

## IBM CICS Interdependency Analyzer for z/OS, Version 5.1

### Recent enhancements

- Support for CICS® Transaction Server V5.1
- Enhanced business application analysis with CICS TS V5.1 application support
- New threadsafe analysis plug-in view
- Improved installation and configuration
- DB2® data lifecycle management
- Native SQL language stored procedures
- Graphical visualization view of resources

### Features

- Business application analysis
- Intuitive CICS Explorer® plug-in
- Centralized data access using DB2 database
- Ability to see *uses* and *where used* relationships
- Powerful query comparison feature
- Command Flow gives advanced program analysis
- Identification of threadsafe / non-threadsafe programs
- Isolation and removal of affinities
- Faster CICSplex® SM workload management implementation
- Highlighting of CICS web service candidates
- Tracking of Task Control Block (TCB) switches

### Benefits

- Gain new insight into your application structure
- Enable informed decision-making
- Optimize CICS resource use
- Accelerate CICS version upgrades
- Support Development and Management processes
- Reduce the time of problem resolution
- Migrate, reuse, and extend CICS applications more quickly

### The power of understanding

To stay competitive in today's rapidly changing market environment, businesses are increasingly adopting new technologies like web services, events, and Atom feeds to help them to respond to marketplace changes with increased speed and agility. Whatever the technology, you need a flexible and responsive IT infrastructure that lets you change your business quickly and cost-effectively. At the same time, you are under pressure to optimize your IT operations — improve the performance, availability and reliability of your existing applications, balance increasing workloads and minimize disruption of routine application maintenance to the user.

IBM® CICS Interdependency Analyzer for z/OS® V5.1 (CICS IA) is a dynamic discovery tool that helps you to understand the relationships, dependencies, and flows of CICS Transaction Server (CICS TS) applications, giving you the insight to update, modernize, and optimize them with confidence.

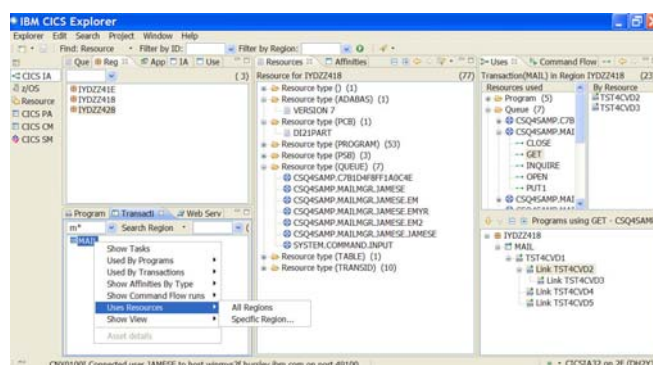


Figure 1 The CICS IA plug-in for CICS Explorer helps you understand application topology

Features like Command Flow, a flexible query engine with a wide range of built-in analysis queries, coupled with an updated CICS Explorer plug-in (see Figure 1), make it possible to achieve even better reuse, management, and control of your applications through improved understanding.

CICS IA helps architects, developers, testers, and system programmers with projects such as application modernization, CICS version-to-version upgrade, threadsafe analysis, affinity removal, and web service refactoring that depend for their success on deep knowledge of application, system, and resource relationships.

The latest versions of sub-systems are supported including CICS TS V5.1, WebSphere® MQ V7.1, DB2 10, and IMS™ 12.

### Collecting relationship data

CICS IA automates detection of runtime relationships among key resources within your CICS system. It records this data in a DB2 database and enables you to analyze the collected information, build a resource-relationship map and use this data in your daily development and operations management processes.

CICS IA includes several components to collect resource-relationship data (see Figure 2). The *dependency collector* intercepts CICS system commands, as well as commands that can create affinities, and records the details of the resources used.

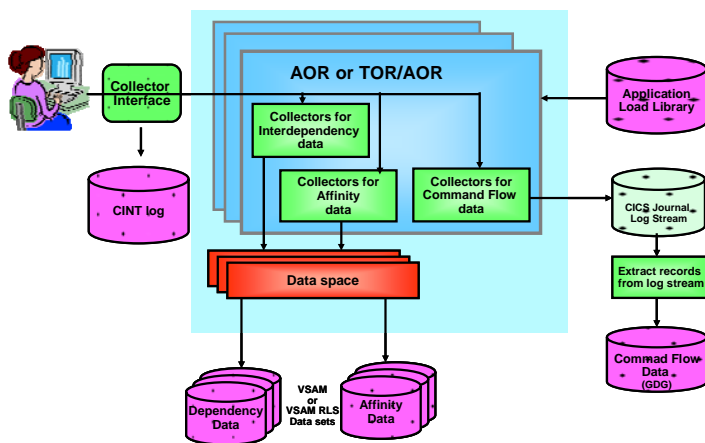


Figure 2 CICS IA V5.1 data collection architecture

The *scanner* component scans the load-module data sets collecting information like programming language and the CICS commands included in the program. Scanner queries show *potential* CICS command use, while dependency queries show *actual* usage. New queries enable comparison of potential versus actual API usage, indicating possible dead code or missing test cases.

The *Command Flow* feature captures all CICS, DB2, IMS, and WebSphere MQ commands in chronological order, along with a wide range of related information including current and previous TCB ID, response and reason codes, times of day, CSECT offset, and much more. With Command Flow, you can see the resources used by a specific instance of a transaction, very useful for threadsafe analysis and to help you understand the flow and structure of umbrella transactions.

The collected data is efficiently stored in an IBM System z® data space to help reduce data-collection overhead (Command Flow data is initially saved to a

CICS user journal), and then offloaded to Virtual Storage Access Method (VSAM) files. Under operator control, the VSAM files are aggregated together and stored in a DB2 database.

CICS commands monitored by CICS IA include CICS application programming interface (API), CICS system programming interface (SPI), and CICS Front End Programming Interface (FEPI) commands. These commands include new and modified commands introduced in the latest release of IBM CICS Transaction Server, V5.1.

CICS IA V5.1 can detect resource information for Business Applications deployed as part of the “Platform as a Service (PaaS)” capability introduced in CICS TS 5.1. CICS IA captures Application associated data for both the Dependency and Command Flow Collection.

CICS IA can detect *loosely-coupled* dependencies between the event source, such as program, queue, file, and the *event* and its *binding* and *capture specification*, which are created when applications generate business events. New plug-in queries can help you to see the events that may need to change, when, for example, file, table, or queue record structures are modified.

CICS IA captures detailed information about the CICS Global User exits (GLUEs and CICS task-related user exits (TRUEs)). This enables you to understand the exits used in your environment and how this can impact your CICS TS upgrades. You can also map the TRUE entry points to more meaningful names. Mappings for a number of IBM-supplied TRUEs are provided and customers can supply their own mappings for other vendor-provided and in-house TRUEs, helping you to understand the vendor products used in conjunction with your applications.

Non-CICS commands monitored by CICS IA include calls to DB2, IMS, and WebSphere MQ resources. Relationship data for ADABAS files used in conjunction with Natural programs can also be collected.

### Understanding CICS resource relationships

Consistent use of the CICS IA collectors helps to create a comprehensive online database. You can access the database using the CICS IA plug-in for CICS Explorer to gain a better understanding of the following artifacts:

- Selected resources of CICS regions

- Resources used by a transaction, program or service
- Ability to view and delete resource data used by a Business application deployed as part of the new CICS TS V5.1 PaaS capability
- Cross-region applications and dependencies
- The resource topology within a particular CICS region
- Discovered data (such as affinities by region)
- Transaction flow for normal and error paths
- Impact analysis – closing files, VSAM file recovery, migrating from VSAM to DB2, and so on
- Knowledge of the first time and last time a particular CICS resource command was issued
- Affinities that need to be removed, when planning for dynamic workload balancing
- Unused resources
- Resources used by different programs
- TCB switching activity, for threadsafe analysis
- Ability to view and delete dependency resource data by collection ID.

CICS IA not only builds relationships for program interactions using the CICS LINK, XCTL and LOAD commands, but also for native language calls using Enterprise COBOL, PL/I languages, and even Software AG Natural fourth-general language. If you use Natural and would like to know how your Natural programs relate to ADABAS files and other CICS resources, CICS IA can help you.

CICS IA provides you with a cross-system view of resources used by a transaction. All collected relationships can be viewed using the intuitive plug-in for CICS Explorer.

In each new release, CICS IA expands the scope of its data capture. CICS IA V5.1 captures information about the new 64 bit SPI / API calls introduced in CICS Transaction Server V5.1, such as GETMAIN64 and FREEMAIN64 .

CICS IA also captures information about any EXEC CICS command that has more than one resource associated with it; for example, collecting both the program and channel name, when a channel is associated with an EXEC CICS LINK program. In

this case, the program is referred to as the primary resource and the channel as the secondary resource. CICS IA maintains such information about related resources so that its plug-in for CICS Explorer can present a useful hierarchical view of resource relationships.

### Navigating relationships

CICS IA provides two ways to query collected resource-relationship data online: the plug-in for CICS Explorer, built on Eclipse technology, and a number of sample queries that can be run in batch or via any SQL interface such as SPUFI. CICS IA also provide some reports that run against the VSAM file (see Figure 3).

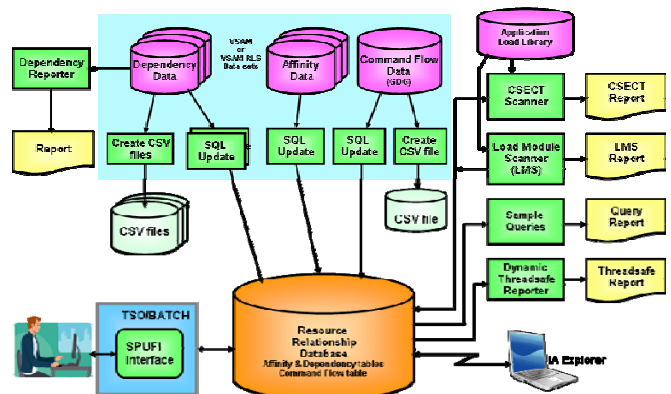


Figure 3 CICS IA V5.1 reporting architecture

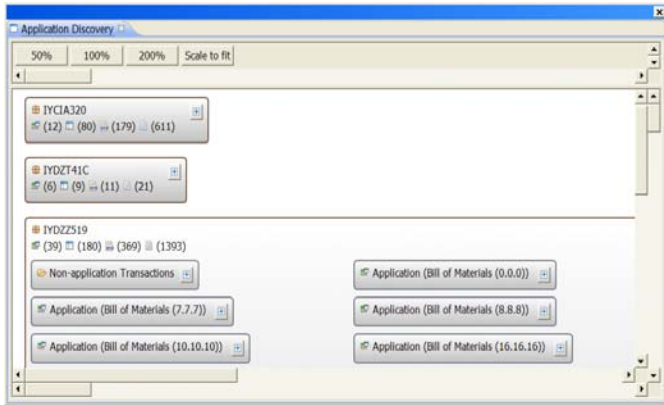
The CICS IA plug-in helps you to navigate intuitively through your CICS resource-relationship data and provides easy-to-use facilities to manage this data and use it in day-to-day analysis. You can interrogate the recorded data to display end-to-end relationships dynamically, such as the files used by a transaction and the functions involved, such as browse or update.

The CICS Explorer interface enables point-and-click navigation, making it much easier to follow a sequence of resource relationships. You can also use the plug-in's data filtering, helping to reduce the volume of data displayed, so that you can identify the required relationships more easily.

The ability to easily see both *uses* and *where used* relationships is particularly valuable when changing record, table, or message layouts. A simple right-click of the mouse shows you all of the programs that use a particular file, so that you can plan your development activities with confidence.

The CICS IA V5.1 Explorer plug-in provides a new *graphical visualization* view. This view allows you to see instantly the relationship between your CICS

regions, your applications, your transactions and your programs. By selecting an application, transaction or program as a focal point you can zoom in to see all the resources used by the selected focal point. The use of filtering on resource type and resource name will allow you to discover which other regions, applications, transactions and programs use the selected resources, as shown in Figure 4 .



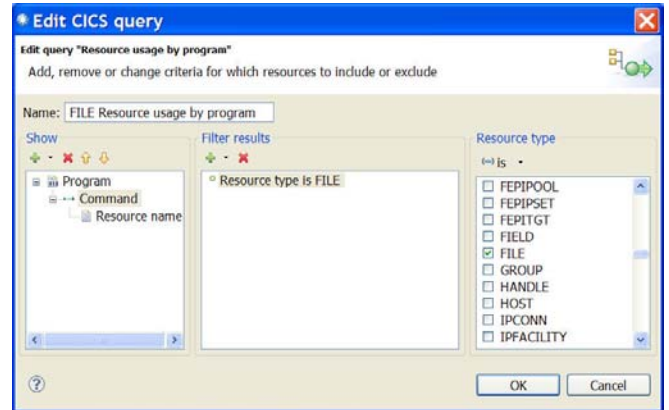
**Figure 4 Understand application relationships in new graphical visualization view**

### Powerful query management

A comprehensive set of Structured Query Language (SQL) queries provided with CICS IA enables you to use the collected data to run comparisons of applications across regions or all interdependencies across regions. This capability can help you to determine, for example, if all the resources required by an application are available following migration from a quality-assurance region to a production region.

Queries can include all the resource types collected by the latest level of CICS Transaction Server. For example, you can collect data to identify all transactions that use a resource type of container.

A wide range of standard queries are supplied and you can easily modify these or create new ones to meet your individual needs (see Figure 5). You can create simple or complex folder structures to save your queries.



**Figure 5 Use the CICS IA plug-in to build and organize your customized queries.**

The output from queries can be saved for subsequent analysis or printing. Saved output from two or more queries can also be used in the *query differencing* function. This function automatically compares the output from multiple queries, for example to show those programs that are both threadsafe and affinity-free, to see relationship changes after an updated version of an application is deployed, or to highlight changes following deployment of a new version of an application to ensure that all identified affinities have been removed.

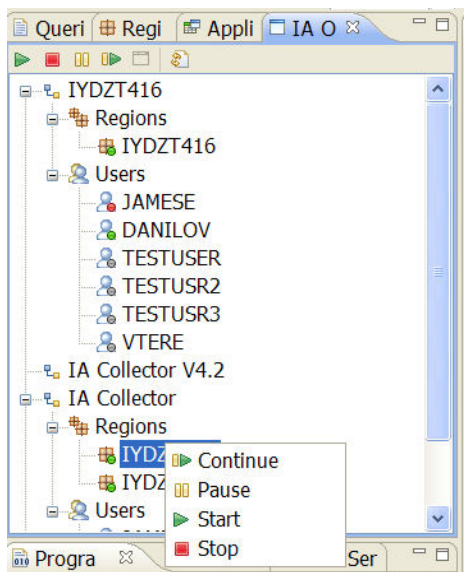
When CICS IA loads dependency data into the database you can assign it a *collection identifier* which can simply be a name or a name and date. The collection ID allows you to manage your CICS IA data better and you can compare data collected for different collection IDs which is particularly useful if you are planning an application upgrade. You can collect data with meaningful collection ids before and after the change, and compare this data.

You can also access resource-relationship data collected in the DB2 database offline using the CICS IA reporter component to produce a comprehensive, printed report of the dependency information for a selected CICS region.

The CICS IA scanner component allows you to scan the load-module data sets to detect and report the EXEC CICS commands that can cause transaction-resource dependency. Summary or detailed reports about each identified application load-library module are available. In CICS IA, the same attributes are collected by the scanner and by the online collectors, producing a consistent view.

## Controlling data collection

Using an online interface, you can control the status of the CICS IA collectors in all enabled CICS regions from one CICS terminal. This capability provides a single point of control for configuring CICS IA options for each region. You can turn data collection for multiple CICS regions on and off, or pause it with a single CINT command to speed selection. This capability helps eliminate the need to edit all CICS regions using the configuration menus to select the resources to be collected.



**Figure 6 Control command flow operations using plug-in**

Command flow control operations, for example to start and stop flow tracing (see Figure 6 **Error! Reference source not found.**), can now be driven directly from the new *IA Operations* view in the CICS IA plug-in, when used with a CICS Atom service. The CICS 3270 interface can also be used to drive both the CINT transactions and the new Command Flow control transaction, CINC.

CICS IA provides a timer-based control capability that enables you to set the data collector to start at a given time of day to fit your schedule. For example, you can set it to collect data at critical times, such as at year end, or to avoid the risk of affecting performance at times of highest workload. You can also choose to set it to collect data for a particular region for one hour of the day and then for another region for the next hour

CICS IA also enables you to exclude defined programs and transactions from data collection. This capability means that data is collected only for programs and transactions that you choose, helping to

eliminate extraneous data and reduce overhead during data capture.

CICS IA V5.1 can also help to manage the life cycle of CICS IA dependency data, allowing users to compare the behavior of different versions of CICS applications, and manage space utilization more easily. Users can identify dependency data using the CICS IA collection ID or the CICS TS application ID, and purge redundant data from DB2.

## Scenario: Lost documentation

CICS systems have supported business growth for decades. Over time, a variety of application development techniques and deployment methods have been used to make application and system changes. However, the documentation, and even source code, for these changes might no longer be available or, in the case of packaged applications, you might never have had the detailed documentation that you now require.

Even if the documentation and source code are available, it can still be difficult to investigate CICS resource relationships manually because of project schedule constraints, after a merger or an acquisition, or when new people join the team.

With CICS IA you can quickly understand the structure, flow, interactions, and relationships of such applications and reconstruct some of the lost documentation, reducing the time and the risk of errors during maintenance.

## Scenario: Maintaining business applications

In prior releases of CICS IA, you could associate key programs and transactions with a business application, for example Order Entry, and run queries to show all resources, actually used by the application. The ability to analyze the relationships at the business application level helps by providing a view of the big picture, for example if you need to deploy the application elsewhere. Now, CICS IA V5 can also use the new CICS TS V5.1 APPLDEF identifier to provide a more consistent view of the business application relationships.

You can use the collected data to help identify resource relationships within your CICS systems. System managers can use this information to maintain the integrity of your CICS systems, enhance the performance of your business applications, and plan application changes, such as migrating to new servers, performing CICS version-to-version upgrades, or

creating new interfaces to enable your core applications to participate in SOAs.

### Scenario: Event life-cycle

CICS TS V4.1 introduced the ability to generate business events when specific actions occurred to named CICS resources, for example when a new customer order with a high purchase value is inserted to the CUSTORD file. The event specification is created non-invasively using the Event Wizard in the CICS Explorer. With CICS IA, you can open the Event Wizard in context, by right-clicking on a CICS resource in any of the CICS IA views, and the wizard will be preloaded with key *capture point* and *filter* details like the resource name, CICS command, and the name of the invoking transaction and program.

If, over time, it becomes necessary to modify the record structure of the CUSTORD file, for example to include a customer email address, a CICS IA query can be used to determine which, if any, business events will also need to be changed. Having changed the event specification you will, of course, also need to change the downstream consumers of the event.

### Scenario: Modernizing applications

CICS IA provides invaluable assistance when you are planning to implement web services. Supplied queries identify existing programs that are candidates for refactoring as web services, for example programs that are called with a communication area (COMMAREA) or channel, or programs without presentation logic. CICS IA captures resource information for EXEC CICS commands that are considered to be presentation logic.

CICS IA also captures key resource information for CICS web services — the program name, URIMAP, container, pipeline, mapping levels, web Services Description Language (WSDL) file name, and WSBIND file name — all of which enable you to understand what resources are required when deploying Web services from development into test, and from test into production.

### Scenario: Workload optimization

CICS IA helps you analyze resource interdependencies and affinities, and assess the impact of application changes quickly and efficiently, allowing you to respond to the constantly changing needs of the marketplace. CICS IA evaluates data for both inter-transaction and transaction-system affinities — information that is essential when implementing dynamic workload balancing.

Using information gathered by CICS IA, you can make better-informed decisions to split workloads efficiently and move applications across CICS regions accordingly. You can even automatically generate affinity group information ready-formatted for input into CICSplex System Manager, saving you time and reducing the chance of transcription errors.

CICS IA can help you to build more flexible CICS systems, balance workloads across IBM CICSplex and IBM Parallel Sysplex® systems, and have the ability to adapt to the fluid conditions inherent in agile business today.

### Scenario: Threadsafe analysis

It has been shown that running CICS applications as threadsafe can save as much as 15 percent of processor usage. CICS IA includes a DB2 table that indicates, by CICS version, which APIs and SPIs are considered to be threadsafe (that is, they do not perform a swap to the quasi-reentrant task control block).

The CICS IA threadsafe table, along with detailed information about programs and files, is used by the plug-in query engine (as shown in Figure 7) and the batch reporter to produce a report that provides information including counts and details of threadsafe and non-threadsafe calls.

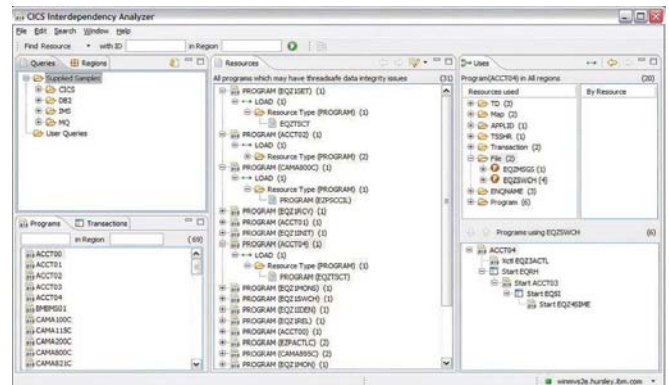


Figure 7 CICS threadsafe information provided by plug-in

Command flow provides even more information to help with threadsafe analysis, showing the specific TCB that each command executes on, and whether a TCB switch was required, before, or after, the command.

The threadsafe readiness report can now be generated by the plug-in, with a summary report for all programs in a region and a detailed report for a program. Summary reports include the count of threadsafe commands and non-threadsafe commands

as well as other vital information required for threadsafe analysis.

When CICS IA is used in conjunction with CICS Performance Analyzer (CICS PA) and its plug-in for CICS Explorer, users can navigate in context very easily between the two. For example, when looking at a CICS PA view showing transactions with large numbers 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 give you the information needed to assess and modify applications and remove constraints to improved performance.

### **Scenario: Mixed-workload applications**

Applications can be an IT organization's biggest asset. Reusing application constructs helps accelerate application development through the life cycle by requiring less new code and reusing previously tested code. If you're developing new web service applications and wish to reuse your current CICS assets, using CICS IA with IBM Rational® Asset Analyzer can help speed your time to market.

You can maintain, extend and transform existing applications through rapid application understanding and impact analysis. And because Rational Asset Analyzer can present complex applications in a visual format, applications are easier to understand.

The CICS IA plug-in lets you launch the Rational Asset Analyzer web interface in context. For example, if CICS IA has identified candidate programs for refactoring as web services, you can link automatically to the Rational Asset Analyzer views for these programs, saving you time.

### **Summary**

Information provided by CICS IA can help you improve the availability of your CICS applications, reduce the cost and increase the speed of CICS application maintenance, change, release, and incident management.

If you're running CICS systems without the information provided by CICS IA, it can be challenging to perform tasks such as splitting workloads across multiple CICS regions to improve availability or identifying which resources are affected by an application change, making programs threadsafe, or refactoring them as web services.

Deep understanding of runtime resource usage and application behavior can also support auditing and governance initiatives,

### **CICS Tools — your pathway to success**

CICS Interdependency Analyzer is one of the five core foundational CICS tools that exploit and augment the latest operational efficiency and service agility enhancements in CICS TS V5.1 in a way that positions you for the next transformational era in technology, moving towards a service delivery platform for cloud computing.

CICS Tools can help you to optimize your CICS resources and achieve greater capacity and improve the availability of your critical enterprise systems. Their powerful automation capabilities can speed service delivery, improve standardization, and reduce risk, while rich discovery, advanced visualization, and comprehensive reporting provide the insight needed to ensure that your applications run smoothly and changes are efficient and reliable.

Support for the application and platform resources introduced in CICS TS V5.1 help you to achieve value from the new version of CICS more quickly. The tools include modern interfaces integrated with CICS Explorer, helping both new and experienced IT personnel to be more productive with minimal training delay. Foundational enhancements continue to extend the tools capabilities in many areas.

The other core foundational CICS tools are:

- IBM CICS Deployment Assistant for z/OS V5.1
- IBM CICS Performance Analyzer for z/OS V5.1
- IBM CICS Configuration Manager for z/OS V5.1
- IBM CICS VSAM Recovery for z/OS V5.1.

### **For more information**

To learn more about IBM CICS Interdependency Analyzer, contact your IBM representative or IBM Business Partner, or visit:

[ibm.com/cics/ianaly](http://ibm.com/cics/ianaly)

To learn more about other IBM CICS Tools, visit:

[ibm.com/cics/tools](http://ibm.com/cics/tools)

For details of the hardware and software requirements CICS Interdependency Analyzer visit:

[ibm.com/cics/ianaly/sysreqs](http://ibm.com/cics/ianaly/sysreqs)

IBM United Kingdom Limited

Hursley Park

Winchester

Hampshire

UK SO21 2JN

United Kingdom

© Copyright IBM Corporation 2011, 2012. US Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

IBM, the IBM logo, ibm.com, and CICS, CICS Explorer, CICSplex, DB2, IMS, Parallel Sysplex, Rational, System z, WebSphere, and z/OS are trademarks of IBM Corporation, registered in many jurisdictions worldwide. ITIL is a registered trademark, and a registered community trademark of The Minister for the Cabinet Office, and is registered in the U.S. Patent and Trademark Office. Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both. Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both. Pentium is a trademark or registered trademark of Intel Corporation or its subsidiaries in the United States and other countries. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml).



GI13-0587-00