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Mainframe modernization hits its stride

It is not an exaggeration to say that our world runs on mainframe technology.

Almost every transaction that powers our world, from real-time computation of stock prices to the trusted allocation of social security checks, from assembling motor vehicles to tracking every object in space, rely on stalwart, yet aging, mainframe technology. This robust world, a testament to the past's innovations, has tirelessly upheld high-volume transactions with rock solid reliability for decades.

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However, the era of “green screens” and specialized operators is fading into the annals of history. The ubiquity of desktop and mobile computing has put technology into every hand, igniting a sweeping transition that ushered in a swath of software engineering advancements. The rise of sophisticated programming languages; vast, scalable databases; and the seemingly endless capabilities that exist in cloud computing have all contributed to this digital renaissance. User-centric design has emerged as a groundbreaking area, driving a paradigm shift in our interaction with technology.

The old-guard technology models, clinging to proven but antiquated practices, can no longer withstand the relentless tide of progress. The days of filling paper forms or dispatching faxes are receding rapidly into the past. Today, individuals demand the convenience of mobile apps and reactive web pages to interact with businesses. They must adapt, delivering enhancements quicker without disrupting operations. On the backend, they must make quick, yet informed, decisions based on live data, delivered by the arsenal of modern data analytics. Fresh talent pools emerging from universities are fluent in contemporary programming languages, and employees envision a career that enable continuously learning and being exposed to the latest tools and technologies. Mainframes, once on the cutting edge, is no longer the center of development. Yet custom enterprise applications that represent businesses’ competitive advantage and critical agency mission processes that keep our government moving still live on these machines. The challenge in moving these systems into the modern area is that the size, complexity, and criticality often overwhelm those who attempt to rebuild or replace them. As a result, businesses and government organizations are now introducing smaller, incremental improvements using modern technologies to lower risk and improve the success rate of modernizing their legacy systems while ensuring business continuity.

Three major trends that can be combined for each individual situation, depending on the unique challenges of the organization: risk sensitivity, ability to shoulder a transition, and desired timeline. First, automated programming language conversion and data migration tools help solve the “technical” challenges by rapidly moving business logic into modern technology, simplifying the testing process by recording data scenarios, and limiting change on end users. This sets the stage for targeted improvements based on specific pain points associated with areas such as user experience, business agility, and data accessibility. It also helps alleviate data gravity, when large parts of an organization are ready to move applications to the cloud and there is little desire to build costly bridges back to data on the mainframe.

Second, mining (or deep analysis of) mainframe applications has become indispensable for areas where the source code itself is the last and only

guaranteed correct documentation of what a system is doing (aka the requirements). In these cases, the systems carry large burdens of technical debt

stemming from outdated technical requirements: limited storage space, old transaction monitors, or a lack of software engineering discipline. In the past, mining for business rules required experienced programmers to read the code, interpret it, and document its behavior … a laborious, slow and time-consuming process. New tools offer semi-automated acceleration by giving users a graphical interface to read code and quickly browse between dependencies, variable use, or programs referred to elsewhere. Tools scan for candidate business rules for developers to review – reducing the effort considerably. In the not-too-distant future, we expect these tools to evolve and learn from manual mining, understand code better, and use advanced technology to help support code understanding, which brings us to the next trend…

Third, Generative Artificial Intelligence (Gen AI) tools are assisting with analysis and recommendations that were once performed manually by analysts, developers, and architects. Large swaths of code rewriting can be simplified and accelerated by using these tools to detect recurring coding patterns and offer automated implementation of improved code based on modern technology and understanding. In addition, techniques are becoming available to find duplicated code and technical debt, even if many iterations of change have been made, similar code runs in different contexts, or different kinds of changes have been done over the years.

The best solution providers combine system integrator experience delivering similar implementations with product suites that improve with each client that goes through a transformation. Innovation can allow leap frogging development using the capabilities of Gen AI Large Language Models (LLMs) combined with code parsing, data understanding, and code dependencies to form an understanding of the legacy system that can be queried and manipulated with not only expert tools but also human language.

Mainframe modernization will require all three trends to be taken together in large systems, where each application or business area can use the one best suited for their needs – whether that is a quick stop gap measure or a full-blown [i]rewrite or transition to software as a service. And the tools used in the process need to grow to support each individual challenge with automation and innovation.

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