NEXT-GENERATION MAINFRAME COMPUTING

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SUMMARY

Mainframe computing requires a “re-envisioning” in order to meet better the challenges posed by changing workloads, staff responsibilities, and workforce capabilities. This paper explores some of the most pressing issues confronting mainframe computing today and outlines the basic requirements that must be met to keep the mainframe relevant in the New Millennium.

INTRODUCTION

The mainframe persists as a highly capable platform for corporate computing. Its performance characteristics and cost-of-ownership advantages over alternative computing platforms are increasingly understood and appreciated. From the standpoint of cost, compliance, continuity and carbon footprint (utility power consumption), the value case for the mainframe has reclaimed its former mindshare, especially in light of current economic realities and the prevailing regulatory climate.

Yet, in many companies, plans to leverage this technology over the longer term are challenged by three trends:

1. New workloads are being added to the traditional mainframe platform, requiring changes to the underlying technology itself. This has led to the proliferation of product- or component-specific software tools for managing new hardware and software elements. The requirement to master multiple management tools is consuming an inordinate amount of the daily work schedules of seasoned mainframers and reducing the time they have available for strategic work.

2. Due to retirements and downsizing, core mainframe staffers are required to shoulder responsibilities individually that were once spread over several domain experts. In the process, traditional job descriptions have blurred, leading to the potential erosion of operational efficiency and managerial discipline that have been the hallmark of mainframe computing.

3. The average age of a mainframer is 53 years. This fact, combined with low enrollments in technology-oriented college degree programs generally, portends a shortage in qualified staff to replace retiring IT practitioners over the next decade – including mainframe staff. Addressing this skills shortage will require increased attention to on-the-job training and mentoring. Mainframers report that they do not have the time available to properly train and mentor next-generation mainframe managers.

To cope with these trends effectively will require nothing less than a re-envisioning of the traditional mainframe experience. Better integration is required to corral myriad software tools into a coherent, useful and time-effective set of services. Workflow capture and automation is needed to maintain the productivity and discipline of mainframe management in the face of changing roles and to facilitate both the capture of operational knowledge and its transferability to new staff. And simplification of the mainframe interaction model, capitalizing on popular memes for application development in the Internet Age, is required to reduce the

perception of complexity that prevents tech-savvy workers from pursuing mainframe skill specializations and careers.

Just as classical music has been sustained over centuries through the periodic re-interpretation of musical form and expression, mainframe technology must also be re-interpreted to address the changing requirements of the business, the skilled worker, the workload, and the technology platform itself. This paper outlines the challenge we confront and the ingredients of a sustainable strategy for keeping the mainframe relevant in the New Millennium.

OUTLINES OF A SOLUTION

The mainframe computing conundrum manifests itself in both short-term (operational) and longer term (knowledge transfer) ways. From an operational standpoint,

- Current mainframers are tasked with cross-domain work responsibilities, including the allocation, configuration and maintenance/troubleshooting of machine resources to support their primary application charges
- Performing cross-domain work requires the use of myriad software tools whose outputs must be appreciated, understood and correlated by the mainframer – typically using a spreadsheet or manual notes
- Keeping up with and mastering new software tools presents significant demands on work time
- Even with value-add software tools, and in part because there are so many of them, workflows are complicated, often undocumented, and are difficult to replicate even for repetitive tasks
- Knowledge is rarely captured from workflows in a uniform or transferable way
- Responsibilities for routine tasks and break/fix work cannot be assigned readily to novice trainees, preventing the optimization of skilled worker time and effort or the cultivation of next-generation managers

In summary, inefficiencies are creeping into day-to-day mainframe operations as a consequence of the consolidation of workload onto fewer personnel and the blurring of traditional job roles, and also as a by-product of the proliferation of task-centric software tools intended to help workers do more with less, but that lack any sort of unifying workflow methodology.

This situation is making current mainframers less efficient than they were in the past. The complexity of workflows and their lack of transferability prevents the re-assignment of lower level work to trainees and forces seasoned mainframers to spend much of their time learning task-centric software tools and attending to routine or break/fix work rather than improving application performance, planning for future growth, or mentoring next generation mainframe workforce.

The last point is of tremendous importance longer term. Over time,

- Absent a convenient workflow-based knowledge capture method, mainframe operations become embued with an increasingly “seat-of-the-pants” operational model – a significant departure from the disciplined and well-documented model of the past

and a source of much of the cost-efficiency and performance-efficiency benefit that has characterized mainframe computing up to now

- Lack of a disciplined operational model and an organized, workflow-centric knowledge base will inevitably impair planning and innovation in the mainframe environment – and, at a time when many companies are shifting distributed computing workload to the mainframe to capitalize on the touted efficiencies of that platform, thereby creating new challenges
- Without an organized, workflow-based and role-centric knowledge base, skills development in next generation mainframers will be significantly impacted. Not only are role-related skills and knowledge more difficult to transfer in an intelligible manner, mentoring activity is impaired as experienced workers are increasingly tasked with low-level break/fix work and are too busy to train the novices

From these points, it is clear that the current state of mainframe computing poses significant long-term risks for business IT planners who are seeking to map out strategies for leveraging the platform to support mission critical work for their organizations going forward. The options for reducing risk are clear: either abandon the platform and seek alternative ways to host applications that produce predictable outcomes, or change the current mainframe work experience.

Any reasonable discussion of future strategy cannot justify the migration of applications off of the mainframe and on to alternative distributed systems solutions. Truth be told, workload migration appears to be moving in the opposite direction due to the generally recognized failure of distributed computing to deliver investment efficiencies comparable to those in mainframe computing.

Systems level resource management and de facto standards for hardware interoperability have driven mainframe resource allocation and utilization efficiencies to within 80 percent of optimal in many shops. By contrast, even with hypervisor technologies and consolidation, distributed computing delivers poor resource allocation and utilization efficiencies -- between 18 to 20 percent of optimal.

Moreover, the labor resources required to support distributed computing on the enterprise level are 10x greater than labor resource requirements to support comparable workload in mainframe shops. The coming skills shortage anticipated to impact IT generally over the next decade may be felt first in mainframe data centers, but it is likely to hit distributed computing in a much more pervasive way.

Finally, mainframe resiliency and uptime tends to be far greater than what is found in most distributed computing environments. From a multi-tenancy perspective, applications running

as guests in mainframe logical partitions are more insulated from each other than are applications operating as guests in x86 hypervisor-based virtual servers: the failure of one guest in a mainframe LPAR does not cause the collapse of other guest applications as is the case in the virtual server world.

While this comparison simplifies the differences to some degree, it drives home the idea that mainframe computing remains a solid fixture in many IT strategies for which planners are hard-pressed to find adequate substitutes. That leaves the alternative: change the mainframe experience. The outlines of meaningful change may be derived from the situation described above.

1. Improve the efficiency of user interaction with the mainframe platform

Clearly, it is not possible to reverse the trends that have begun to compromise the traditional organizational model of mainframe shops. Both economic pressures and staffing shortages have led to the current "lean" staffing model observed in most shops today. Correcting this problem would require (1) significant increases in staff sizes to return to a rigidly-defined hierarchy of domain experts – an investment most companies cannot afford to make in the near-term economic climate – and (2) a significant uptick in the numbers of students enrolling in degree programs centered on information technology to provide workers with needed skills to replace the aging mainframe workforce – something beyond the control of business in any case.

Bottom line: we cannot return to the past to address the current challenge. Instead, the mainframe experience must adapt to reflect new realities. At the core, we need a flexible workflow-driven methodology that can capture the tasks and activities that are assigned to and undertaken by technicians working in the mainframe shop as it exists today.

This means, first and foremost, establishing a mechanism to integrate myriad task-oriented software tools used by technologists to perform routine tasks. We need a way to capture the procedures that are being performed, the software tools that are being used, and the inputs that the tools provide into a more automated workflow-oriented format. That way, routine workflows can be repeated more efficiently, or handed off to novices to perform, thereby optimizing the knowledge and skills of more seasoned technicians.

2. Create a coherent and manageable knowledgebase

The traditional roles and job descriptions of mainframe workers have begun to blur and "hybrid" roles are emerging. There is no way to reverse this trend. To prevent change from becoming outright Balkanization, however, it needs to be managed.

We have witnessed the proliferation of software tools and utilities that are intended by their vendors to simplify the work of mainframers who confront hybrid responsibilities. Too often, these tools have instead introduced new levels of complexity and challenge.

Tools do not work together efficiently, whether obtained from several vendor/developers or just from one. For tools to deliver any value at all, the mainframer must (1) know which tools to apply to a given task, (2) master their proper use, then (3) operate each tool independently of the others to collect data, which are then combined via homemade spreadsheets (or by other manual means) to support decisions and actions. This *modus operandi* is not only clumsy and prone to error, it also prevents task-related knowledge – both the knowledge extracted from the workflow and knowledge about the efficacy of different work approaches or different tools – from ever being collected in a uniform repository that avails itself of review, consultation or knowledge transfer.

In other words, we aren't capturing information about the processes and procedures that mainframers are using to perform useful work. We can't repeat procedures readily, but must instead "reinvent" them – even for the most routine tasks. We can't begin to align activities with new "hybridized" job roles to better understand what hybrid mainframers do for a living. We can't evaluate critically the differences between different approaches or their outcomes. We can't automate workflows with sufficient confidence to assign them to trainee mainframers.

Clearly, we need a new method of interacting with point software that will capture work activity into meaningful and repeatable workflows. Of course, just amassing this workflow information is not sufficient to build a useful or efficient knowledge base. Organizing workflows both by task and by the role of the user who performs them will facilitate the definition of a 21st Century mainframe staffing model, customized to the needs of a company, and will help delineate the knowledge and skills requirements sought from those who staff positions today and tomorrow.

From a training standpoint, such a workflow knowledge base could well become a mentoring machine. Many organizations, by virtue of an aging mainframe workplace, have less than the ten years required to "grow" a competent mainframe staff to serve their ongoing business needs. A workflow-centric knowledge base could serve as an effective adjunct to other training

programs, as a training accelerator, and as the means to enable low-level work to be reassigned from mainframe maestros-in-training.

3. Make the mainframe experience more accessible

While a workflow-centric re-envisioning of the mainframe experience could pay dividends in terms of greater staff efficiency and long term knowledge capture and transfer, efforts should also be made to improve the accessibility of mainframe technology to those who have acquired IT skills and knowledge – but not necessarily in mainframe-specific technologies.

Studies show that enrollments in university level IT education programs are well off their highs from the late 1980s. Of those seeking technical degrees or trade school education in IT, only a small percentage of candidates are focused on developing mainframe technology skills expertise. It can be safely assumed, therefore, that the pool of candidates for mainframe staff positions in the future will probably not manifest significant mainframe skills and knowledge, underscoring the need for mentoring and on-the-job training.

In addition to making mainframe skills more transferable, the workflow-centric mainframe experience should also make human interaction with the mainframe easier. At its simplest level, this may translate into making greater use of a mouse click-driven graphical user interface to interact with mainframe software processes. Contemporary computer users have been introduced to computing via web browsers and feature-rich cellular telephones. To the extent that these basic computing methods can be harnessed to simplify how users interact with mainframe technology, several key benefits may be realized – ranging from lessening the anxiety manifested by many novice managers when confronted by the mainframe's cryptic, text command driven model to increasing the appeal of mainframe work generally by increasing its "cool factor."

Improvements in the interface aside, the simplification of complex work processes into "micro-applications" triggered by a simple icon selection can be a tremendous timesaver. While such interface engineering does not mitigate the need for a clear understanding of the sysplex environment, it provides accessibility that can be leveraged by novices as they become more familiar with underlying hardware and software complexities.

To some, the idea of making the mainframe experience more accessible to non-mainframers may sound heretical. However, it should be kept in mind that the mainframe itself is changing. There are now mainframe operating systems designed to enable the consolidation of distributed computing applications and data into mainframe LPARs and Linux for z is making major inroads in companies with no mainframe experience whatsoever. We might just need

the skills that contemporary computer mavens are cultivating in x86 computing environments to support the increasingly diverse workload of the 21st Century mainframe.

GOING FORWARD

Changing the mainframe experience by incorporating ideas such workflow-centric computing, knowledge base work capture, and mouse click interfaces is key to the perpetuation of mainframe computing in the New Millennium. CA is the clear thought leader in this effort, having dedicated the last two years to conducting an exhaustive analysis of requirements as part of its Mainframe 2.0 initiative.

The company will shortly be unveiling a set of technologies that advance the three goals outlined in this paper, technologies that will doubtless be refined and expanded over time to meet the needs of CA customers and to encourage the participation of third party developers in a coherent mainframe experience model. The timing of this effort could not be better given changes in the mainframe platform and the expanding workload it supports, the aging mainframe workforce, and the IT skills gap that all business IT planners are beginning to wrestle with today.

The challenges are well understood. Solution-building is well under way. The mainframe is here to stay.