

A Guide to Mainframe Challenges for the Next Generation

How State and Local
Governments are
Turning to Integration

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**THE CHALLENGES
MAINFRAMES POSE
FOR STATE AND
LOCAL GOVERNMENTS**



The Challenges Mainframes Pose for State and Local Governments

State and local governments that depend on legacy mainframe technology for core processes are facing daunting challenges as they look to the future. FORTRAN, COBOL and green screens are clearly waves of the past, but they still have applications that are relevant today, and the best path forward in terms of cost, risk, and smoothness of transition is not so clear to many public sector IT organizations. Fortunately, technology exists that can both leverage the past and launch the future. This eBook will detail both the challenges public sector agencies face and the solutions state and local governments can implement to meet them.

One of the most significant challenges mainframes pose for state and local governments is the need to provide a better online experience for users. Conditioned by their interactions with major online vendors, residents expect transactions like applying for a permit, looking up crime statistics, or simply reporting a pothole to be simple and straightforward. They also expect to execute those transactions using whatever device suits them, whether it's their computer, their tablet, or their smartphone.

Mainframe technology, which reached maturity before the first cell phone was even manufactured, was never designed to meet mobile requirements. But creating better interfaces and simpler processes to interact with the external world of citizen users is only one of many challenges.



The Workforce Dilemma

For many IT leaders, the most daunting mainframe challenge is an aging workforce. While no precise statistics are available, it is common knowledge that most mainframe experts are in their mid-fifties at the youngest, and many are close to retirement. When they leave an organization, they will take with them an enormous amount of knowledge about the code and the applications that critical government functions rely on daily.

Furthermore, these employees will be very difficult to replace. Whether it's justified or not, mainframe computers are not perceived as "cool" by younger coders. The result is a shrinking talent pool with no upturn in sight. CIOs are faced with a basic question: When these employees retire, who will keep the lights on?

A similar problem exists with the individuals who use the legacy applications built on mainframes to work with the public, with vendors, and with other departments within the government. Inputting data on a series of green screens and knowing which of the 24 PF keys to hit at each point in the process is not at all intuitive. In addition, a number of these applications no longer precisely conform to current workflows, and therefore require workarounds that are known only to the operators. The result is a very steep learning curve for new employees before they become fully productive.

These workforce-related issues are exacerbated by a serious lack of documentation. Inadequate documentation is a common problem throughout the IT industry, but it's particularly serious when mainframes are involved. Today, there are still programmers who are deeply familiar with the languages and common practices in use when legacy code was first written, and therefore less dependent on documentation. Their number, however, is rapidly shrinking, and when they're gone there may be nowhere to turn.

Lack of Integration

From a technical perspective, mainframes are typically isolated from other systems, and the perception—not necessarily accurate—is that they can be difficult to interconnect with these systems. The siloed nature of mainframes can add extra challenges for IT groups that want to design business processes requiring other systems to interact with them. Also, mainframe computers were initially designed to supply data via scheduled reports. In today's world, direct interactions between users and systems in real time are often desired.

Another operational problem is the lack of process visibility. If a process crashes, or fails to function properly, finding the cause can be difficult.

Given these issues, it might appear that eliminating mainframes altogether is a logical plan. This is certainly not the case. Mainframes have many important positive attributes that have significant value to the government organizations they serve. These positives can and should be preserved.

Critical Data and Processes

The mainframes that serve state and local governments contain an enormous amount of critical data. While it may be in formats that are no longer in common use, it's there and it can be trusted.





In many ways, the precisely tailored business logic in mainframes is even more valuable. Often, literally years of work have gone into creating processes and reports that meet the precise needs of the various departments and users. Abandoning the mainframe means losing all of this logic, or, more precisely, attempting to recreate it on another system. This is a task that may or may not be possible and at minimum involves a tremendous amount of work.

Reliability and Security

Another argument in favor of mainframes is their reliability, stability, and availability. Mainframe computers typically run at near 100 percent utilization rates, and they do so on a 24/7 basis without problems – for years on end. In fact, the mean time between failures for mainframes can often be measured in decades. This explains why the largest private sector companies in the world rely on them so heavily, including 71 percent of global Fortune 500 companies, 96 of the world's top 100 banks, 23 of the 25 top US retailers, and 9 out of 10 of the world's largest insurance companies.¹

Security is yet another factor in the mainframe's favor. No other technology even comes close when it comes to protecting sensitive data. According to the Identity Theft Resource Center, there were 1,093 successful hacks involving identity theft in 2016. In 2017 the figure at mid-year was 791.² In contrast, in the 50-year history of mainframe computers, there has been exactly one successful hack (of a Swedish bank in 2015). Mainframes are as close to impenetrable as a system can be.

For the state and local governments that operate them, mainframes are a known quantity. The people who use them and the people who keep them up and running have years of experience. When things go wrong, they know what to do and who to call to solve the problem, and they've proved their reliability time and time again. Abandoning the mainframe means losing all of that institutional memory.

Finally, the cost of the rip-and-replace approach is significant, and usually ends up being far more than the initial estimate. One company saw its costs escalate from the budgeted \$5 million to \$200 million. This is obviously an extreme case, but large cost and time overruns are the rule, not the exception.

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**EXPLORING
ALTERNATIVES TO
THE MAINFRAME
STATUS QUO**



Exploring Alternatives to the Mainframe Status Quo

Public sector IT organizations that are exploring alternatives to mainframe-centered computing solutions often feel that their only option is migration to a distributed architecture, most likely a cloud such as AWS. Unfortunately, this option almost always dictates an all-or-nothing approach because of the complexity of mainframe workloads.

In addition to the application itself, any given workload may include multiple programming languages, tools for workload management, a transaction processing manager, and a database engine. These components interact and have dependencies, some of which may not be fully understood, so the only “safe” approach is to move them all at once – the rip-and-replace approach.

Mainframe to cloud migration has been compared to performing open heart surgery on a marathon runner – during a race. While this is perhaps an extreme characterization, performing a rip-and-replace while keeping a business running is no easy task. In one study that assessed the success rates of more than 400 enterprises with various cloud vendors, the highest success rate was only 67 percent, and the average success rate was 45 percent.³

Beyond the significant risk of failure, there’s another problem. Organizations that choose to replace their mainframe (either with a cloud solution or a distributed, on-premises system) typically choose a commercial off the shelf system (COTS), and these systems are notorious for their lack of flexibility. Departments may actually be forced to accept fewer capabilities than they had before, or make modifications to the COTS that could cause serious headaches with upgrades over time.

Resource Constraints

A third problem with the rip-and-replace approach is the resource demands it creates. Put simply, an agency or department that's replacing a mainframe ends up having to run two systems at once, often for months. Also, there are difficult decisions about which people will be assigned to which tasks. If the old guard mainframe employees stay with the mainframe, they won't be familiar with the new system when it's finally up and running. If they focus on the new system, then replacements have to be found for them to maintain the legacy system, which is not an easy task.

Moving Forward While Reducing Costs Through Integration

A wiser approach to upgrading a mainframe-based infrastructure is to leverage what's there and integrate it with new systems. The two strongest arguments for this approach are lower cost and reduced risk.





Modern, virtualized server farms are becoming more efficient, but a strong case can be made that the cost of mainframe computing is still significantly lower per unit of work per user. One prominent mainframe consulting group, Arcati, claims that distributed solutions are twice as expensive.⁴ A study by Rubin Worldwide indicates organizations that rely more heavily on distributed systems have a total infrastructure cost that's 60 percent higher than those where mainframe computing predominates.⁵

Whether or not these figures hold true for every IT organization, there's no doubt that server farms have many hidden costs. These include:

- **Power.** The cost of powering and cooling servers adds roughly 50 percent to their acquisition costs on an annual basis
- **Administration.** The resources to maintain a server-based infrastructure are significantly greater than those required for a mainframe.
- **Replacement costs.** Servers are typically replaced on a three- or four-year cycle, in contrast to mainframes, which remain in service for decades.

Third-party cloud deployments appear to offer better economics, but these may be somewhat deceptive. For example, it is easy to over-provision within a cloud and end up paying for significant unused capacity.

The far greater concern with cloud deployments is risk. To begin with, there's the 50-50 chance that a cloud migration will fail. Beyond that, cloud providers can't offer the "five nines" reliability (99.999% uptime) of mainframes. Companies that require 24/7 operation and availability for their mission-critical applications simply can't rely on public clouds. Even AWS, the undisputed leader in terms of customers and capacity, recently suffered a five-hour outage due to a single mistyped command.

Fortunately, all these problems can be avoided by moving forward with an integration strategy.



New Dimensions in Data

With Software AG technology, mainframe infrastructures can be leveraged and enhanced to put data in the hands of the user, on any device, in real time, including previously siloed mainframe data that could only be accessed through scheduled reports in rigid, predetermined formats. Furthermore, the Software AG data virtualization technology that accomplishes this leaves mainframe data in the mainframe, untouched and unmodified.

Most government departments depend on the processes, workflows, and business rules already embedded in legacy applications to carry out their mission on a daily basis. Software AG allows these organizations to re-use rather than replace these legacy applications and expose program functionality as Web services.

With Software AG's mainframe integration solution, organizations can:

- Continue to get business value from the processes, workflows, and business rules already embedded in legacy applications
- Modify interfaces quickly, giving a modern look and feel to Natural, COBOL, RPG, or any other 3GL applications
- Integrate core applications with desktop and Web applications
- Integrate green-screen and legacy applications with mobile devices and applications
- Expose program functionality as Web services using SOA enablement tools

In other words, integration provides the best of both worlds: mainframe data, processes, and reliability with up-to-date interactions and interfaces.

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**HOW STATE AND
LOCAL GOVERNMENTS
CAN BENEFIT
FROM MAINFRAME
INTEGRATION**



How State and Local Governments Can Benefit from Mainframe Integration

For state and local governments that want to avoid the cost and risk of a rip-and-replace approach to modernization, Software AG offers a suite of products that leverage existing mainframe solutions to meet the needs of today's users.

Comprehensive Access to Data in Real Time

Software AG CONNX unlocks enterprise data wherever it resides, including legacy mainframe systems. Technically speaking, CONNX uses a single metadata management model that lets applications retrieve and manipulate data from one or more sources – without requiring any technical details about how that data is formatted or where it is physically located. This approach delivers important benefits that enable:

- Access to data, including data residing on mainframes, in real time via a variety of endpoints, including laptops, tablets, and smart phones.
- Federated searches that include multiple databases that would otherwise be incompatible
- Direct download of data into Microsoft® Excel spreadsheet sheets for convenient analysis in a familiar format
- Web-enabled reporting for employees, vendors, and residents

Modernized Interfaces for User-Friendly Transactions

At the session/screen level, Software AG ApplinX offers government IT organizations a non-invasive way to modernize, improve, and simplify the user experience – by leveraging rather than abandoning legacy code. With ApplinX there is no need to modify or even understand that code because it doesn't need to be changed in any way. This means IT organizations can quickly and easily deliver a new and improved experience with applications written in languages such as Natural, RPG, or COBOL.

Specifically, organizations can:

- Quickly convert green screens into modern Web interfaces
- Encapsulate user sessions or screens into ready-touse .NET®, Java® or Web services
- Automate previously manual actions to eliminate redundancies and increase productivity





Integrating Legacy and New Environments

At the business logic/program level, Software AG EntireX helps governments create new processes and services by leveraging the business logic that already exists, significantly extending its value. This can mean integrating mainframe assets into process applications or creating new services for consumption by .NET and Java applications.

With EntireX, IT organizations can:

- Speed the development of new services while lowering development costs
- Trigger events in new systems from established mainframe and LUW environments
- Enable bi-directional communication between previously siloed mainframes and other systems in a multi-platform environment

Like mainframe computers themselves, these Software AG products are all time-tested, and have delivered results in use case after use case on a global basis. Here are a few examples.

California Department of Technology

The California Department of Technology (CDT) provides information technology services to state, county, and local government entities in California, the largest U.S state and the sixth largest economy in the world. The department, which serves 38.8 million residents, relies on the mainframe for bulk processing of census data, industry/consumer statistics, tax collection data, state resource planning data, and billions of transactions.

By replicating data stored in massive mainframe repositories across disparate departments, and integrating bi-directionally with process applications, CDT serves as a trusted, single source of truth. Agencies and citizens can now securely access data from any repository, anytime. Agencies can also collaborate across lines and create high-value services quickly by re-using existing application functions.

Sources

¹ <http://www.share.org/p/bl/et/blogaid=234>

² <http://www.idtheftcenter.org/2016databreaches.html>

³ <https://info.iland.com/ema-survey>

⁴ [http://enterprisesystemsmedia.com/article/top-10-reasons-the-mainframe-is-the-most-cost-efficient-platform-avail#sr=g&m=o&cp=or&ct=-tm&st=\(opu%2qspwjefe\)&ts=1507910978](http://enterprisesystemsmedia.com/article/top-10-reasons-the-mainframe-is-the-most-cost-efficient-platform-avail#sr=g&m=o&cp=or&ct=-tm&st=(opu%2qspwjefe)&ts=1507910978)

⁵ <http://www.weblearn.hs-bremen.de/risse/RST/docs/IBM/ZSL03135USEN.pdf>

Ducks Unlimited Canada

With more than 100,000 grassroots supporters and more than 5,000 volunteers, Ducks Unlimited Canada (DUC) secures and enhances over 3.5 acres of waterfowl breeding habitats in Canada, and protects an additional 14.9 million acres through agreements with provincial and territorial governments.

To improve operations in areas such as finance, HR, fundraising, and others, the organization moved its applications to the Web. An impressive 85 percent of the HTML code needed was auto-generated with models.

Moving forward, wire framing is used for prototyping new features. Software AG plug-ins greatly simplify integration with Google Maps™ mapping service, the Esri® Geographic Information System, content management systems, and other third-party tools, enabling core applications to do more. For example, by integrating one of its applications with a mailing system used for fundraising, DUC reduced direct mail bouncebacks by 55 percent.

Virginia Department of Motor Vehicles

Virginia's Department of Motor Vehicles (DMV) provides online transactions and citizen services to more than 6.2 million licensed users via what is considered one of the most progressive websites of any DMV in the country. Virginia DMV collects \$2 .2 million in revenue using its core system to provide licensing, registration, and titling for all drivers and vehicles in the state. To process compliance issues related to court orders, insurance monitoring, and driver safety, Virginia DMV re-uses services to integrate more than 75 applications from across the state and federal government.

These are only three examples among dozens that could be cited to demonstrate the proven viability and value of mainframe integration as the solution of choice for modernizing mainframe environments in state and local governments.

For more information on Software AG's Government Integration Hub, visit: www.softwareaggov.com or email us at info@softwareaggov.com