choose from a vast selection of infrastructure hosting platforms which offer flexible pricing models to suit different consumption patterns. The confluence of cloud computing platforms, the digital revolution, and the COVID-19 pandemic has sent companies rushing to exit the data center business and embrace outsourcing. Cloud is no longer a single technology but a dynamic continuum of capabilities from on-premises systems to public to edge and everything in between, all seamlessly connected by cloud-first networks. **Accenture refers to this as the Cloud Continuum.** And in this Continuum, innovations that used to be exclusively in the public cloud can now be found in multiple locations and destinations.



It's important to understand this context, because being in a hybrid environment increases the complexity of any modernization journey – particularly where mainframe is concerned. As you modernize your mainframe applications, even if you take that application to the cloud, you're most likely going to be in a hybrid world. Why? Because that application will be connected to hundreds of others – some in co-location facilities, some on-premises, and some in the cloud. This makes integration very complex.

Some companies are reluctant to migrate apps off the mainframe because the stakes are so high. For instance, the world's mainframes have payment processing systems that support trillions of dollars' worth of transactions every day. It will be some time before these companies decommission their mainframes. Until they move off, they can take advantage of the mainframe's quantum-safe encryption, and its enhanced capabilities for meeting regulatory and other compliance requirements.

But keeping the mainframe doesn't have to mean doing nothing. The mainframe is a key resource for companies' hybrid cloud strategies and enables the mainframe to run cloud-ready solutions. This allows enterprises to leverage hybrid architectures to support various approaches that can help address the challenges around agility and talent, while maximizing the mainframe's contributions. **This enables companies to use the mainframe as part of the Cloud Continuum.**

# The modernization assessment

Because there are many modernization solutions available and because these solutions can be deployed across the Cloud Continuum, we need to spend time to understand what's motivating the company to modernize. We also need to understand more about the company's plan for the mainframe and how they see it fitting into their company over the next five to seven years.

**We believe modernization is inevitable – the real question is to what extent.** Broadly speaking, companies fall into three categories:

## 01

### The mainframe is core to my business

These organizations won't move everything off the mainframe soon. For now, they're staying put and modernizing in place.

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## 02

### I want to move some applications off

A more cautious approach, focused on the easy workload migrations.

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## 03

### Finish the job

Get me off the mainframe – it's no longer part of my business.

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Once we understand the organization's goals, we then need to develop the business case. It's vital to work with both the IT function and the business to make sure the business case represents both parties. Building a business case fundamentally boils down to one issue: At what point do the short-term costs outweigh the long-term benefits of a modernization?



# Case studies

## Public and Private Cloud

Let's look at a few examples of companies that have successfully decommissioned mainframes and migrated to cloud.

# A financial services company replaces all mainframes across three continents

This global financial services company had mainframes in ten countries across three continents. The company wanted to move its core banking systems from the mainframe to the group's open scalable cloud infrastructure (OHE), to help:

- Break vendor and technology lock-in
- Boost IT flexibility and business agility
- Modern DevOps increases developer productivity
- Make customer data more readily accessible
- Provide scalability for growth in transaction volumes
- Cut costs by 50%

**We're helping the company migrate its core banking systems to public and private cloud. We're running a huge replatforming program to migrate 300K millions of instructions per second (MIPS) and decommission all mainframes by 2024.**





# An energy company replatforms its mainframe

Next, let's look at a leading global energy company that wanted to eliminate its mainframe apps entirely, or replace them with non-mainframe solutions. The mainframes hold historical accounting data used by the Upstream Legal and Royalty groups to defend them against external litigation, as well as the master data repository for oil and gas leases.

**We helped them replatform its active production applications and associated data and move them to a hybrid cloud distributed environment that provides “mainframe-like” functionality using the Micro Focus Enterprise Suite.**

Now, the company has successfully replatformed its mainframe, including:

- 20 applications; 21,000 source modules; 9 million lines of code; 375 defined mainframe users; 5,200 database tables; 100 TB of data
- Successfully converting very old technologies (e.g., Mark IV, FOCUS and Assembler) to more modern alternatives
- Streamlining system testing by introducing automated regression testing
- Cutting operational costs by 39% by moving off the mainframe



## A call for change at Arek Oy

Arek Oy delivers pension calculation services to all pension providers in Finland. These calculations, based on decades worth of data, are highly regulated and extremely complicated. They also come with stringent compliance and accuracy requirements. Historically, the company calculated the value of every Finnish citizen's pension via a proprietary mainframe. These valuations—drawn from analyses of 22 million lines of code and 7,000 COBOL modules—were then regularly passed along to the pension providers in the form of standardized reports.

Arek Oy needed to make a choice. It could update the existing mainframe to accommodate growing demand, but the static costs associated with running the infrastructure were high and the COBOL skills needed to maintain it were in short supply. The other option involved shifting its system of pension calculations from the mainframe to a private cloud solution.

**Arek Oy worked closely with Accenture to establish the necessary structure and technical framework to facilitate the conversion to Google Cloud and, specifically, to Google Cloud's Anthos application management platform.**



# Modernizing the delivery of financial aid

The U.S. Department of Education's Office of Federal Student Aid (FSA) wanted to modernize the Common Origination and Disbursement (COD) process for federal financial aid for postsecondary education.

To enable cost savings, improve agility, and enhance security, Accenture [helped modernize COD by re-architecting it from its mainframe platform to a fully automated, modern technology stack](#) hosted on a FedRAMP authorized cloud service provider, AWS GovCloud (US). We transitioned the hosting with the establishment of a DevSecOps foundation to enable a rapid path to adopt AWS capabilities to support the pace of capability development needed by FSA.





# Case studies

## In place modernization

Now let's look at three case studies where companies modernized in place.



# Modern tech, simplified service for Social Security

This example is from the Central Provident Fund Board (CPF Board), Singapore's social security organization. They needed to simplify their website to make the information easy to find and understand, and they also wanted to create a personalized digital experience that would be easy to navigate on all devices. Accenture helped CPF Board reimagine and modernize its core mainframe applications—the central application and data repository platform—with minimal service interruption.

The Accenture-CPF Board team modernized the language from Common Business Oriented Language (COBOL) to Java, designed so the majority of Java still runs on the mainframe. This addressed the shortage of Cobol skills while enabling faster changes and reduced development time on back-end systems by utilizing common Java DevSecOps frameworks.

**To complement the re-imagined back-end, we integrated it into a transformed front end and utilizing the latest cloud platforms, the CPF Board digital shopfront was able to handle more than 5 times the normal daily user activity. The new system proved to be stable and resilient, [achieving 35% greater member-engagement](#). In addition, the team rolled out the new mobile and web experience, connecting members with customized content and tools. Finally, CPF Board streamlined more than 1,000 content pages into 320 pages, simplifying the content and making the website more user-friendly.**



# A leading U.S. bank rearchitects their mainframe Loan Management System

Accenture was engaged by a leading US bank to lead the batch process transformation and expose existing mainframe-based services as APIs. The client was struggling to identify where to start and needed support to integrate the technologies involved. We collaborated with the client to re-architect their mainframe-based packaged Loan System (utilizing Cobol, CICS, Assembler) being used by their customer service agents to manage loans. We exposed high value mainframe services as APIs and integrated them into their API management systems with a modernized front end and applications running in their private cloud.

**These transformations resulted in an improved user experience, reduced call volumes and SLA performance of their customer facing support teams. The client has repeated this architectural framework when they needed to expose other services already on the mainframe to enable hybrid cloud architectures.**



# Transforming mainframe services for a European wealth management firm

Accenture transformed the way we deliver mainframe services to a European Wealth Management firm utilizing a Scaled Agile Framework powered by DevSecOps.

We have been serving this client for over a decade and have collaborated with them to increase productivity and to deliver business results faster. We have delivered mainframe changes faster in an agile framework with an average of 30% reduction in the development efforts.

**This enabled the investment bank to be the first bank in Switzerland to offer a purely virtual credit card that can be used in seconds, plus a quantified multimillion savings to boot directly attributed to Mainframe DevSecOps. The new ways of working and a template architecture framework used for the virtual credit card will make it easier for the client to introduce other new digital products moving forward.**



## Conclusions

# Big decisions to make

Legacy mainframes have underpinned many of the world's top businesses for decades. But maintaining them is becoming increasingly difficult and expensive. What's more, they're tricky to weave into the fabric of a cloud-first business and modernizing them can be just as hard.

Companies face difficult choices about which modernization solution to choose and if they should modernize in place or in the public cloud. Both options can be costly and complex. Companies need to think about their long-term objective and cloud strategy. Since the public cloud offers a significant amount of innovation and very flexible commercial models, it should be strongly considered as the landing zone for any mainframe application modernization solution. The public cloud providers are also investing in new tools and solutions to accelerate the migration to their platforms. As an example, AWS bought Blu Age and partnered with Micro Focus to offer a Mainframe Modernization as-a-Service (AWS M2) solution. Google Cloud bought Cornerstone Technology.

The good news? Modern compute infrastructure is robust enough to support mainframe load, and there are various modernization techniques that can accelerate the journey. Our approach helps companies assess when and how to modernize their mainframe apps/data for the cloud, to find the right fit for their unique business needs. Companies need to first identify their pain points and understand what's motivating their mainframe application modernization agenda. They also need to determine what their risk tolerance is, and whether staying on the mainframe poses a future risk to revenue. Furthermore, they must assess their applications and understand what modernization solutions are available. Not all mainframes are the same, so the mainframe application modernization journey will differ between organizations.

Clients have many options, and Accenture can help with our assessment and proven architecture approaches.



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This content is provided for general information purposes and is not intended to be used in place of consultation with our professional advisors.

## References

[1] Accenture performed a telephonic survey of global enterprises that use mainframes for their businesses. As part of this survey, 700 global enterprises were interviewed spreading across United States, China, India, Australia, New Zealand, Japan, Singapore, Italy, Spain, The Netherlands, Switzerland, Canada, United Kingdom, France, and Germany. Of these, 52% of respondents were either CIO or CTO, 38% were IT Directors/Mainframe Directors/Direct reports of CIO/CTO, and 10% were CFO or direct reports of CFO. 31% of these enterprises had annual revenues of more than US\$ 10B, 29% had annual revenues between US\$ 1B and 10B, and 40% had revenues between \$500 and \$999M. 41% of the sample had either full enterprise deployment or deployed mainframes in majority of their business areas; while 55% of the sample had mainframes deployed in some of their business areas, and 4% were in piloting/proof-of-concept stage. Enterprises from a range of industries were covered in this survey.

[2] Why the mainframe is alive and thriving | ZDNET.

[3] Announcing IBM z16: Real-time AI for Transaction Processing at Scale and Industry's First Quantum-Safe System.

## About Accenture

Accenture is a global professional services company with leading capabilities in digital, cloud and security. Combining unmatched experience and specialized skills across more than 40 industries, we offer Strategy and Consulting, Technology and Operations services and Accenture Song — all powered by the world's largest network of Advanced Technology and Intelligent Operations centers. Our 721,000 people deliver on the promise of technology and human ingenuity every day, serving clients in more than 120 countries. We embrace the power of change to create value and shared success for our clients, people, shareholders, partners and communities. Visit us at [www.accenture.com](http://www.accenture.com)

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