



Managing your CICS systems now and in the future.

By Paul Johnson, IBM Software Group

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Executive summary

Enterprise-management capabilities for IBM CICS® Transaction Server enable effective management of large runtime configurations through modern user interfaces, so that you can meet demanding service-level objectives. These enterprise-management capabilities, supplied through IBM CICSplex® System Manager, continue the integration, simplification, monitoring and automation trends in IBM systems management.

CICSplex System Manager is an integral part of CICS Transaction Server. Its role is to reduce the complexity of operating multiple CICS regions by providing single-system image (SSI) access to all major CICS management functions, such as resource definition, operation, monitoring, real-time analysis and workload management, as well as services at the business-application level, through an easy-to-use Web user interface (WUI). You gain access from a single point of control, from which you can manage resources regardless of their physical location. A comprehensive application programming interface (API) is also provided to support strategic integration with complementary tools, as well as to enable automation and scripting of system-management tasks.

The latest enhancements to CICSplex System Manager make it even more productive in helping manage your enterprise. In particular, the WUI can not only make day-to-day operations quicker and easier, but it can also make it easier to transfer skills among your employees. As part of CICS Transaction Server, the CICSplex System Manager WUI is a powerful argument for migrating to the latest version of CICS Transaction Server.

Introduction

The CICSplex System Manager element of CICS Transaction Server for z/OS, Version 3.1 is a system-management tool that enables you to manage multiple CICS systems from a single control point. Enterprises in which CICSplex System Manager can be useful range from those running 10 to 15 CICS systems, to those running 200 to 300 (or more) CICS systems. In the latest IBM Multiple Virtual Storage (IBM MVS™) sysplex environment, having such large numbers of CICS systems to support a transaction-processing workload is becoming increasingly common.

As it relates to CICSplex System Manager, a CICSplex is any grouping of CICS systems that you want to manage and manipulate as if they were a single entity – in other words, a management domain, made up of those CICS systems for which you want to establish an SSI. A CICSplex managed by CICSplex System Manager could include every CICS system in your enterprise. Or you could define multiple CICSplexes, each of which would include some logical grouping of CICS systems.

For example, a CICSplex could comprise all CICS systems on a particular MVS image, all CICS systems accessible by a subset of your users, or all CICS systems serving a particular geographical area. Furthermore, the composition of a CICSplex can be altered without affecting the functions of the underlying CICS systems.

CICSplex System Manager provides a range of functions to help you productively manage your entire CICSplex. You can define resources, control operations, set thresholds for warnings, automate operations – and dynamically manage your whole workload. The strategic direction for performing all of these functions is through a modern browser interface, the CICSplex System Manager WUI, which runs on a dedicated CICS region associated with CICSplex System Manager. The WUI is an alternative to the MVS/Time Sharing Option (TSO) Interactive System Productivity Facility (ISPF) user interface, which IBM plans to remove in a future version.

An important architectural feature of CICSplex System Manager is its API. You can use API commands in REXX scripts, and you can use them in your own application programs to monitor and control resources and CICS systems. The commands can be used with C, PL/I, COBOL and Assembler by way of the EXEC CPSM verb.

IBM's strategic intention is to integrate IBM system-management tooling with CICSplex System Manager through its API. You can see the first steps in this strategy in the integration of IBM CICS Configuration Manager software.

The five key functions of CICSplex System Manager are:

- Business-application services (BAS), which manage resource definitions
- Operations (OPS), which provides access to operations, monitoring and statistics data
- Monitoring (MON), which enables you to sample operations, monitoring and statistics data
- Real-time analysis (RTA), which enables you to detect and automate situations
- Workload management (WLM) which enables you to administer dynamic throughput in a CICSplex environment

All CICSplex System Manager components, resources, system-management requirements and the relationships between them are held as objects in a data repository. These objects can be manipulated through the user interface views. The batched repository-update facility is provided for the batched creation of CICSplex System Manager resource definitions. Figure 1 shows an overview of the components in CICSplex System Manager.

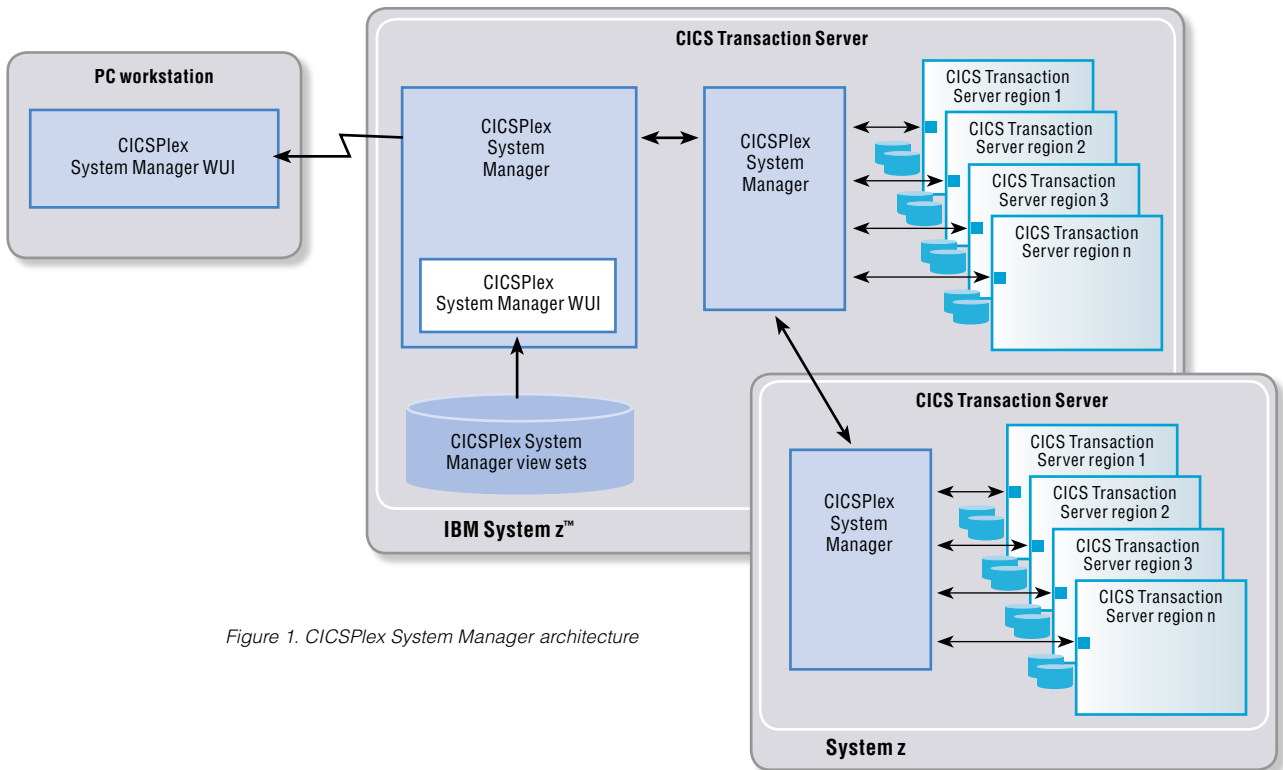


Figure 1. CICSplex System Manager architecture

The WUI

The CICSplex System Manager WUI enables you to easily carry out operational and administrative tasks necessary to monitor and control CICS resources. You can link to the WUI from any location that provides IP network connectivity to a host from a workstation to the WUI server.

Traditionally, CICSplex System Manager user interaction has taken place using the MVS/TSO ISPF user interface. However, the alternative Web browser-based interface is the preferred interface for CICSplex System Manager. This interface requires you to use a second dedicated CICS region known as a WUI region. The WUI uses CICS Web services to enable interaction with a Web browser over TCP/IP. A page of information from the WUI region presented on the browser is known as a *WUI view*; a collection of WUI views is known as a *view set*.

Security

The new version of the WUI provides an interface to the full function of CICSplex System Manager. You might be familiar with the TSO interface, and you might be curious about how you can improve on the speed of the familiar command-line entry. You might even wonder if the WUI can be as secure as the TSO interface.

In this context, the term WUI means that it provides you with access to CICSplex System Manager through a Web browser. The Web browser replaces the TSO terminal and provides a more graphical and familiar experience for people new to the platform, and more-effective facilities for the advanced user. No other significant change has been made to the architecture and the components used to support it. No actual Web server is involved; the browser connects directly to a CICS region that serves up the HTML using the CICS Web support.

So, broadly speaking, the browser replaces the 3270 terminal (or, more likely, an emulator); HTML replaces 3270 (which probably goes over TCP/IP through TN3270, anyway); and the requests are still carried out in a combination of CICSplex System Manager components in the managed CICS regions. This function means that the infrastructure isn't vulnerable to the sorts of common issues suffered by other Web applications, because no other server is involved.

Tailoring the WUI to work the way you work

The WUI adds some important capabilities to the traditional interface. It comes with a complete set of menus and views that encapsulate a wide range of CICS knowledge about the various relationships between the objects managed in CICS. You can also customize it to present views that are specially tailored for you – or for any other user.

You can build your own menus and views using a view editor. In each view, you can add hyperlinks between levels of detail: for instance, from tasks for a given unit of work in the CICSplex to specific task detail. Or between resource relationships, so that you can navigate to a program referenced by a transaction. And you can add filters or rules to alert you when a threshold that you've defined is reached.

The view editor is an online, Web-based tool that leads you step by step through the process of creating and previewing your views and menus without requiring any knowledge of HTML. You can design views and menus from scratch or start with one of the existing views. And the WUI incorporates security features that enable you to restrict the use of the view editor to nominated users.

Probably the most obvious way to gain productivity is to build task-based views. When you create a task-based view, you're effectively creating a mini-workflow that walks you through a series of process steps to achieve a specific objective. You can structure your data in a task-oriented way. You can organize the user interface by user task or by application, define the links between views, and define the buttons that will appear on a display and what they will do. And you can have as many views of the same object as you like, each one showing a different selection of data depending on the user task.

If you have a Java™ technology-enabled browser, you can use graphical presentations of your data. For example, you could have either a bar gauge that shows the number of tasks active in a CICS region, or a warning light that you can configure to change color or flash, depending on the threshold values you define for the field.

Capturing enterprise-specific knowledge

Often, tasks require a series of steps for completion. For instance, you might need to perform each of the following steps to shut down a target region in an active workload:

- 1) *View the active target region for a workload and, from this view, select a target region and quiesce it.*
- 2) *View affinities for the selected workload, and check that there are no active affinities that will be affected by shutting down the target region.*
- 3) *View active tasks in the region, and check active tasks in the target region.*
- 4) *View CICS target regions, and shut down the target region.*

You can develop menus that can guide any other user through the task. For each of the tasks being performed in your enterprise, you know which CICSplex System Manager objects are involved in the task, and so you can create a menu for the task that contains those objects. In this way, you can create menus that reflect your business procedures. When you build the task view, you're in effect capturing expert knowledge and making it available to a wider audience. Doing this helps you optimize how fast the task can be completed – and helps secure the future of your operations.

You can expand on the menus by adding your own customized help information for each view and menu in your national language. For example, you could describe the task to be performed, or provide contact names and telephone numbers that are specific to your location. The help documents might be located on the CICS system that you have selected to act as your WUI server, or each menu and view might be linked to an existing Web-based procedures manual on an external server. Figure 2 shows the WUI menu editor and its relationship to the main WUI menu. This editor also supports tabular and detail view customization.

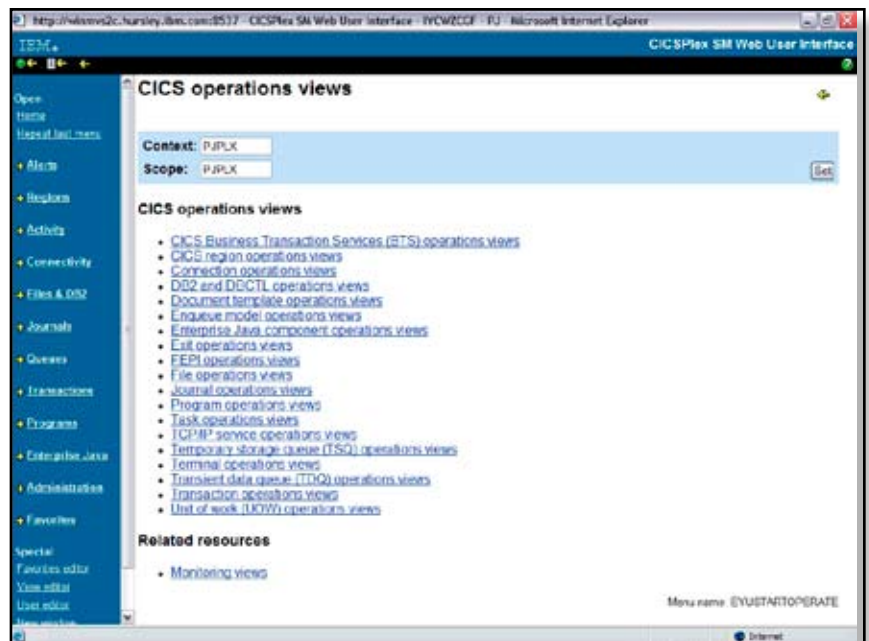


Figure 2. The WUI menu editor

Making the most of the new WUI

The new version of the WUI can help you do your job more easily and quickly, and help you share your knowledge with other, less-experienced people. You'll find a “favorites” mechanism that you can use to save and select your favorite views so that you can focus on the specific subset of views applicable to you as a CICSplex System Manager user. And, because the WUI was first added to CICSplex System Manager, the screen design has been enhanced to help improve usability.

CICSplex System Manager delivers a modern user interface that enables you to access all the different system-management functions available for CICS Transaction Server. Establishing a CICSplex System Manager environment configured to your enterprise needs can help reduce the time it takes to implement new CICS functions and helps reduce migration complexity.

BAS

BAS provides an alternative to resource definition online (RDO). RDO is based on a structure in which definitions are tied to a single group, and groups are processed sequentially from a group list. BAS frees resource definitions from associations with only one group. This capability means that a resource definition can be used and reused, and associated with more than one group as needed. BAS enables you to associate your resources according to their use within your enterprise, so that you can choose to manage individual resources rather than a group. For example, you could disable all the files associated with your payroll system without affecting any other files in the CICSplex environment.

This key aspect of BAS enables you to manage your enterprise in terms of your business applications, rather than your CICS systems. You can manage your resources at the application level by providing a single point of definition for your resources. All the resources for the CICSplex, and the relationships between them, are held in one place on the CICSplex System Manager data repository, giving a single-system image for the CICSplex. CICSplex System Manager produces local and remote instances of a resource from a single definition. BAS also provides logical scoping that enables you to link and manage your resources according to their business relationship, rather than by their physical location in a CICS system. You can install these resources, either automatically when the CICS system is started, or dynamically, as required, into a running CICSplex.

A business application can be any set of resources that represent a meaningful entity in your enterprise. Within the application, you can group together resources of a particular type and define the runtime characteristics of that group. At run time, you can refine the selection of resources to be installed by using a filter expression, and you can change the resource attributes by using an override expression.

Change-control management using BAS

BAS can help you to manage your change-control tasks. It enables you to install resources throughout the CICSplex environment by issuing a single request. You can use a single resource definition to install multiple instances of the resource in multiple CICS systems, and you can use the same resource definition to install both local and remote resources. To install resources either automatically or dynamically, CICSplex System Manager needs to know in which CICS systems the resources should be installed and how the resources will be used.

The *target-scope value* identifies the CICS system or systems where CICSplex System Manager should install the resources. A target-scope value is required for all types of resource definitions. These CICS systems are the primary target for resource installation, and you must indicate whether a resource is local or remote to the target CICS systems. The *related-scope value* identifies a single CICS system where resources identified as remote to the target system should be installed as local resources. The *usage value* indicates whether resources are local or remote to the target CICS system. Local resources are installed only in those systems identified in the target scope. Remote resources are installed as remote resources in the target system, and as local resources in the related CICS system. To determine which resources to install and where, CICSplex System Manager checks the target-scope, related-scope and resource-group values in your resource assignments, resource descriptions and the related associations.

IBM CICS Configuration Manager

You can use IBM CICS Configuration Manager for z/OS to support your CICS resource-definition administration and change-control management requirements in conjunction with CICSplex System Manager. CICS Configuration Manager provides a common interface to CICS system-definition files or CICSplex System Manager data repositories. Administration and management of CICS resource definitions are accomplished based on CICS configurations. Whether or not the relevant CICS resource definitions reside on data repositories or on DFHCSD files (that is, RDO files) is transparent to the user of CICS Configuration Manager.

Through its online-management interface, CICS Configuration Manager provides a single, system view of your resources that is completely independent and transparent to the underlying repository. This feature means that you can freely view, update and migrate resource definitions between CICSplex System Manager and DFHCSD-managed CICS regions in both directions. If you migrate CICS resource definitions from DFHCSD-managed CICS regions to a target CICSplex System Manager data repository, you could, after testing the definitions, fall back to DFHCSD definitions by using a single backout command. This capability enables you to migrate CICS resource definitions to BAS much more easily and with minimal risk to your business.

CICS Configuration Manager provides facilities to administer and manage CICS resources that enable you to define, update and move CICS resource definitions. Resources can be managed through the online TSO interface similar to the RDO process.

Change-control management functionality allows you to arrange CICS resource definitions in migration packages, which you can then distribute to single or multiple CICS regions. CICS Configuration Manager can follow rules you set to adjust resource attributes when moving packaged resource definitions to the targeted environment. A single command can migrate a package of CICS resource definitions across environments, automatically transforming environment-specific attributes, which speeds implementation while helping to eliminate manual-entry errors. The ability to approve change-control management functions means that a resource-definition change can be made only if it successfully completes its approval cycle. This approval process provides opportunities for participants to catch mistakes before they affect system availability.

CICS Configuration Manager also provides robust auditing and reporting facilities. An audit log records every new or modified definition or package along with its date, time and list of approvers. You can also reverse changes, reverting to previous definitions, even several enhancement states back. You can generate reports to identify redundant definitions and resources that are defined multiple times. And you can also compare resource definitions from multiple CICS configurations, as well as search and filter by criteria such as name, type, group and attribute values.

Operations

The OPS function in CICSplex System Manager is essentially similar to that of CEMT. Thus, you can examine and alter the CICS system resource definitions initiated at startup, while the region is running. Views also show more information than does CEMT. Operational data is augmented by CICS monitoring and statistics data. You can view information about resources across all CICS systems in a scope, and you can perform actions on resources across all systems in a scope in one operation.

From any point of control, you can take advantage of SSI to perform tasks, either across the entire CICSplex or across a selected subset. Display information about the current status of one or more instances of a CICS resource in an enterprise, and change the status of the resources with a single entry. And issue an action command to affect the status of the displayed resources.

You use the WUI or the ISPF user interface to issue the commands.

The responses are displayed in panels known as operations views, which can summarize related facts and provide access using hyperlinks to other, related information. The operations views mirror the functionality currently provided for CICS systems. Operators can therefore work in essentially the same way as they are used to, without any change to their basic approach to daily system activities.

Monitoring

CICS monitoring collects data about the performance of all transaction supplied by CICS Transaction Server and users during online processing for later offline analysis. You can choose which classes of monitoring data you want CICS to collect, from three types:

- *Performance data*
- *Exception data*
- *Transaction-resource data*

Performance data is detailed transaction-level information, such as the processor and elapsed time for a transaction, or the time spent waiting for input and output. CICS Transaction Server writes at least one performance record for each transaction that is being monitored. Performance data is collected at system-defined, event-monitoring points (EMPs) in the CICS code, but if you want to gather more performance-class data than is provided at the system-defined EMPs, you can invoke user-defined EMPs in your application programs. You can use these additional EMPs to count the number of times a certain event occurs, or to time the interval between two events, for example.

Exception data provides information about exceptional conditions suffered by a transaction, such as queuing for file strings, or waiting for temporary storage. This data highlights possible problems in system operation. CICS Transaction Server writes one exception record for each exception condition that occurs.

Transaction resource data provides more transaction-level information about individual resources accessed by a transaction. Currently, the transaction-resource class covers file and temporary-storage queue resources. CICS Transaction Server writes one transaction-resource record for each transaction that is being monitored, provided that the transaction accesses at least one of the resources for which monitoring data is requested.

The CICSplex System Manager monitoring component samples operations, monitoring and statistics data and calculates averages, rates, totals and percentages from raw statistics data for resources including CICS systems, connections, IBM DB2® threads, files and data tables, CICS journals, programs and transactions, temporary storage, terminals and transient data queues.

Real-time analysis

CICSplex System Manager isn't restricted to telling you about a problem only after it has occurred. The real strength of CICSplex System Manager lies in its ability to detect potential problems with CICS resources because it can detect and warn of the slightest change in the status of a CICS resource. For example, CICSplex System Manager can tell you that resource contention is growing, or that the dynamic storage area (DSA) free space is falling, or that the number of users of a particular transaction is high. These can all be indicators of future problems that you can avoid by taking preventive action.

The CICSplex System Manager RTA function provides automatic, external notification of conditions in which you have expressed an interest. The notification can take the form of a console message, a generic alert to IBM Tivoli® NetView® systems, or both. Real-time analysis is not concerned solely with commonly recognized error conditions; you can ask to be notified about any aspect of a resource's status. Real-time analysis also enables you to take actions without having to use an external automation product.

There are several benefits of using RTA:

- *Automatic actions can be taken within CICS, removing the requirement to use external automation products.*
- *Potential problems can be detected and corrected before they become critical.*
- *User performance can be improved by the early detection of bottlenecks that could affect response time.*
- *The volume of information presented to operators can be reduced by filtering out unnecessary messages.*

Using RTA, you can invoke both system availability monitoring (SAM) and RTA resource monitoring, which includes master authentication server (MAS) and analysis point monitoring (APM).

The SAM function monitors basic CICS system state and planned hours of availability. If any of a set of predefined conditions occurs while a CICS system is being monitored, CICSplex System Manager sends out external notifications at the start of the condition and also when it is resolved. A basic SAM setup detects short-on-storage condition, system dump in progress, transaction dump in progress, system has reached MAXTASKS limit and tasks stalling because of resource contention.

Using the MRM function, you can monitor the status of any specific or generic CICS resource, and be informed when its status deviates from a specified norm. You can also select both the resource status you are interested in and the type of external notification it generates – for instance, when the status of a resource reaches a certain threshold. The threshold can be simple (status of Connection SYS1 is RELEASED) or made more sophisticated by combining simple thresholds with logical operators (Use Count of transaction ABCD is greater than 50 OR less than 5). It's possible to specify a number of times the threshold must be breached before CICSplex System Manager issues an alert or takes action.

When you need to analyze generic resources, you can test an aggregation of the status (for example, average Use Count across all transactions matching M*). A threshold can apply to an individual system or groups of systems, and each system in the group will issue a notification when required. You can also use MRM to monitor resources not managed by CICSplex System Manager with user-written status programs.

The RTA APM function is the same as its MRM function, except that when resources are monitored in multiple CICS systems, the occurrence of the same problem in any number of those CICS systems can result in one external notification rather than several. APM doesn't support user-written status programs for monitoring non-CICS resources. In all other respects, however, APM offers the same opportunities as MRM for early detection of potential problems, and for an automated response in such situations.

Workload management

CICSplex System Manager workload-management function provides you with the capability to control where your work requests are run to optimize performance and workload throughput. The workload-management function dynamically routes work requests to the most suitable target region from a predefined set of target regions.

In a CICSplex environment, resources such as transactions and programs required in one region can be owned by another. For example, you may have a terminal-owning region (TOR) that requires access to transactions owned by an application-owning region (AOR). You can specify the location of a resource when you are designing your system. Then, requests for a specific resource are always routed to the same region. Typically, the location of the resource is specified in the installed resource definition. This is known as *static routing*.

With dynamic routing, the location of the resource is decided at run time. In CICSplex System Manager, the decision on where to run a piece of work is made by the user-replaceable, dynamic-routing program that creates the environment necessary for CICSplex System Manager technology-based dynamic routing, and sets up the runtime environment. It balances work from multiple routing regions across multiple target regions.

A target region is selected using one of two methods: the queue method routes work to the region with the shortest queue of work, whereas the MVS goal method uses the same criteria for target selection as the MVS system. Work to be routed can include transactions, dynamic program link requests, EXEC CICS START TRANSID TERMID requests, CICS business transaction services (BTS) processes and activities, 3270 bridge requests, and Enterprise JavaBeans (EJB) requests.

Summary

CICSplex System Manager is the long-term strategic tool for managing all the CICS systems across your enterprise. It has an architecture and API that lend themselves to integration with complementary tools from IBM and other vendors, and its range of functions encompasses the system definition, operations, analysis and automation tasks that occupy CICS system administrators. In addition, its WUI can make it extremely productive. The benefits of CICSplex System Manager add considerable weight to the arguments for migrating to the latest level of CICS Transaction Server.

For more information

To learn more about how to effectively manage your enterprise CICS systems, contact your IBM representative or IBM Business Partner, or visit:

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IBM United Kingdom Limited
Hursley Park
Winchester
Hampshire
SO21 2JN
United Kingdom

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