

## IBM CICS Interdependency Analyzer for z/OS, Version 3.2

### Recent enhancements

- Support for CICS® Transaction Server V4.2
- Improved CICS Explorer™ views
- Plug-in control for data collection
- Command Flow self-service
- CICS Business Events support
- Enhanced business application analysis
- CICS user exit detection and mapping
- Data life-cycle management

### Features

- Intuitive CICS Explorer plug-in
- Centralized data access using DB2® database
- See *uses* and *where used* relationships
- Powerful comparison feature
- Command Flow gives advanced program analysis
- Business application analysis
- Identify threadsafe / non-threadsafe programs
- Isolate and remove affinities
- Speed CICSplex® SM workload management
- Highlight CICS web service candidates
- Track Task Control Block (TCB) switches

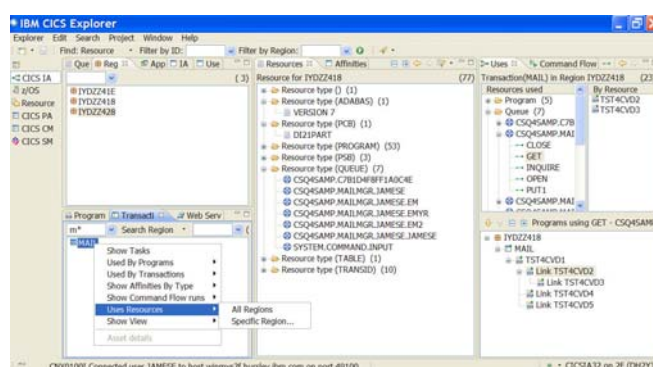
### Benefits

- 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® V3.2 (CICS IA) is a 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.

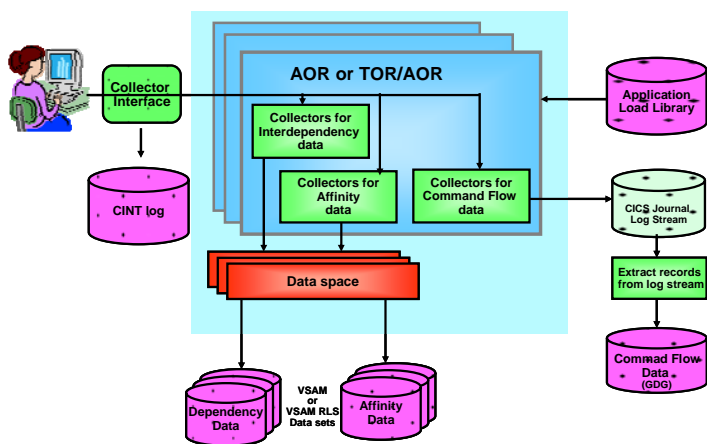
CICS IA helps architects, developers, testers, and system programmers with projects such as application modernization, CICS version-to-version upgrade, threadsafe analysis, affinity removal, and Web service refactoring that depend for their success on deep knowledge of application, system, and resource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

The latest versions of sub-systems are supported including CICS TS V4.2, WebSphere® MQ V7.1, DB2 10, and IMS™ 11. Also new is support for CICS user exit usage analysis, business event dependency tracking, and a business event wizard.

### 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 V3.2 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 will capture 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, time 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, V4.2.

CICS IA V3.2 can detect *loosely-coupled* dependencies between the event source (program, queue, file, etc) 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. In this release you can 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 required for a particular transaction to run

- Business applications
- 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, etc
- Know 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

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 will 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 V3.2 captures information about the new resources introduced in CICS Transaction Server V4.2 including OSGIBUNDLE, OSGISERVICE, EPADAPTER, and resources associated with Event capture Specification. It also captures detailed data for Events.

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. We also provide some reports that run against the VSAM file (see Figure 3).

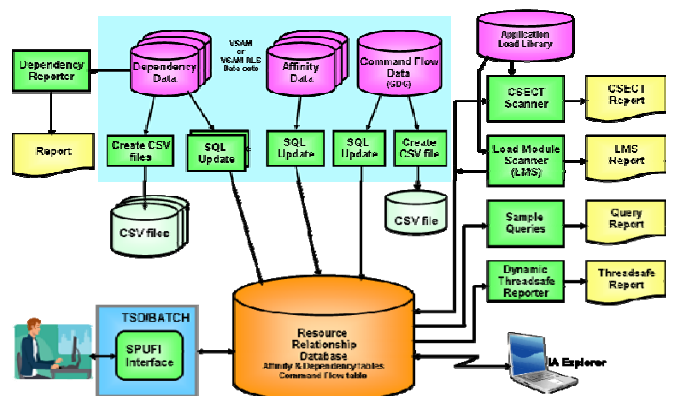


Figure 3 CICS IA V3.2 reporting architecture

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.

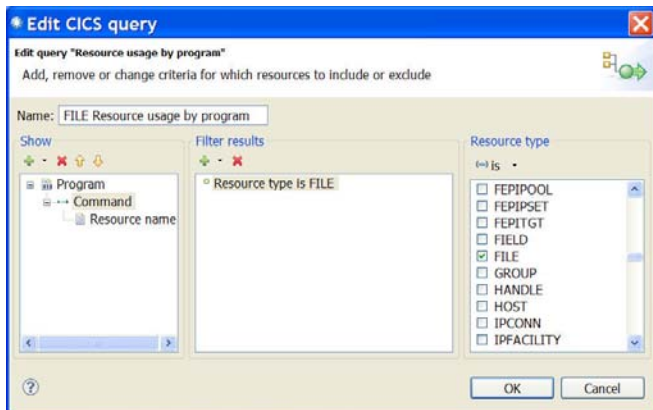
The ability to easily see both *uses* and *where used* relationships is particularly valuable when changing record, table, or message layouts. A simple right-click of the mouse will show you all of the programs that use a particular file - so that you can plan your development activities with confidence.

## 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 4). You can create simple or complex folder structures to save your queries.



**Figure 4** 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 automatically compares the output from multiple queries, for example, to show those programs which 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.

With CICS IA, you can also identify the version of CICS programs that you are running. Using this information, you can compare resource and relationship data for different program versions and identify application changes. For example, CICS IA

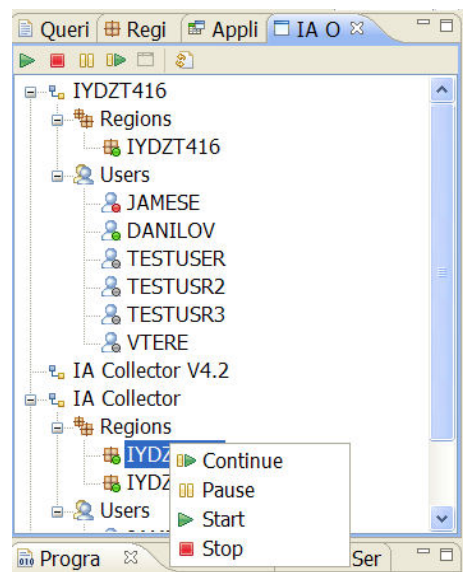
can show if a new type of resource dependency is introduced by a new version of a program. You can use this information to maintain your dependency database, such as to remove data about obsolete levels of programs.

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 V3.2, the same attributes are collected by the scanner and by the on-line 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 5** Control command flow operations using plug-in Command flow control operations, for example to start and stop flow tracing (see ), can now be driven

directly from the new *IA Operations* view in the CICS IA plug-in, when used with a CICS TS V4 Atomservice. On prior CICS releases, the existing CICS 3270 interface is 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.

New in CICS IA V3.2 is the ability 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 will be able to identify collections of dependency data, in a similar manner to that provided by Command Flow, compare different versions, and purge data related to old versions 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: Event life-cycle**

CICS TS V4.1 introduced the ability to generate business events when specific actions occurred to named CICS resources, e.g. 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 V3.2, you can now 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 pre-loaded 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, e.g. 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).

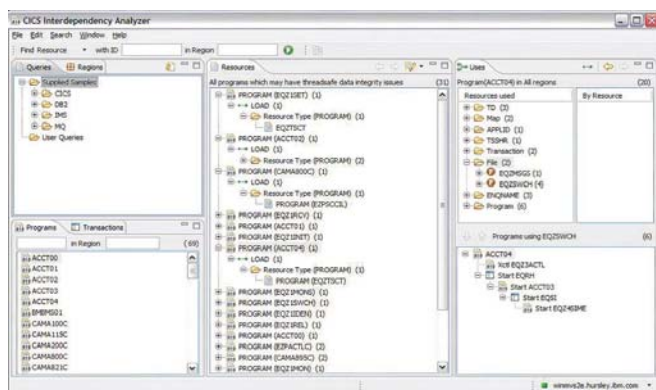


Figure 6 CICS threadsafe information provided by plug-in

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 6) and the batch reporter to produce a report that will provide information including counts and details of threadsafe and non-threadsafe calls.

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

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: Maintaining business applications

In CICS IA V3.2, you can associate key programs and transactions with a *business application*, e.g. 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.

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: 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 (See Figure 7). 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.

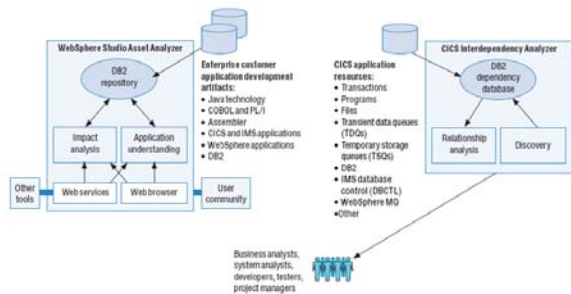


Figure 5. CICS Interdependency Analyzer automates application discovery for mixed-workload environments.

**Figure 7 CICS IA automates application discovery for mixed-workload environments.**

### 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, and help you implement Information Technology Infrastructure Library (ITIL) and IBM service management processes, such as 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, for example, to comply with national legislation such as the U.S. Sarbanes-Oxley Act or industry-led regulations industry such as Healthcare Insurance Portability and Accountability Act (HIPAA) and Basel II.

## IBM System z tools — your pathway to success

CICS IA is a part of an extensive portfolio of IBM System z tools, including CICS tools, problem determination (PD) tools, application development tools, and data and systems management tools. The tools support the entire application life cycle, which helps you to build, test, deploy, and manage enterprise solutions. As a result, you can make the most of your System z platform investments and take advantage of the latest functions introduced in CICS Transaction Server, Version 4.

The comprehensive portfolio of IBM CICS tools offers you the opportunity to realize the full potential of your CICS systems, whatever your business strategy. You have the potential to maintain and manage your core CICS applications more easily and at a lower cost. CICS tools enhance IBM service management initiatives to optimize IT processes, maximize CICS system availability, reduce total cost of ownership (TCO), and transform CICS applications to achieve greater business flexibility. Moreover, in today's world of increasing governance, CICS tools can help to meet growing demands for reporting and audit compliance, and improve control over CICS runtime environments.

All IBM CICS, PD, and application development tools support the latest releases of CICS Transaction Server.

### 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)

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## IBM CICS Interdependency Analyzer for z/OS, Version 3.2 at a glance

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### Hardware requirements

CICS Interdependency Analyzer V3.2 can run on any IBM System z machine on which a required operating system and other required software are installed and running.

The CICS Explorer runs on any workstation that supports one of the listed operating systems, with minimum Pentium IV 1GHz or faster, 1 GB RAM recommended and 500 MB of free disk space.

### Software requirements

CICS Interdependency Analyzer requires z/OS V1.9.

The CICS Explorer and its plug-ins are supported on the Microsoft Windows and Linux platforms listed on the Systems Requirements page shown below.

Full details of the hardware and software requirements CICS Interdependency Analyzer can be found at:

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

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