WHITEPAPER

MODERNIZATION SECRETS OF THE FORTUNE 1000: MAINFRAME MIPS REDUCTION
INSIDE THE OPTIONS AND OPTIMAL SOLUTIONS FOR REDUCING MIPS
Introduction

Mainframes have proven to be secure, fast, and reliable processing platforms. They also tend to be complex, at least partially homegrown, business-critical systems. New use cases are driving MIPS and costs upwards, presenting challenges for CFOs. However, the perceived risk of updating these systems is often higher than the perceived risk of doing nothing, so despite their cost and complexity, many companies are still married to the mainframe. But a storm is brewing. A very costly storm that will present problems and risk that doing nothing will make a lot worse.

Who Should Read This:
Relevance by Organizational Role

This content specifically helps:

- **CIOs** looking to streamline systems and add efficiencies
- **CFOs** looking to dramatically reduce Mainframe usage spend
- **Business Analysts** seeking to leverage data analytics and/or business intelligence to gain competitive advantage
- **Enterprise Architects** seeking to ensure future needs of the organization will be met in an efficient, sustainable, agile, and adaptable manner
- **Technical Managers** seeking to end dependency on a legacy technology

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About Modern Systems

A global leader in modernization since 1983, we have:

- Been trusted by Walmart to modernize the world’s biggest order processing system
- Completed many large scale, successful batch offloading projects worldwide
- Developed a solution set that offers the most choice and least risk for modernizing legacy applications and databases
- Become one of the largest modernization firms in the world
Building the Business Case: Why Focus on MIPS?

Businesses have taken a strong stance on operational cost reduction and have focused much of their time and effort on IT departments.

Organizations have tried a number of approaches to cut these costs, including staff reduction, outsourcing, consolidating data centers, or replacing old software and hardware with newer counterparts. All of these approaches carry an element of risk and could actually result in increased costs, especially when complex software environments are involved. However, an approach which enables IT cost reduction at low-risk for both business and IT is quickly catching on- the management of CPU resource consumption (a.k.a. MIPS) on the mainframe through Portfolio Optimization.

What Are MIPS? Why Do They Matter?

MIPS is an acronym for Millions of Instructions per Second, a measurement of processing power and CPU consumption typically associated with running applications on the mainframe. Most utilities and applications in the mainframe world are licensed based on the size of the machine or the number of MIPS. In other words, MIPS is the primary driver of mainframe cost. With the mainframe commanding roughly 40% of IT budgets it operates in, CIOs have huge incentives to reign-in MIPS.

MIPS optimization has assumed significance not only due to tight economic conditions, but also due to the proliferation of mobile technology, the growth of distributed systems, and the burden that new integrated applications place on mainframe CPUs. This growth is driving average annual mainframe cost increases in the neighborhood of 10% with no sign of letting up.

The challenges surrounding the new era of explosive MIPS growth were highlighted in a recent Compuware-commissioned study of 350 CIOs from enterprise organizations. The study examined the impact of new technologies and trends on the mainframe application environment.

Key Findings

- **55%** More than half of enterprise applications call upon the mainframe to complete transactions.
- **89%** Of CIOs stated mainframe workloads are increasing and getting more varied.
- **91%** Of CIOs say high customer expectations are increasing the pressure on the mainframe to perform.
- **87%** Of CIOs believe complexity is creating new risks in relation to application performance.
- **70%** Of CIOs say mobility has increased MIPS consumption by over a quarter since their mainframes integrated with mobile applications.
- **63%** Of companies are unaware of application problems until calls start coming into the help desk.
- **80%** Of IT departments are fire-fighting performance problems in war-room scenarios on a monthly basis.
Building The Business Case: Common Cost Growth Factors

Despite folklore touting a decline in mainframe use, the reality is that mainframe usage is greater today than ever before. Three key factors are driving firms to move workloads off of the mainframe to save coin.

A Dynamic Technical Landscape Can Cripple Performance

The smartphone generation of consumers expect services to launch in seconds; if they don’t, dissatisfaction is often expressed very swiftly, scathingly, and publicly. As a result, CIOs are feeling the pressure: In the aforementioned Compuware-commissioned study, 91% of those surveyed said performance expectations of the mainframe have increased now that customer-facing applications are using it.

Meeting the performance demands of the online universe has proven to be a challenge in mainframe environments. Integrating new applications with older mainframe technology adds a great deal of complexity to the application delivery chain. This added complexity is also increasing costs. For example, the launch of insurance quote aggregators has required insurers to increase mainframe capacity by orders of magnitude to meet demand. Because of this cost, many insurers don’t participate in the aggregator’s marketplace. Further, research shows that mobile is also driving a significant rise in consumption, having increased MIPS usage by an average of 41%; with a small, yet significant, 2% saying consumption had more than doubled as a result of the introduction of mobile.

Inefficient Code & Lack of Mainframe Skills

An increase in usage is not the only factor driving MIPS consumption, inefficiencies are also making the mainframe work harder than it needs to. Enterprise Systems Media’s research shows that a staggering 68% of developers creating new distributed applications have very limited understanding of the mainframe. Most CIOs (70%) are concerned that this lack of skills and understanding of the mainframe application environment is leading to inefficient coding, resulting in increased MIPS consumption and impacted performance. For example, changes in use and lack of understanding can lead to structures that can become degraded, even though they started out being very efficient, due to changes in the application logic or to the data without holistic understanding.

Lower Cost Alternatives

Mainframe usage fees make up a significant component in the overall cost of ownership, nearly 10% to 40% of an organization’s IT budget depending on the size of the mainframe footprint according to a study commissioned by Infosys. Of course, running computer software costs money on every computing platform, but for mainframe users the incurred costs are especially high. According to the US Department of Defense, average mainframe per hour spend in 2014 sits at a staggering $499.98, sixteen times the cost of running an equivalent computing environment on a Linux platform with similar performance characteristics. Even worse, that per-hour average is rising year-over-year due in part to the fact that MIPS consumption is steadily on the rise. IT industry analysts estimate that most large organizations utilizing mainframes should expect their systems’ CPU resource consumption to increase by 15–20% annually.
Portfolio Optimization: What Are Your Options?

Batch Tuning

Batch tuning as a subset of application tuning primarily focuses on batch throughput and resource consumption while improving the batch window to reduce costs. Consider leveraging the existing CPU consumption reports to perform a cumulative trend analysis for all batch loads, and investigate the peaks and the applications contributing to those peaks. There could be a few jobs that top this chart due to intensive processing. In such cases an analyst can look to see if the job can be split into smaller jobs or re-written to optimize CPU utilization.

When tuning a batch run, there are three basic areas to investigate:

- Reliability
- Parallelism
- Performance

When viewed from the Storage angle, most work is concentrated in the performance area, but a lot of simple improvements can be made in reliability and parallelism. The main problem with batch tuning is that fixing these jobs requires programming resources that are at least somewhat familiar with the legacy code and environment. These resources are extremely scarce and often overloaded with other maintenance tasks.

Batch Scheduling

Efficient management of batch windows is as much an art as it is a science. This is especially true when the legacy systems being scrutinized have been running mainframe batch jobs for decades. The management of a batch window will have a direct impact on the processing delay and on larger batch windows. Though batch scheduling is typically done using scheduling tools, a few of the following best practices should be considered in scheduling job streams for efficient batch window management.

Batch Scheduling Best Practices

- Draw and analyze internal and external dependency charts before taking action
- Identify the critical path for a particular sequence of job flow and try to avoid redundant dependencies
- Create a logical group of jobs in one stream based on application or business needs
- Explore parallel runs

Batch Offloading

Organizations can significantly reduce MIPS consumption by identifying high consumption workloads within the existing environment and offloading these workloads onto less costly systems. Companies need to move from a reactive to a proactive approach, identifying and rectifying problems before they occur. Plus, directly offloading workloads like reporting using conversion software enables companies to take advantage of off-mainframe processing without interrupting or impacting operation processes or end users. This exercise also presents the opportunity for the firm to explore the possibility of utilizing the cloud to reduce infrastructure costs and increase flexibility. Offloading and re-platforming these high MIPS consuming workloads is a relatively low-cost option and it reuses the original business logic and other assets from the old mainframe system producing a functionally equivalent operating environment, decreasing total cost of ownership, introducing flexibility in infrastructure and underlying software, and as a bonus, inching the old big iron a little bit closer to the fully modernized ideal world that every IT manager dreams of.
The Modern Systems Solution: Portfolio Optimization

Portfolio Optimization service leverages off-mainframe processing power to reduce MIPS and overall cost-of-ownership. This service allows customers to move batch processing away from the mainframe gradually with no risk to on-going production operations.

Cut Costs & Mitigate Risk

Offloading workloads to reduce MIPS is relatively easy and transparent to the user experience when planned and executed properly with adequate computing resources. In addition to MIPS reduction, moving batch jobs out of the mainframe environment is a key component in a phased approach toward overall system modernization. As a result, it significantly reduces mainframe costs and is less time-consuming than re-engineering or total conversion efforts.

Plan to Work, Work to Plan

Modern Systems recognizes that the most impactful batch offloads are only achieved through careful planning and overarching visibility. As such, our experts wield a proven strategy for identifying impactful, suitable workloads for transition off the mainframe with more than 25 years of modernization experience.

The following are standard aspects of a Portfolio Optimization project:

- Application Index
- Target Environment Setup
- Architectural Transformation
- Solution Testing and Validation
- Change Control
- On-going Support

Application Index

The indexing phase is designed to provide a clear picture of the application and to identify batch work suitable for transitioning off-mainframe. Modern Systems will determine and document the application state and any important dependencies or conditions (e.g., external interfaces, batch dependencies, etc.) and collaborate with customer resources to map out impactful, low-risk candidates for transition.

Target Environment Setup

Modern Systems will assess, set up, and deploy the target environment in accordance with application and customer requirements. While target environments may vary, we ensure the functionality by making all relevant data accessible to the off-mainframe batch environment. This in turn provides a mechanism to allow the mainframe to kick-off a job or series of jobs in the new environment, providing a means of monitoring job execution and progress, and tools to manage batch job output.

Since suitable workloads are converted to Java or C#, the available infrastructure for hosting the batch environment is nearly infinite. Modern Systems has seen a steady trend of cloud adoption for batch execution due to the inherently simple and inexpensive scalability of cloud architecture.
The Modern Systems Solution: Portfolio Optimization

Refactoring
To run off of the mainframe, application code is refactored to a suitable language for the target environment selected in the previous phase. For all environments, this process includes conversion of code to Java or C#, and JCL being converted to a suitable language for the target operating system. Portfolio Optimization allows for gradual transition, therefore the refactoring process may be repeated multiple times on different work packets depending upon the transition approach.

Solution Testing & Validation
Once the application code is converted, testing is required to ensure functionality. Modern Systems will unit test each batch job for error free execution.

After unit testing, converted jobs are ready to be run. The jobs are run as equivalents to the jobs on the mainframe for as long as required to ensure:

- Functionality matches exactly
- Performance of the off-mainframe jobs is sufficient
- The off-mainframe jobs can be managed and controlled effectively

Once testing and validation is satisfactorily completed, the output from the off-mainframe jobs can be used instead of the output from the mainframe equivalents. At that stage, the mainframe job can be disabled, leaving only the off-mainframe version executing.

Change Management
The application can be changed, updated, and redeployed to the off-mainframe environment at any point in time. The impact and effort behind Change Control always depends on the frequency and volume of required changes. Changes can be applied in several ways:

- As documented, required changes - Modern Systems can make changes and unit test in the off-mainframe environment before deployment
- As changes in the refactored code – In this scenario, the customer will update the program and pass it to Modern Systems to implement in the off-mainframe environment
- As changes in the original code – The customer will update the program and pass it to Modern Systems for re-transformation and implementation in the off-mainframe environment

On-Going Support
Modern Systems provides various levels of on-going support for the Transaction Engine and the off-mainframe batch environment to ensure like-for-like functionality and continuity.
Batch Offloading: Metropolitan Transportation Authority

Phased Modernization effort starts with batch process applications, cost reduction

Background

The MTA is a New York public authority and public benefit corporation that provides transportation services in the NY Metropolitan region through its operating agencies, namely:

- New York City Transit (subways)
- Long Island Railroad
- Metro-North Railroad
- Bridges and Tunnels
- Staten Island Railway
- Capital Construction Company
- MTA Bus Company

The MTA is running an IBM mainframe. Part of their overall IT strategy for reducing cost and risk includes moving critical applications off of the legacy mainframe environment to newer, more flexible and cost-effective platforms. The first selected for modernization is called IMPACT (Integrated Management of Payment Accounting and Capital Tracking), a batch process application. IMPACT is built in COBOL, leveraging VSAM as the data tier.

Solution

MTA considered the option to re-host the IMPACT application in a COBOL container on a newer platform, but preferred the alternative of converting the IMPACT application from COBOL to Java for improved future maintainability, flexibility, cost-effectiveness and support. The converted environment will enhance MTA's position to provide improved, cost-effective services to its customers. The data tier will be converted from VSAM to Oracle Database.

Going from COBOL to Java isn’t a trivial undertaking. Understanding all levels of functionality and relationships is essential for success. Modern Systems will start by leveraging our Portfolio Analysis technology to assess the application’s technical inventory and risk factors. Then, we’ll work with MTA to finalize test strategies and critical factors to validate equivalent functionality between the source and target systems.

Since our solution is 100% automated, any errors found during testing will most likely be common to similar code in other parts of the application. This leads to a testing approach which tests all major items at a high level and then some specific items at a much lower level. Making sure the test scripts that are used cover the right scenarios is a vital part of the project’s success and problem-free migrated applications.

In the end, MTA’s mainframe application portfolio will run the same as it always has without any visible or impactful change for users. However, by moving batch processes off the mainframe, MTA will achieve its cost-savings goals and begin to validate their organizational approach for modernization.