IBM CICS tools: Customer ROI from Discovery, Optimization, and Enablement Outcomes

August 2014

Branham
B R A N H A M   G R O U P   I N C.

Executive Summary

For 50 years now, the mainframe or IBM System z platform has continued to play a vital role within organizations across North America and abroad. Organizations continue to add new and varied workloads to the mainframe, which continually adapts to trends and evolves with the changes in IT. As customers continue to plan ahead for the next generation of systems and resources, each must take every opportunity to evaluate new options in cutting unnecessary costs, and in further reducing their processing requirements, including the tuning of existing applications. Optimization in this regard is crucial and can help postpone processor upgrades and with it, the expense of additional software licensing costs.

Of the same vein, the continued increase in new workloads and mobile applications puts tremendous demand and strain on existing system and application programmer staff. Supporting development and operations teams with the right tools can help by allowing them to complete their tasks more quickly and efficiently, ultimately decreasing the need for additional, increasingly expensive and difficult to find resources.

The continued challenges expressed by organizations experiencing these growing pains have prompted Branham to reinvestigate and see if the way organizations are addressing these challenges has changed over the last few years. In this update Branham looked at the most ubiquitous application for System z, the IBM CICS Transaction Server, being deployed in almost every mainframe environment. This ubiquity allowed Branham to focus on the solutions that would provide the widest possible value for System z customers.

With the ability to provide hardware, software, and services through a single vendor solution, Branham once again took a look at the latest CICS Tools that are available from IBM, expanding to include IBM's Problem Determination Tools, Rational Tools and more. In co-operation with IBM, Branham was able to interview several existing (new and old) IBM CICS Tools customers that had evaluated or are current customers of such offerings as IBM CICS Interdependency Analyzer, CICS Performance Analyzer, CICS Configuration Manager, the newer CICS Deployment Assistant as well as those using the CICS Explorer graphical interface.

Further, with the increasing adoption of mobile as the primary general-purpose computing platform, and the increasing movement towards the optimization of communication and collaboration between development and operation teams, more commonly referred to as DevOps, Branham also investigated how IBM CICS customers are addressing these evolving areas.

Of the customers that were interviewed, it was clear that IT environments and overall customer experiences continued to be largely unique. However, there continue to be several common value propositions for System z customers that were well evident. Overall, the most significant value continues to be cost cutting measures such as the conversion to threadsafe applications. The following provides a view into some of the savings that these customers realized through the use of the latest CICS tools:

- » A reduction from weeks to hours for the discovery and documentation of existing CICS topologies.
- » 75% time savings for the identification, coding, and testing of CPSM rules, in some cases equating to the recovery of a whole month in time savings for a major affinity.
- » Upwards of 90% time savings to identify and validate typical performance issue related changes.
- » An average of 66% less time to administer CICS Service Definition changes, which happen on a daily basis.
- » From 10% to 25% CPU savings for applications that were converted to threadsafe.
- » A 75% reduction in time to recover from a major issue related outage.
- » Upwards of 80% time savings to identify, code, and test applications when converting to threadsafe.
- » A 50% reduction in the time it takes to identify application code and files (and DB2 Table-Views) that are no longer used and can be decommissioned.

Whether replacing existing vendor tools or homegrown solutions, these customers continue to find additional value and savings that "alone justify the cost of the IBM CICS tools." This report includes a summary of some of the potential cost savings based on real world experiences, and can assist in providing some added insight to those that are tasked with improving development and operational efficiencies in their CICS environment for the next generation.

Introduction

The mainframe, or IBM System z platform, has been an integral part of the business fabric for over 50 years and continues to prove its worth for cost control and reliability, amongst many other factors. Continued interest in the platform is in stark contrast to the practice of migrating to distributed systems for a "perceived" cost delta. In recent years, as distributed systems have grown in size and complexity, users have started to see an escalation in personnel hours, maintenance requirements, and environmental costs. With the introduction of new workloads, this has only compounded the issue, where the mainframe has helped organizations to significantly reduce some of the associated expenditures. While not void of maintenance related costs, studies continue to show that the number of personnel hours is often significantly less in a mainframe environment.

As association with mainframe implementations, many large organizations have been using the IBM Customer Information Control System (CICS) since the early 1970s. In fact, CICS has a dominant presence, being installed at almost every System z site. Used for developing, running and managing transaction applications on the mainframe, these systems have grown and evolved with the business over time. For example, System z plays an important role in today's mobile world, extending existing enterprise data and transactions to mobile users.

IBM continues to reinvent the mainframe keeping it attuned to the evolving ICT industry and relevant to organizations by addressing new advances such as cloud computing, Big Data and analytics, social, and mobile. IBM strategies have also helped organizations reduce mainframe related costs through increased standards support and new capabilities to reduce resource consumption of existing applications, and the introduction of new pricing models to help reduce costs associate with new workloads being introduced on the mainframe.

Overall however, today's IT organizations are home to a myriad of platforms, tools and technologies that need to work in an integrated manner. System of engagement application delivery based on "lean" and "agile" principles continue to put pressure on systems of record to update rapidly. The continued adoption of these modern tools not only helps improve development effectiveness but also in modernizing the development environment for z/OS developers. Modernizing the development environment is key to z/OS and CICS being seen as a modern development platform.

The purpose of this report is to provide customers with insight into some of the intricacies of the mainframe, while helping identify areas where applications can be tuned and productivity benefits realized. This discussion will focus on the CICS platform in particular, looking at the various tools used in CICS application development such as CICS Tools, Problem Determination Tools, and Rational Development Tools. These tools not only help organizations with cost savings with respect to the optimization of existing CICS assets, but also help support the modernization of applications (e.g., Web Services enablement).

Mainframe Cost Benefit Factors

It's no surprise that businesses continue to push a "do more with less mentality". With the number of mergers and acquisitions in which the largest organizations partake, this way of thinking becomes increasingly difficult to support. Add the growing demands of regulatory compliance while maximizing system availability and performance, and the demands placed on the IT staff are significant.

Organizations need to know that they have taken every opportunity to optimize their applications in efforts of controlling the costs associated with hardware upgrades and third party software. The following outlines a variety of areas that should be considered as part of a cost mitigation strategy for not only a CICS environment, but also the broader mainframe.

Cost Considerations

» **CPU Time:** Some organizations may already have a value associated with CPU time in their environment. This is often simply the cost of the CPU lease per month. The ability to tune applications to help decrease CPU usage during peak times can have significant value, particularly if it helps postpone pending new processor purchases, which themselves would also have added software licensing costs. Important to note is that CPU savings are only realized if the saved processing time could be used for something else. Specifically, saving 10 minutes of CPU time from a job that runs at 3 am in a site where the nightly batch cycle completes an hour before needed is not really saving anything. However, saving this time from peak period transactions in a CICS region that is constrained at 11 a.m. can provide significant savings. Further, the ability to move development and early testing to Rational Development and Test environments for System z allows organizations more effectively use systems for production use, and increases

the available capacity for development teams in this modern development process.

Even Small Changes Can Lead to Big Savings

When applications are tweaked to reduce response times and CPU consumption, even the smallest changes can equate to significant savings. For example, a large US banking institution stated that *"one CICS transaction that was tuned only saved fifteen seconds from the original, except that 15-20 tellers in 500 branches executed this transaction every hour. So 20 times 500 equals 10,000 transactions per hour, times 15 seconds equals 150,000 seconds every hour. Over an 8 hour day, that's 5.5 hours in CPU savings!"*

» **Software:** Many organizations are uncomfortable with the thought of increased costs associated to third party software when CPU upgrades are required. While these costs may be fairly difficult to determine without a lot of effort, it is very important for organizations to do so. Software costs may be one of the most significant savings that can be achieved. In some environments, this amount is equal to the CPU costs, while in others it may be up to double the CPU costs. Even as a percentage of the overall CPU costs, these costs should not be ignored, as the savings can often easily justify the costs associated with the tools used to postpone the perceived necessary processor upgrades. Delaying a processor upgrade can save organizations thousands of dollars in delayed software costs.

» **Personnel:** While hardware costs continue to decrease, personnel costs continue to rise. Providing application and system programmers with the tools necessary to complete their tasks more productively not only helps to reduce the demands on these personnel, but also helps them fulfill various requests, such as system changes, more rapidly. Similarly, users waiting for these changes to be implemented can get back to work sooner. While the intention may not be to eliminate personnel, providing them with more efficient graphical user interfaces and consolidated management views could allow them to put more focus on new business initiatives, thus leading to increased competitive advantage. Where subcontracts or new staff are involved, shortening the times to learn an existing environment can also produce significant savings.

» **Outages:** Making changes to applications without understanding their relationships with, and effects on, related applications is a recipe for failure, which can subsequently lead to application outages. Downtime

for large organizations can be quite expensive, and the ability to eliminate or reduce their duration is significant. Many may not understand the magnitude of such outages. Taking into consideration consequences such as lost user productivity, lost IT staff productivity, lost revenue, overtime payments, wasted goods and material, and imposed fines or penalties, average hourly impacts due to outages can be upwards of millions of dollars depending on the industry. Tools that help automate system changes and quickly back out of erroneous changes can significantly help reduce unplanned outages based on human error.

» **Customer Value:** Customer satisfaction and user time as a further cost consideration, while more of an esoteric savings, is difficult to measure. In many cases, organizations will be able to find enough savings in the hard resources to justify most optimization efforts and may not need to investigate the requirement to put a dollar value on customer savings. However, depending on the type of business and the nature of the competition, this may be a requirement. Stories abound about customers leaving their brokerage firms, or banks, or Internet providers, etc., because of poor response times. Customers today have more options and less patience. In short, the primary goal of optimization may not be the delaying of a processor upgrade, but rather an improvement related to response times during peak hours or additional application functionality to keep and attract new customers.

How Much Does An Outage Really Cost?

Average downtime costs vary considerably across industries. Information Management magazine estimates this cost can range from $90,000 per hour in the media sector to about $6.46 million per hour for large online brokerages. According to the IT Process Institute, resolution time per outage averages 200 minutes. *An international Managed Healthcare Company was able to reduce the time to resolve even the most major issue by 75% with IBM CICS Performance Analyzer.* Even cutting down the suggested typical 200 minutes by 55% for minor issues could mean millions less in financial impact.

Licensing Considerations

IBM has continued to innovate and maintain the relevancy of the System z platform, trying to help reduce costs for its customers through advancements in not only the technology itself, but also in how it is licensed. The advent of the Workload License Charge provides sub-capacity

software pricing where fees are linked to the actual capacity used by software within the LPAR where it runs. This ensures customers pay only for the software they actually use. With the release of the z196, IBM also introduced an Advanced Workload License Charge (AWLC) that in short, further lowers prices per tier, offering improved price performance as compared to VWLC for all customers above 3MSUs.

> **CICS TS VUE OTC:** To help encourage new workloads on System z, IBM introduced lower software costs for applications running on New Application License Change (zNALC) Logical Partitions (LPARs). CICS Transaction Server Value Unit Edition, now offers a One Time Charge price metric that provides an alternative pricing model for eligible workloads (i.e., net new Java workload that executes within the CICS TS VUE Java Virtual Machine server environment, on the condition that the workload is qualified and approved through the zNALC qualification process).

Unfortunately, customers may still be paying too much, and optimizing applications can have a dramatic effect on overall software costs even when paying through a sub-capacity pricing model. For example, Variable Workload License Charges (VWLC) calculates CPU usage based on the MSU measurement unit. Every 5 minutes the Workload Manager (WLM) inside each LPAR calculates a 4-hour rolling MSU average. At the beginning of each month, the Sub-Capacity Report Tool (SCRT) provides the LPAR usage, being the highest sum of the measured 4-hour rolling MSU average for the LPARs in the Central Processing Complex. Charges are not based on the product CPU usage in the LPARs, but rather on the sum of the usage of all the LPARs where the products were running.

Table 1 shows an example of how the SCRT calculates the LPAR utilization capacity for different products and LPAR combinations.

The MAX value is the highest usage determined from the sum of the utilization for all LPARs in which a particular product ran in a given hour. It is not the sum of the highest usage for individual LPARs in which a particular product ran during different hours. In this example, the peak value of the month for z/OS is in hour 4. It is the sum of the z/OS usage across all the LPARs during hour 4, or 520 MSUs. The peak value for CICS is in hour 718. IMS ran only in the first part of the month in LPAR2 so its usage value is 402 MSU.

In the above example, note that running IMS in the same partition as CICS also increases the IMS usage in that LPAR, making it more expensive because IMS will be paid for on its own consumption plus the MSU already used by CICS. In this case, reducing CICS related overhead through application tuning and optimization can have dramatic cost savings by also decreasing the consumption costs related to IMS and any other VWLC software running in the same LPARs (e.g., DB2, WebSphere MQ, IMS, Lotus Domino, and z/OS itself). While there are many areas these optimizations might be applicable, one of the most common areas is around CICS based applications.

Mainframe Optimization with CICS Tools

In an effort to further understand some of the current cost considerations and challenges that customers are facing in a mainframe environment, Branham Group spoke with a variety of IBM CICS customers to assess their ongoing use of the tool sets and what steps they had taken in efforts of realizing productivity improvements and ultimate cost savings.

Table 1: LPAR Utilization											
4-hour rolling average			**z/OS**			**CICS**			**IMS**		
Hour	LPAR1	LPAR2	LPAR1	LPAR2	SUM	LPAR1	LPAR2	SUM	LPAR1	LPAR2	SUM
1	100	333	100	333	433	0	333	333	0	333	333
2	120	321	120	321	441	0	321	321	0	321	321
3	112	345	112	345	457	0	345	345	0	345	345
4	118	402	118	402	**520**	0	402	402	0	402	**402**
.	.	.	.	.	.	.	.	.	.	.	.
718	127	348	127	348	475	127	348	**475**	0	0	0
719	133	299	133	299	432	133	299	432	0	0	0
720	122	300	122	300	422	122	300	422	0	0	0
MAX					520			475			402

CICS Tools

» **IBM CICS Interdependency Analyzer (IA) v5.2** for z/OS is a runtime tool that automatically builds a comprehensive database of CICS resource relationships. It enables development teams to understand quickly and easily which transactions, programs, maps, and other resources will be affected by planned changes. Inexperienced users can quickly understand what a CICS region contains, what resources a transaction needs in order to run; which programs use which resources; and which resources are no longer used.

» **IBM CICS Performance Analyzer (PA) v5.2** is an offline reporting tool that complements real-time monitoring solutions, analyzing a wide range of System Management Facilities (SMF) records to produce comprehensive reports on all aspects of CICS system performance. Whether planning, building, managing, or deploying complex mainframe CICS applications, CICS Performance Analyzer makes it easier to improve CICS related system performance and more quickly recover from unplanned outages when they occur (e.g., Offline Performance Analysis helps uncover the types of problems that are occurring, when and how often, and any trends leading to poor performance and outages).

» **IBM CICS Configuration Manager (CM) v5.2** wraps a software solution around CICS resource definitions and the migration of these definitions so that they can be managed in a controlled and audited fashion. Working equally well with CICS CSDs and Data Repositories under CICSPlex® System Management (CPSM), it can migrate changes seamlessly between these environments. It also integrates with change management software using a batch interface to migrate the resource definitions.

» **IBM CICS Deployment Assistant (DA) v5.2** enables organizations to quickly discover existing CICS regions and subsystems; including DB2 and WebSphere MQ. It provides policy driven automation for the creation, deployment, customization, and control of CICS regions (e.g., start/stop and clone regions). Users can visually navigate from CICSPlex to Managed regions, CMAS, and the Web User Interface.

It should be noted that since CICS Transaction Server v5.1, IBM has synchronized the tool versions to help alleviate confusion and better illustrate which versions of the tools are required to capitalize on the optimal feature set. However, newer releases of the tools are still backwards compatible with older versions of CICS TS.

Tools for CICS Universal Management Environment

» **IBM CICS Explorer** provides an Eclipse-based systems management environment for application programmers, system programmers, and other operations staff. Available as a free download (no individual seat charges apply), it provides a modern interface to CICS that is highly customizable and can be integrated with information from additional third party tools, providing users with a single Master Terminal.

» **IBM CICSPlex System Manager** (CPSM) enables the management of multiple CICS systems through a single point of control. It provides high availability and workload management, dynamically routing transactions to the most appropriate CICS region based on availability and other specific criteria, while also issuing problem warnings based on real-time analytics.

Problem Determination Tools

» **IBM Application Performance Analyzer for z/OS** measures and reports on how applications use resources, helping identify system constraints and improve application performance.

» **IBM Debug Tool for z/OS** helps examine, monitor, and control the execution of application programs (e.g., C, C++, COBOL, and PL/I). It provides an interactive source-level debugging tool for compiled applications in a variety of environments (i.e., step debugging of mixed-language applications in the same session). The Load Module Analyzer feature of Debug Tool helps users understand the elements of applications and estimate the migration effort of users' applications.

» **IBM Fault Analyzer for z/OS** helps developers analyze and fix application and system failures for CICS, WebSphere MQ, IMS, and DB2 environments. When an application ends abnormally Fault Analyzer automatically gathers information about an application and the surrounding environment.

» **IBM File Manager for z/OS** provides user-friendly tools for working with z/OS data sets, DB2, CICS or IMS data, HFS files, or MQ queues. In addition to its formatted editor capability, File Manager provides a set of utility functions to manipulate data such as copy, create test data, compare, print, batch edit, find/change, and much more.

» **IBM Workload Simulator for z/OS and OS/390** enables administrators to conduct stress, regression, function and capacity planning tests by simulating a network of terminals and its associated messages.

» **IBM Problem Determination Tools Studio** (and Plug-ins) provides access to PD Tools through an Eclipse-based GUI. It contains the capabilities found in each of the individual PD Tools plug-ins.

Development Tools

» **IBM Rational Developer for System z** (RDz) provides rich COBOL, PL/I and JCL editors with content assist, real-time validation of syntax, and more. Syntax errors are flagged while typing compared to having to compile and sift through listings to fix errors. The ability to edit multiple sessions at the same time, along with a set of views (e.g., outline, job monitor, etc.), eliminates the need to jump between different views. RDz is a premier IDE that provides edit, compile, and debug capabilities, and is seamlessly integrated with planning, collaboration, change management, SCM, automated testing, quality analysis and more. RDz is built on the open source Eclipse platform making it easily extensible.

» **Rational Development and Test Environments for System z** (RD&T) provides a full, true z/OS environment (including CICS) for development and test purposes on Intel Linux. Development and test can be performed without consuming MIPS. RD&T also provides additional LPARs on the network for individual teams to use as their development environment.

» **IBM Rational Team Concert** enhances team collaboration with integrated features like work-item, build and software configuration management and provides high visibility into project activities and team progress with multilevel dashboards and reporting features. It can facilitate planning and execution of agile or formal projects with planning tools and templates, while consistent processes help improve software quality while advanced source control helps improve productivity for distributed teams.

» **IBM UrbanCode** offers solutions to facilitate automated application release and deployment for complex interdependent applications, infrastructure changes including audit trails, versioning and approvals needed in production environments. It supports both traditional CICS applications and modern CICS Java applications and services, allowing a single tool to deploy all application artifact types across multiple platform types.

» **IBM Rational Test Workbench** (RTW) provides a comprehensive test automation solution for mobile to mainframe application, regression testing, integration technologies, and performance and scalability testing. Specifically for CICS, it provides not only traditional testing but also service interface testing for CICS Gateway, CICS services, and even CICS DPL calls.

» **IBM Rational Test Virtualization Server** provides the ability to run service stubs built with RTW to allow teams to work independently while building up the application. For example, the CICS back end team can provide a stub (based on a defined JSON schema definition) for the mobile front end teams to test with, without requiring the actual service to be ready or available until later in the development process.

Two major themes are evident: the reduction of CPU cycles (e.g., through conversion to threadsafe applications and CICS region consolidation), and increased productivity through added time savings. The conversion of CICS applications to threadsafe was noted to provide the most significant cost benefit for customers, while increased productivity was also experienced, incorporating a number of different perspectives and esoteric benefits not as easily calculable.

Reduced CPU Cycles through Conversion to Threadsafe Applications

This particular topic may be one of the simplest yet most significant changes that organizations can make, providing some of the largest benefits when optimizing the performance of their CICS applications. Although some will be familiar with this topic, many may not understand the tremendous value that the movement of CICS applications toward threadsafe may provide (see sidebar "Converting To Threadsafe Saves Millions). To really portray this value, a little parallel education is required.

On the mainframe, a Task Control Block (TCB) is a z/OS control block that represents a dispatchable unit of work. In short, TCBs represent tasks such as an executing user program. CICS has only one TCB referred to as the quasi-reentrant (QR) TCB that is shared by all CICS tasks. This facilitates "free" serialization to share resources (e.g., files, data sources, etc.) since there cannot be multiple application programs running simultaneously within CICS (i.e., although the same program can be executed by multiple CICS tasks, only one of those CICS tasks is active at any one point in time). However, this limited the multi-processing capacity of CICS to specialized functions and in many installations, the QR TCB reflected 80 to 95% of the total CPU used by the CICS address space.

Through the advent of open TCBs, CICS applications can now be dispatched to run in parallel (simultaneously) with the QR TCB providing a possible reduction in CPU usage and increased transaction throughput. This parallelism now presents the situation where two different tasks running simultaneously on separate TCBs could require access to the same resources. If there is no synchronization, the result could produce invalid results or compromise data integrity.

A *threadsafe* program requires built in mechanisms (e.g., ENQ/DEQ) to ensure serialized access to a shared resource to avoid data integrity problems. It is important to understand that a single program that operates without the agreed-upon serialization technique(s) can affect the predictability and integrity of an entire system of otherwise threadsafe programs. Therefore, an application system cannot be considered threadsafe until all programs that are sharing common resources implement appropriate standards.

> "By making only one major application threadsafe we were able to save 700 MIPS"
>
> - Major US Bank

If not defined as threadsafe, then CICS will automatically switch to the QR TCB for a non-threadsafe command, and there is a CPU price to pay for this switch (around 2,000 instructions). With a high percentage of threadsafe commands within a threadsafe application, the thread of execution can remain on an open TCB for longer, which improves the performance of the system. Processing as many tasks as possible on the open TCBs will remove constraints on the QR TCB and reduce the response times of both threadsafe and non-threadsafe transactions.

Converting to Threadsafe Saves Millions

A large US based Health Insurance Company recently converted a number of their applications to threadsafe providing them with a significant savings. This particular environment is home to 600 applications, over 1000 platforms, and sees 60 million transactions a day. While the majority of the applications were converted over a 6-7 month period, over the span of a year the company was able to save over 2 billion switches and saw a savings of 1300 MIPS during peak hours.

Depending on the hardware (the cost per MIPS drops with each generation) and the software stack (e.g., z/OS, DB2, CICS, MQ, COBOL, NetView) costs per MIPS can vary drastically. Being conservative, some estimate the average cost to be anywhere from $1,500 to $3,000 annually per MIPS (some estimates range from $2K to over $12K), illustrating that this particular customer could have saved an estimated $1.95 million to $3.9 million or more.

These savings can be further accelerated with tools like IBM CICS Interdependency Analyzer, which provides reports for which applications are prime candidates for threadsafe conversion. For example, one customer interviewed saw an average **65% reduction in the time it took to identify, code and test threadsafe applications** compared to not having the tool. Given the number of applications this company converted, this equated to years of recovered developer hours.

Not a One and Done Operations

As one customer noted, CICS Interdependency Analyzer is "not a one and done tool." Specifically, while the combination of CICS PA and CICS IA help accelerate the identification and isolation of opportunities for threadsafe conversion, with each release IBM continues to increase what can be converted to threadsafe. For example, with the release of CICS TS 3.2, WebSphere MQ requests could be made threadsafe. Similarly, the release of CICS TS 4.2 saw the addition of IMS requests, and Transient Data as of CICS TS 5.1. CICS IA V5.2 has also expanded its scope of data capture to CICSPlex SM commands, further enhancing threadsafe analysis. Finally, CICS no longer switches to the Resource-Owning TCB to load a program when an application is already running on an open TCB. Instead, CICS carries out the program load on the open TCB, helping further increase throughput and reducing CPU usage. In short, with each upgrade, customers have an opportunity to go back and see what additional switching can be eliminated for further cost savings. Specifically, customers may be able to achieve new performance gains not possible with the previous version of CICS TS and the CICS Tools

Figure 1: Brokerage Industry Threadsafe Conversion Savings

How important is this? Based on the z196 redbook value, one (1) million TCB switches waste 2.3 CPU seconds, and for one (1) billion switches, over 38 CPU minutes are wasted. Similarly, one billion TCB switches on an EC12 processor will waste over 35 CPU minutes (z9 and z10 waste 116 and 46 CPU minutes respectively for 1 billion switches). In one example, a customer had ½ billion TCB switches in their environment every day, which provided significant return on investment when designating their CICS applications as threadsafe. An average projection is a savings between 2% – 15%.

> "CICS IA gets better with every release. The UI is very intuitive with continued enhancements"
>
> - Major US Bank

Figure 1 provides an example of a leading brokerage firm and its documented CPU savings when converting four of its modules to threadsafe.

To help organizations convert their CICS applications to threadsafe in a reliable and timely manner (vs. a manual approach), IBM CICS Interdependency Analyzer provides insight into existing programs and their relationships with other transactions and resources. It provides the facilities to assist in the movement to a threadsafe environment by analyzing the application to uncover data integrity
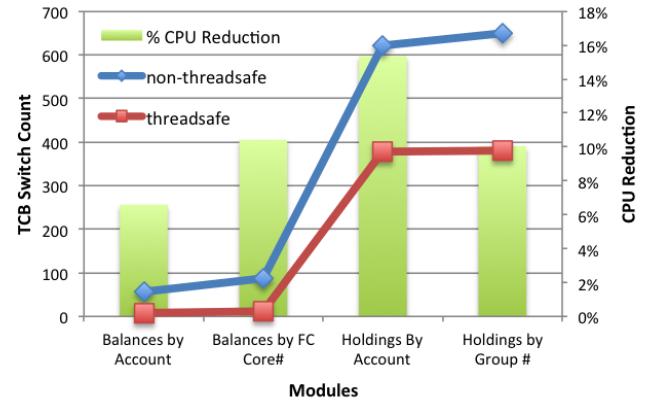
immediately, determine which exits are threadsafe, and exposures, show which programs can be made threadsafe to ensure application changes do not cause an ABEND or regress an already defined threadsafe environment. Similarly, IBM CICS Performance Analyzer can provide answers to questions such as: Which TCBs a transaction used? How many TCB switches occurred? What was the switch delay time? How much Dispatch and CPU time did they use? Why did my transaction take so long?, etc.

> "For the programs that were converted to threadsafe, we saw a 10-25% CPU savings"
>
> - Large National Bank

When CICS IA is used in conjunction with CICS PA and it's plug-in for CICS Explorer, users can navigate in context very easily between the two products. For example, when looking at a CICS PA view that shows transactions with a large number of TCB switches, a simple right-click can show the program structure and detailed TCB switch activity for selected transactions. CICS IA provides the most comprehensive analysis available of threadsafe attributes to provide the information needed to assess and modify applications, and to remove constraints to improve performance.

For many customers, the financial cost of running their applications is related directly to the amount of CPU consumed. Under these circumstances, the CPU savings gained by migrating appropriate applications to a threadsafe environment can equate to a significant financial saving.

Calculating Wasted CPU

Interested in calculating your wasted CPU due to TCB switching? The average number of TCB switches per transaction is available through SMF 110 (CICS CMF) records, obtainable through any tool that reports on SMF data. The TCB switch information is obtained from group DFHTASK, class 248. The field name for this class is CHMODECT before CICS TS 3.1 and DSCHMDLY for CICS TS 3.1 and higher.

To complete the calculation, the following assumptions must be made: a z196 and EC12 process is .192 and .178 nanoseconds per cycle respectively (for reference, z9 and z10 are 0.58 and 0.23 nanoseconds respectively); the average instruction required 6 cycles; and each TCB switch requires 2,000 instructions. This leaves only two variables required: the number of TCB switches per transaction; and the number of times that transaction is executed in a single day. The calculation is as follows:

$$\frac{2000 \text{ Instructions}}{1 \text{ switch}} \times \frac{6 \text{ cycles}}{1 \text{ instruction}} \times \frac{.192ns \text{ (or .178ns)}}{1 \text{ cycle}} \times \frac{1 \text{ second}}{1000000000ns} \times \frac{1 \text{ minute}}{60 \text{ seconds}} \times \frac{\# \text{ TCB switches}}{1 \text{ transaction}} \times \frac{\# \text{ transactions}}{1 \text{ day}} = \frac{\text{wasted CPU minutes}}{\text{day}}$$

When talking with IBM mainframe customers, in most cases the concept of converting applications to threadsafe was not a foreign concept. In fact many organizations that Branham spoke with have already made an effort to convert applications to threadsafe. With the prerequisite of making applications multiprocessor enabled (i.e., converted to threadsafe), a number of organizations interviewed have moved on to the consolidation of CICS regions.

IBM CICS VSAM Transparency (VT)

One customer interviewed had over 50,000 programs that accessed VSAM files. In some cases, the core files were referenced by 80% of the applications. *"We simply don't have the resources to convert so many applications at once. CICS VT allows us to break the work down into smaller pieces."* In short, CICS VT allows CICS program to continue to use the VSAM programming interface to access data, while the data is more sharable through DB2. CICS VT files become eligible for threadsafe tuning because of the DB2 physical access while providing potential improvements in performance via DB2 buffering (caching).

CICS Region Consolidation Helps Further Decrease CPU Usage

With the release of version 5.1, IBM CICS introduced performance and scalability enhancements that allow more work to run in a single CICS region. This increased capacity is delivered through the doubling of the MAXTASK limit to 2,000 and the optimization of storage area usage to provide greater vertical scalability, while optimized TCB usage and greater threadsafe capacity provides more horizontal scalability.

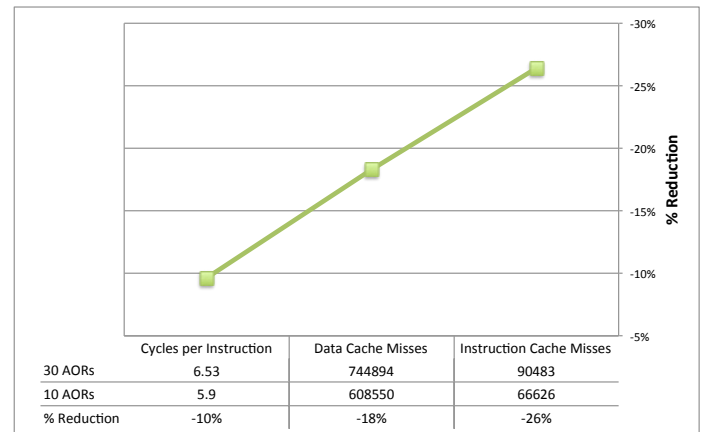To better accommodate the consolidation of CICS regions, IBM has focused on increasing the capacity of the CICS regions by allowing more tasks to run within a single CICS region. Typically there are two constraints, CPU and storage. The storage constraint in the 31-bit area was increasingly becoming an issue. With CICS Transaction Server Version 5.1, IBM moved the control block structures above the bar into 64-bit storage, providing relief in the 31-bit area and allowing customers to run more work. More specifically, this helps avoid short-on-storage conditions and can reduce the need for additional CICS regions.

	Cycles per Instruction	Data Cache Misses	Instruction Cache Misses
30 AORs	6.53	744894	90483
10 AORs	5.9	608550	66626
% Reduction	-10%	-18%	-26%

Figure 2: Region Consolidation Performance Benefits

For customers who have already converted many of their applications to threadsafe, some are actively consolidating CICS regions for additional CPU savings, especially where they want to "eliminate single application regions." Regions that look similar are often good candidates for consolidation and initial observations around a 3:1 region consolidation (e.g., 30 regions down to 10) have seen about a 10% decrease in CPU utilization; although results for individual environments will obviously vary.

Increased Productivity through Added Time Savings

While the conversion of CICS applications to threadsafe and the consolidation of CICS regions can provide a calculable benefit to customers, Branham's interviews also revealed a number of additional benefits that provide cost savings in other ways, including productivity benefits, the virtual elimination of errors, help with meeting governance requirements, and more. Some of the more commonly noted examples included the following:

» **System and Workload Management:** IBM CICSPlex System Manager (CPSM) provides organizations with the facilities to manage large and complex configurations of CICS resources through a single point of control (using CICS Explorer as the interface). By contrast, when CICSPlex is not used, administrators must connect to everything individually rather than through a single management infrastructure. Further, CICSPlex helps CICS and associated applications use the full capabilities of the IBM Parallel Sysplex architecture.

> "We use CICSplex extensively, particularly for workload management. Just about all regions are involved."
>
> *- Multinational Provider of Health Benefits Management Services*

From a workload perspective, CPSM supports dynamic workload distribution, balancing workloads across IBM CICSPlex and IBM Parallel Sysplex systems, adapting to fluid conditions inherent in an agile business. In an ideal CICSplex environment, any work can run on any processor under any CICS region in the system. This makes it possible for organizations to maximize software and hardware investments while eliminating almost all planned and unplanned downtime. Finally, CICSplex provides real-time analysis to monitor points of interest, provide notifications, and automatically modify resources to correct issues.

With the exception of one interviewed IBM customer, where all CICS system management was now performed through CICSplex, most customers only had partial implementations but were actively working to move production environments to CICSplex. More specifically, CICS IA has been instrumental in helping them to identify affinities so they can adjust these applications to capitalize on the benefits provided by CICSPlex System Manager.

» **Affinities and CPSM Rules:** CICS transactions use many different techniques to pass data from one to another. Some techniques require that the transactions that are exchanging data must execute in the same CICS region and therefore impose restrictions on the dynamic routing of transactions. If transactions exchange data in ways that impose such restrictions, there is said to be an affinity between them; the disadvantage being that these applications cannot capitalize on the ability to run on any processor under any CICS region in a CICSplex. IBM CICS Interdependency Analyzer will identify affinities that would prevent the combining of CICS regions and/or the movement of resources to a different CICS region. CICS Interdependency Analyzer also provides the facilities to generate the necessary CICSPlex System Manager (CPSM) rules required to activate transaction routing while maintaining the existing transaction affinities. For a site moving to dynamic transaction routing, this feature can reduce the time to production while eliminating the risk of transaction abends. In fact, during the Branham interviews, customers noted a savings upward of 75% for the time required to identify, code, and test CPSM rules. For a process that can take several business days for major affinities, this provided customers with significant time savings.

Major Affinity Example Savings:

The average time required for a system programmer to identify, code, and test CPSM rules for a major affinity can take upwards of 200 hours. For reference, major affinity rules apply to transactions with resources that exist for a unit of work, plus system or transaction affinities for persistent resources such as a user login state. A 75% savings based on this 200 hours is a 150 hour reduction. That's approximately a month or 20 work days that a system programmer now has available to focus on other initiatives. For a paid consultant, at a rate of $65/hr, this one example could provide a savings of almost $10,000.

For those customers yet to implement CPSM, CICS Deployment Assistant also provides an easy to use wizard. By simply entering the name of the new CICSplex, some TCP/IP port numbers, and a couple of other details, the wizard creates the CICSPlex SM CMAS (the primary CICSplex region) and Web UI server region pair to form the basis of a new CICSPlex SM topology.

» **Performance Tuning and Analysis:** IBM CICS Performance Analyzer provides the facilities for performance bench marking before and after changes

to validate improved optimization. On average, this tool provided over 70% time savings when system programmers were tasked with the identification and validation of performance related changes. For example, simple performance analysis could be reduced from 4 hours to 1. Similarly, complex performance related issues were reduced from 48 hours to 12 hours. And in some cases customers saw upwards of a 90% decrease in the time required to identify and validate performance changes. Using IBM CICS Performance Analyzer, customers were "better able to improve performance" (e.g., one customer noted a 16% savings in CPU time after using CICS PA to identify performance issues) and "better able to diagnose the root cause" of performance issues after a recovery had been achieved.

> "Through CICS Performance Analyzer we were able to become more capable in thinks like tracking transactions, that were other-wise frustrating, with other third party tools."
>
> - Large Financial Institution

CICS Performance Analyzer includes over 200 reports (that can be exported to PDF) designed to meet a customers reporting and analysis objectives. Customers can easily tailor these reports to their specific analysis requirements or create their own. These prebuilt reports and the ability to easily create custom reports were reported across the board as being easier than alternatives such as SAS, MXG, etc. Specifically, there was a significantly shorter learning curve.

» **Automated Subsystems Management:** Every CICS region refers to a set of resource definitions. Typically, organizations maintain each of their CICS regions in at least three separate environments: development, test, and production. Changes to resource definitions are migrated from development to test, and then from test to production. As shown in Figure 3, even if each environment contains only one CICS region, this means three sets of resource definitions, and two migrations are needed to move each change into production. IBM CICS Configuration Manager is designed specifically to help reduce the time required to migrate changes to CICS System Definition (CSD) files, and provides the ability to track and back out changes if the results are not satisfactory.

> "In the past year, we were able to save over an estimated 2 months worth of man-hours when identifying and validating performance issues through the use of CICS PA."
>
> - Sylvie Constans, System Engineer at CA-SILCA, IT production subsidiary of Groupe Credit-Agricole

Several of the customers that were interviewed had implemented IBM CICS Configuration Manager. Interesting to note was that many of these customers already had home grown solutions to help ease the complexity of migrating CSDs. While the average IBM CICS Configuration Manager customer saw a time savings of about 3:1, those customers with home grown
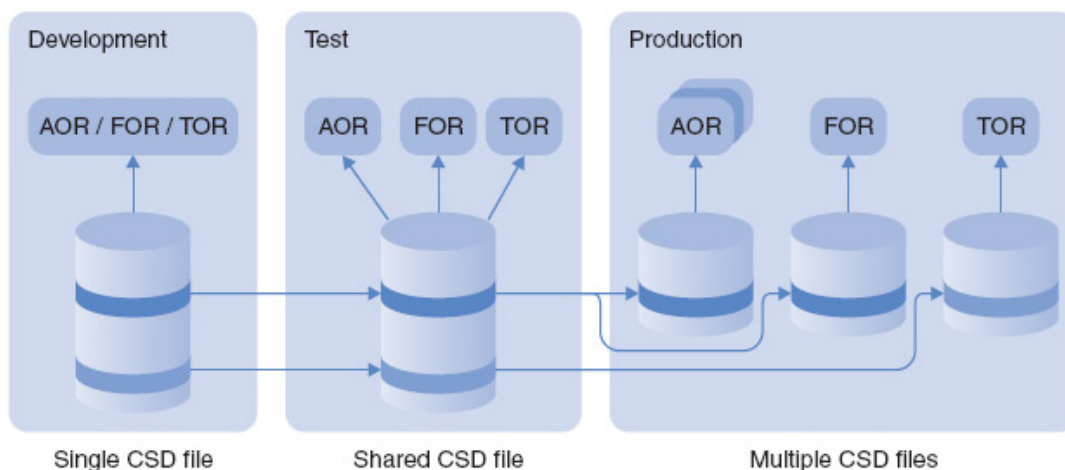

Figure 3: Migration of CSDs

> "A real differentiator for us came through CICS Configuration Manager's auditing and control capabilities."
>
> *- Large Financial Institution*

solutions or existing vendor products did not see this time savings. So why the purchase?

Beyond the initial time savings provided by CICS Configuration Manager, or its cost savings when used to replace an existing vendor implementation, many of these customers were after, or found value in, the additional facilities. Specifically, a number of customers interviewed looked specifically at the auditing and control capabilities. Customers noted that this provided "the biggest bang for the buck" with regards to purchasing CICS Configuration Manager. It provided value on a number of fronts including, but not limited to, compliance related requirements, tight and transparent control over changes, the ability to quickly compare proposed changes for accepting/declining self-service requests, and the reduction in errors and downtime by rolling back erroneous modifications. Some customers admittedly have found tremendous value in the rollback feature "more than once." Based on the already discussed costs associated with downtimes, this can provide significant value in and of itself, regardless of the time savings associated with definition migrations.

» **Eased Learning Curves:** Customers noted that the IBM tools help them with respect to reducing learning curves in a couple of ways. For example, CICS Deployment Assistant and CICS Interdependency Analyzer help

"unravel the complexity" allowing new or inexperienced developers to quickly learn existing environments and applications, including the relationships between the different components. Features such as the CICS IA Command Flow allow individual developers to quickly capture all the CICS, DB2, MMQ, and IMS commands that are issued by a transaction in chronological order.

IBM CICS Deployment Assistant (DA) enables users to quickly discover existing CICS regions and subsystems, manage a CICS topology, and automate the creation, deployment, customization, and control of CICS regions through a graphical user interface. One of the most valuable components of CICS DA was noted to be the discovery phase, helping subcontractors when learning systems that typically have little or dated documentation.

It is also important to qualify what is discovered. For example, is a connection actually used, or even if there are lots of connections to a region how high or low is the activity during the day? Through integration with CICS IA and CICS PA, users can drill down into the discovered topology displaying in context details provided by CICS IA and CICS PA.

IBM CICS DA helps customers use the latest IBM CICS Technology (including the new Mobile and Cloud support) faster and easier. Users can discover, model, visualize, and deploy new and existing CICS regions, using automation and best practices built on an organizations own knowledge and experience.

» **Mobile Enablement of CICS Applications:** The speed of mobile adoption has dictated the need for transformational innovation as opposed to incremental. By extending enterprise applications onto a mobile platform, organizations can capitalize on existing

"CICS DA discovery reduces learning times from weeks to hours or a day, saving organizations significant expense when using subcontractors. Where subcontractors can run 50 – 100 euros per hour, it represents big savings for customers when they can provide all the information about their environment to the contractors when they arrive. Where more and more companies are using subcontractors, this represents significant value. For example, at a European customer with 300+ CICS regions on 8+ LPARs it took several weeks to discover the topology with the CICS interconnections, DB2, IMS, and WebSphere MQ connections, workloads, and applications, etc. With CICS DA, in conjunction with CICS PA and CICS IA, this could have been reduced to 1 maybe 2 hours."

- Jean Paul Caron, Independent CICS Consultant

investments without the need to develop entirely new solutions to support mobile devices. Through the included mobile extensions, CICS TS V5.2 provides support for the JSON (JavaScript Object Notation) data format, ideal for integrating mobile devices and RESTful JSON-based Web Services.

Some of the IBM customers Branham interviewed have already fully mobile enabled select CICS applications through a multi-tier architecture including an Enterprise Service Bus and multiple front-end technologies. Some are in the initial discussion phases while others are looking to IBM Worklight, a mobile application platform that supports multiple mobile operating environments through a single codebase.

IBM Worklight Server offers a middle-tier gateway that facilitates the integration of multiple back-end services (e.g., CICS, IMS, DB2, etc.) with mobile applications. Adapters (e.g., SQL JMS, HTTP, etc.) can issue requests to multiple back-end systems and then combine the retrieved information into one response back to the mobile application, caching frequently requested information.

Using COBOL copybooks, developers can generate the JSON schema that allows the mobile application to communicate with CICS Web Services with a lightweight payload. A mobile developer then uses the JSON schema to build a Worklight adapter, which the frontend mobile developer calls. CICS manages the transformation between the JSON and COBOL copybook structure and the CICS services.

Tools such as Rational Developer for Systems z (RDz) and CICS IA provide invaluable assistance when service-enabling applications for mobile or web access. For example, CICS IA helps identify existing programs that are candidates for hosting as web services and captures key resource information for CICS Web services (e.g., program name, URIMAP, mapping levels, WSDL, etc.), which helps users understand the resources required when deploying web services from development into test, and from test into production. RDz offers simple tools with wizards that identify the application inputs and outputs, generating Web Service artifacts and "wrapper-programs" so that no reengineering or duplicate code maintenance is necessary. Further, when mobile enabling applications CICS PA helps identify the effect of new applications on a CICS system.

The speed of change with respect to mobile applications means that quality applications need a flexible and iterative approach, which can represent an operational challenge as much as a technological issue. The IBM System z platform supports a unified approach to mobile systems, technology platforms, and even a core operating model that is designed with mobile in mind.

» **DevOps Adoption:** DevOps is not a technology or methodology, but rather a movement towards a seamless integration of enterprise application development and the IT production environment. It incorporates tools and best practices with the goal of connecting the application development and operations teams through optimized processes, communication, and collaboration to support the rapid delivery of quality business applications and solutions. While some of the organizations Branham spoke with are continuing with the status quo, some are embracing (or have plans to) the DevOps approach as a means to streamline and accelerate application development and deployment.

Embracing DevOps

According to IBM, DevOps is "an approach for software delivery based on "lean" and "agile" principles, in which all stakeholders—from line of business to development, quality assurance and operations—collaborate to deliver software more efficiently based on a continuous feedback loop. Adopting DevOps capabilities and principles can result in applications that are more efficient and effective, with continuous process improvement, while helping ensure that the changes and enhancements to the software are based on real customer feedback'" (IBM whitepaper: *Adopting a DevOps approach with IBM System z, https://ibm.biz/BdFidN*).

As access to CICS-based systems of record by mobile, modern web interfaces, and other systems of engagement increases, so to does the importance of the agility and efficiency that DevOps can provide. In the most recent releases, CICS Transaction Server and CICS tools have done much to increase transparency and collaboration. Given that the transformation to a DevOps culture will take some time to be fully implemented, organizations are advised to adopt this approach to prepare for the future.

To cater to the different scenarios or facets of application development, IBM uses Eclipse as the common environment that allows plug-ins to link to one another. Organizations have the flexibility to pick and choose the combination of tools that address their unique needs. This includes integration and linking to tools such as IBM CICS Tools, IBM Problem Determination Tools, Rational Developer for System z (RDz), Rational Team Concert, IBM Worklight, IBM z/OS Explorer, etc. Using these and

other integrated tools, organizations can optimize the development process.

Using the mobile enablement of a CICS application as an example, the following provides an illustration of how different products provide key capabilities across all phases of the DevOps cycle:

Continuous Business Planning
- CICS PA helps create capacity plans

Collaborative Development
- CICS IA helps identify mobile service entry points
- CICS DA helps create development and test regions (particularly where CICSPlex is not used)
- File Manager can be used to update any data models where required and mask production data for security purposes
- RDz and IBM Worklight is used to quickly build the mobile applications
- RTC provides full source code management for all artifact types (including traditional CICS COBOL applications and modern Java components as well as the build capabilities), and enables inter-role communication across the entire DevOps Cycle through work items and planning capabilities
- CICS CM can package the configuration changes

Continuous Testing
- Workload Simulator provides the facilities for function and load tests
- Debug Tool helps to diagnose problems
- Application Performance Analyzer and CICS Performance Analyzer help eliminate performance hot-spots
- Rational Test Workbench and Rational Virtualization Server provides simplified testing and virtualized services for applications
- Rational Development and Test Environments for System z provide additional test capacity for development and automated testing, as well as additional platforms for new version testing

Continuous Release and Deployment
- CICS DA can then be used to create production regions
- CICS CM helps migrate the production configuration
- IBM UrbanCode Deploy for deployment of all built artifacts including traditional load modules, new CICS service definitions, and other platform application components

Continuous Monitoring
- CICS PA is used to further analyze and optimize performance of the production deployment
- Fault Analyzer supports the automation of fault processing

Continuous Feedback and Improvement
- And then back to CICS PA to report on mobile workload usage and generate service level agreement reports.
- CICS PA and other performance management tools can monitor applications in the production environment, and collect metrics and data that feed back into the development process for faster issue acceptance, root cause analysis, and problem resolution
- CICS CM can define approval requirements before changes are implemented and provides an audit trail for the changes that are made.

DevOps is becoming the standard operating procedure for large and complex IT environments. It enables application development and deployment teams to work in lockstep to ensure new functionality is rolled out as rapidly as possible to its business units and customers. DevOps also enables the real-time monitoring of systems during testing and deployment and enables IT professionals to incorporate the resulting insights into future deployments. The IBM CICS Tools are not just about optimizing current workloads for CPU savings, but supports optimization during the development process for new applications, not just the modernization of existing applications.

» **Solution Packs** – A few of the IBM customers interviewed for this paper have taken advantage of the IBM Solution Packs, which combine the complementary features and functionality of the IBM CICS and Problem Determination tools. While the IBM CICS Tools are available stand alone, these Solution Packs provide a discounted route to CICS Tools ownership. It should be noted that customers who have purchased the stand alone products, are eligible to upgrade to a solution pack. At the time of writing, available solution packs include:

- *CICS Optimization Solution Pack for z/OS V5.2* – Delivers a comprehensive portfolio of the IBM optimization tools for CICS including CICS IA, CICS DA, CICS PA, CICS CM, and CICS VSAM Recovery. This solution pack provides end-to-end analysis and optimization of CICS systems and applications.

- *CICS Modernization Solution Pack for z/OS V5.2* – Includes CICS IA, CICS DA, and CICS Transaction Gateway for z/OS (V9.1) to help organizations understand deployed CICS application and system resources, connect from non-mainframe devices, identify and mobile enable applications, and create the CICS infrastructure to support the increased workflows.

- *IBM Problem Determination Solution Pack for z/OS V1.1* – Provides cost effective problem analysis for z/OS sub-systems and languages with both GUI & 3270 interfaces. It includes File Manager for z/OS, Fault Analyzer for z/OS, Debug Tool for z/OS, Workload Simulator for z/OS and OS/390, Hour Glass, and Data Set Commander.

- *IBM Problem Determination Testing Solution Pack for z/OS V1.1* - Includes Debug Tool for z/OS, Workload Simulator for z/OS and OS/390, and Hour Glass, helping reduce testing time, improve application reliability and user diagnosis capabilities, and improve user's ability to regulate and monitor testing activities.

During Branham's interviews, it was often found that customers purchased CICS Tools for a specific task (e.g., CICS IA for threadsafe reporting, CICS CM for audit and control, etc.). Once implemented however, the additional benefits provided by the tools were not always investigated leaving tremendous value on the table. More than once, Branham heard "we're not using it to its full potential." And in a couple instances customers "didn't know it did that," being introduced to helpful features they already owned.

Where the IBM CICS Tools provide enough value to justify their purchase, customers have an opportunity to investigate the additional benefits that come with them to increase the value and productivity even further. For example, customers that purchase CICS PA and CICS IA specifically for the purpose of converting applications to threadsafe, now have an opportunity for additional performance tuning, region consolidation, application decommission, and the movement to CICSplex. Further, IBM reports a high renewal rate for its Software Subscription and Support, which means these customers have access to updated products with the latest feature sets and added cost benefits.

Summary

Owing to its ubiquitous nature, CICS provides mainframe customers with significant opportunity for cost restraint and increased productivity gains. Tuning these mainframe applications can provide dramatic savings, when these modifications help to postpone CPU upgrades or reduce CPU utilization. The savings associated with charges for third party software can be tremendous. Even those organizations licensing software based on Variable Workload License Charges still have a significant opportunity to reduce associated software costs.

One of the most cost effective techniques with respect to optimization and cost control can be the conversion of CICS applications to threadsafe, followed by the consolidation of CICS regions. This supports the use of parallel processing to decrease CPU consumption, simultaneously helping satisfy impatient users and/or customers through reduced response times.

CICS Tools such as IBM CICS Deployment Assistant, CICS Interdependency Analyzer, CICS Performance Analyzer, and CICS Configuration Manager also help to increase overall productivity. Some examples articulated in

"In using CICS Interdependency Analyzer we have realized upwards of a fifty percent reduction in the time it takes to identify application code and files (and DB2 Table-Views) that are no longer used. Decommissioning code will continue to contribute to cost savings through alleviated maintenance costs long after these tools have paid for themselves."

- International Health Insurance Provider

"From and ROI perspective, the predominant justification for bringing in CICS IA was the threadsafe rollout because of gained throughput and MIPS reduction, helping us save money overall. While it was brought in mainly for this purpose, we also enjoy the benefits of the cross-referencing capabilities and command flow. Using the cross referencing, we identified potential single points of failure and were able to migrate them to high availability and scalability."

- US-based Health Insurance Provider

this report include the automation of processes such as the generation of CICSPlex System Manager rules, comprehensive CICS topology discovery, or the automated migration of CSD alterations between CICS environments. Similarly, organizations can offload actual CSD change requests to application programmers, alleviating load from System Programmers, while still maintaining control of changes through an approval process, all while supporting compliancy auditing.

Finally, CICS Transaction Server supports the movement of CICS applications into the mobile space. It allows organizations to use existing enterprise services that are hosted on CICS, or to develop services that support new lines of business. Developers can develop, configure, and deploy a mobile application that connects directly to CICS Transaction Server or to CICS through IBM Worklight Server. The integration of development and operations tools (e.g., CICS Tools, PD Tools, and RDz) to facilitate the transition to the DevOps approach helps accelerate and support rapid application development, testing, versioning, and rapid deployment, ensuring a high level of software quality and system performance.

Organizations need to know that they have done everything they can to optimize their existing applications to help postpone the added costs that come with new hardware purchases. This tuning can also have significant ramifications with respect to additional software purchases. Organizations need to know that end customers are being provided with the best response times possible and through their preferred interfaces to help prevent the defection to competitors.

In efforts of assessing your current state and whether there may be areas of improvement or cost savings, consider the following as you plan ahead:

» Are you still using applications that could benefit from conversion to threadsafe?

» Do existing applications have a number of affinities preventing optimal system and workload management through CICSplex?

» Do your programmers spend an inordinate amount of time tuning applications?

» Are you using more contractors or new staff? What more can be done to reduce learning curves and optimize their value?

» Are you paying heavily to maintain outdated applications that should be decommissioned?

» Have you considered moving data contained in VSAM to DB2 for better accessibility?

» Are you anticipating new processor purchases as a result of continued growth?

» Have you considered how to mobile enable and/or Web Service enable your CICS applications?

» Do you spend a significant portion of the week "putting out fires" and handling support cases associated with new application deployments?

» Are your programmers and support staff using the latest features to maximum benefit? Are you aware of the most recent updates and how they can help?

As a final thought, organizations should consider the latest in IBM's modern development tooling for CICS as part of any investment plans for the future. There is significant value that can be achieved through these types of tools, with an immediate return on the investment. Based on real world examples with broad relevance, it is clear that there are many benefits to working with the latest in IBM's modern development tooling.

About Branham Group Inc.

Branham Group is a leading industry analyst and strategic consulting company servicing the global information and communication technology (ICT) marketplace. Branham Group assists ICT companies and related institutions in achieving market success through its custom consulting services (Planning, Marketing and Partnering), and through its multi-client research subscription programs (Digital Health, Outsourcing, and Green IT). Branham also produces an annual listing of the top ICT companies in Canada (www.branham300.com), tracks the Canadian Outsourcing industry (www.branhamoutsourcing.com) and monitors over 450 Healthcare ICT vendors.

For more information regarding Branham Group, please visit www.branhamgroup.com.

Branham Group Inc.
45 O'Connor Street, Suite 1150
Ottawa, ON
Canada K1P 1A4
Tel: 613.745.2282
Fax: 613.745.4990
www.branhamgroup.com