

2012

IBM System z Technical University

Enabling the infrastructure for smarter computing

CICS Transaction Server *From Start to Finish*

Highlight and replace with session ID

Steve Zemblowski



Notes

This presentation will cover an introduction to the Customer Information Control System (CICS) portfolio covering CICS Transaction Server, the CICS Explorer, CICS Connectors and CICS Tools.

The history of how and why CICS was created will be discussed.

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Notes

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Session Agenda

- CICS portfolio
 - ✓ CICS Transaction Server
 - ✓ CICS Explorer
 - ✓ CICS Connectors
 - ✓ CICS Tools

Notes

The following topics will be presented during this session:

CICS Transaction Server

The CICS Explorer

CICS Connectors

CICS Tools

CICS

What is the full name of CICS?

Customer Information Control System



The year: 1964

- IBM introduces the System 360
 - ✓ First family of computers
 - ✓ Operating System provides basic functions
 - Networking
 - BTAM
 - QTAM
 - Data Access
 - EXCP
 - BDAM

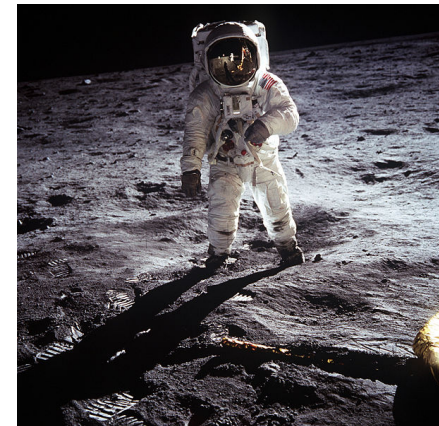
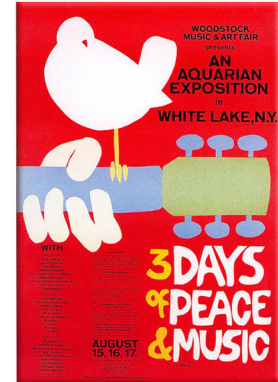
Notes

In 1964 IBM introduces the System 360, a family of computers, all of which used the same instruction set. A customer could upgrade to the next member of the family gaining increased performance without having to reprogram their applications.

The operation system provided a number of basic functions allowing for communication with a number of telecommunication devices and access to data. The interface to these function was at a low level and required a high level of knowledge to implement applications successfully.

The year: 1969

- Woodstock (the first) was held
- First flight of the Concorde
- Man walks on the moon



Notes

1969 was a great time for the world and for IBM. Events, such as Woodstock, the maiden flight of Concord, and the first man on the Moon, changed world culture and history.

The year: 1969...

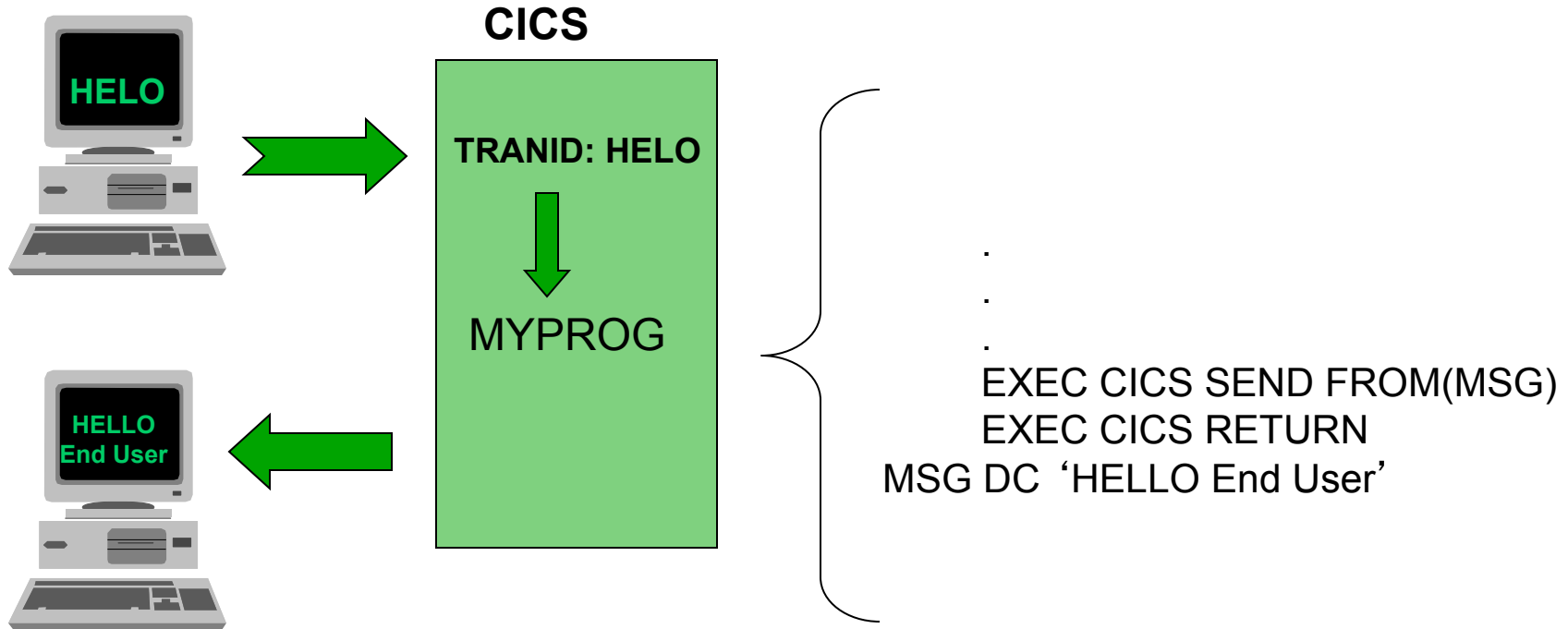
- First release of CICS is available
 - ✓ Hides the complex O/S API from programmers
 - Macro API
 - DFHFC TYPE=READ
 - Command API (1975)
 - EXEC CICS READ FILE
 - ✓ Provides services
 - Task Control
 - File Control
 - Terminal Control
 - Program Control



Notes

In April 1968, IBM released Public Utility Customer Information Control System (PUCICS). It was free code, known as a Type II program, which was originally created to address the needs of a few companies; however the industry-wide, almost immediate demand for PUCICS showed that almost every other kind of organization across a multitude of industries had the same needs. The wide demand for the transaction processing capabilities provided by this new system prompted IBM to drop the “Public Utility” part of the name and officially release the product known as CICS on July 8th, 1969.

CICS was developed to shield the application programmer from the low level functions in the operating system. The original programming interface for CICS was a macro language, suitable for assembler language programmers, but was changed in 1975 to a command level interface.



Notes

This chart illustrates a typical flow in and out of CICS. A transaction identifier is entered to CICS. This TRANID is associated with an initial program which CICS passes control to. The application program can interrogate input, access data and send a response back to the input device.

This architecture is present today but rather than a TRANID entered from a 3270 device a task can be started from a web browser, a TCP/IP flow and many other methods.

What is CICS?

- It's a transaction processor
- It's a transaction monitor
- It's an application server

CICS is one of the "35 Technologies that shaped the industry" (Computerworld, Sept 2002)

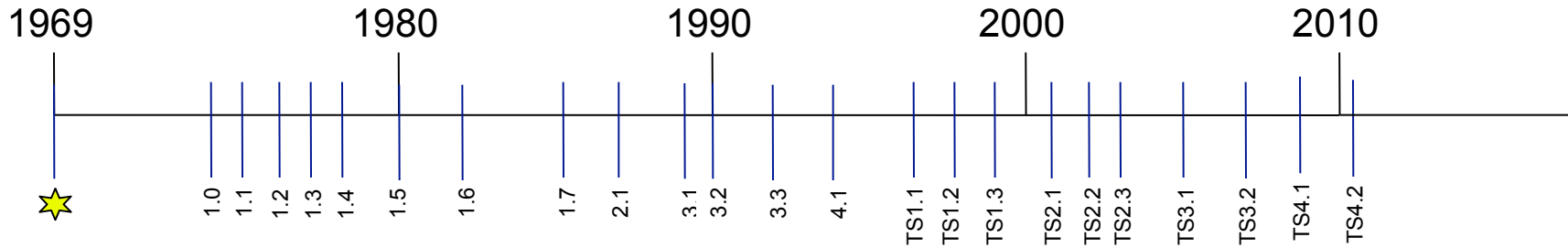
"CICS is probably the most successful piece of software of all time . . . It is the mainstay of business computing throughout the world . . . Millions of users unknowingly activate CICS every day, and if it were to disappear the world economy would grind to a halt."

Phil Manchester, Personal Computer Magazine, March 1994

What does CICS actually do?

- Provides a concurrent execution environment for multiple users
- Provide access to multiple data stores
- Manage the operating environment to provide:
 - ✓ Security
 - ✓ Integrity
 - ✓ Scalability
 - ✓ Recovery

The Evolution of CICS



'69 CICS was born

'74 CICS OS/VS 1.0

'75 CICS OS/VS 1.1

'76 CICS OS/VS 1.2

'77 CICS OS/VS 1.3

'78 CICS OS/VS 1.4

'80 CICS OS/VS 1.5

'82 CICS OS/VS 1.6

'85 CICS OS/VS 1.7

'87 CICS MVS 2.1

'89 CICS MVS/ESA 3.1

'90 CICS MVS/ESA 3.2

'92 CICS MVS/ESA 3.3

'94 CICS MVS/ESA 4.1

'96 CICS TS 1.1

'97 CICS TS 1.2

'99 CICS TS 1.3

'01 CICS TS 2.1

'02 CICS TS 2.2

'03 CICS TS 2.3

'05 CICS TS 3.1

'07 CICS TS 3.2

'09 CICS TS 4.1

'11 CICS TS 4.2

'12 CICS TS 5.1

'12 CICS TS 5.1

Platform as a Service, Policy based Management, Liberty Web Container, Scalability

Notes

This chart shows the history of CICS of CICS releases throughout its lifetime.

Where is CICS Developed?



CICS development has been entrusted at Hursley, Winchester, UK since 1974

Notes

In 1974, CICS development was moved to Hursley in the United Kingdom. The Hursley programming center assumed the world wide CICS mission, taking global responsibility for CICS, which was at the time, and still is today, one of the leading program products in IBM. To keep CICS viable after the move, Hursley chose not to use the newest technologies on the market to support CICS but rather to use the best technologies available at the time. This was a major factor in the long term success of CICS.

1974 was also the year that CICS Virtual Storage (CICS/VS) Version 1.0, was released, which introduced single address spacing and management functions. A year later, in 1975, IBM determined that over 30% of all terminals world wide were running CICS.

In 1976, CICS/VS Version 1.3 was released, which introduced the command level and recovery and restart functions. The command level API was an important new capability. It was added to CICS in the shape of High Level Programming Interface (HLPI), allowing access to CICS services and resources more easily, which meant CICS applications and IT infrastructure upgrades were completed in a fraction of the time.

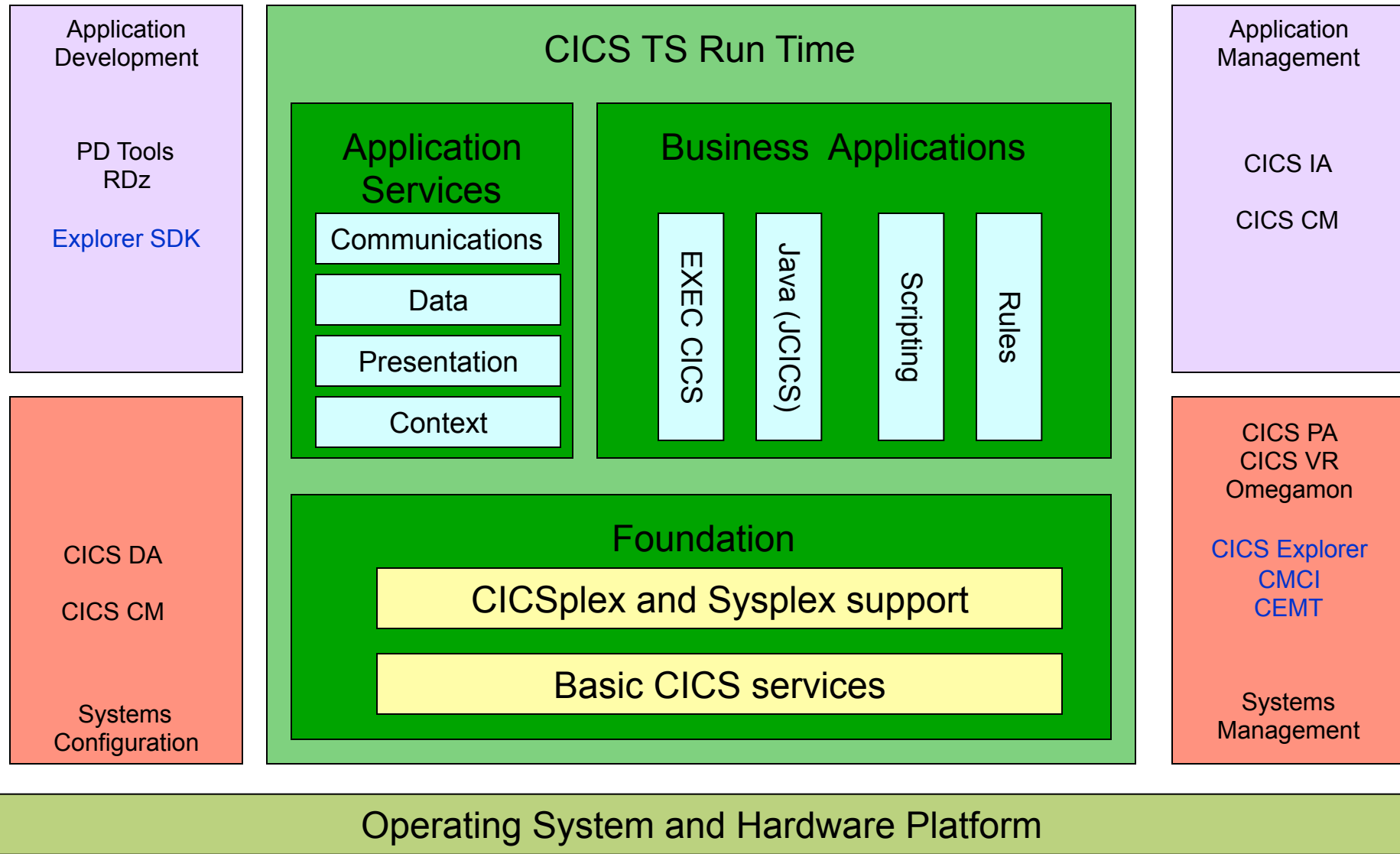
Where is CICS Used?



Notes

This chart shows the cities around the world where CICS is used. Note that there may be multiple customers in a single city.

Current CICS Platform Architecture



Notes

This is an architectural diagram of CICS showing the various components and functions. This chart also shows how a number of IBM products support the different functions within CICS.

Current CICS Platform Functions

- Foundation
 - ✓ Basic CICS services
 - Storage management, enqueues, logging, trace, task management, RMI, monitoring, directory, loader, timer, dispatcher, GLUEs, statistics, recovery management, events
 - ✓ CICSplex and Sysplex support
 - WLM, name counter services, MRO & XCF support, CFDT, TS data sharing, VSAM RLS, SSI

Notes

CICS provides a number of Foundation Services necessary for running on-line applications. These are broken down into two major areas:

Basic CICS services

These services consist of elementary functions to run work inside of CICS and comprise:

Storage management, enqueues, logging, trace, task management, RMI, monitoring, directory, loader, timer, dispatcher, GLUEs, statistics, recovery management, events

CICSplex and Sysplex support

These services consist of interaction with the operating system to allow CICS work to be distributed across a Parallel Sysplex and include:

WLM, name counter services, MRO & XCF support, CFDT, TS data sharing, VSAM RLS, SSI

Current CICS Platform Functions...

- Application Services
 - ✓ Communications
 - TCP/IP, VTAM, MQ, sockets, MRO, APPC, terminal control, HTTP, EXCI
 - ✓ Data Management
 - VSAM, BDAM, transient data, temporary storage, DB2, IMS, OEM
 - ✓ Presentation
 - Terminal control, BMS, FEPI, Document API
 - ✓ Context
 - Channels & containers, BTS, Pipeline

Notes

CICS provides a number of Application Services to allow a program to communicate with the outside world through a number of different communication protocols and transports. These include:

TCP/IP, VTAM, MQ, sockets, MRO, APPC, terminal control, HTTP, EXCI

CICS provides access to a number of different data stores to allow the application to read and update data with integrity. This data stores include:

VSAM, BDAM, transient data, temporary storage, DB2, IMS, OEM

CICS provides a number of different technologies to provide for the presentation of data to different types of devices. These technologies include:

Terminal control, BMS, FEPI, Document API

CICS provides a number of different constructs to allow data to be passed retrieved between programs and transactions as well as controlling how programs are invoked in a processing sequence. These include:

Channels & containers, BTS, Pipeline

Current CICS Platform Functions...

- Business Applications
 - ✓ EXEC CICS
 - Commands for both the application/systems programmer
 - EXEC CICS READ FILE('ACCTFIL') RIDFLD(ACCTC) UPDATE ...
 - EXEC CICS SET ...
 - ✓ JCICS
 - JCICS is the Java equivalent of the EXEC CICS API
 - Java class library
 - `TSQ tsq = new TSQ();`
 - `tsq.setName("JCICSTSQ");`
 - ✓ Scripting
 - PHP and Groovy
 - ✓ Rules
 - WebSphere Operational Decision Manager

Notes

CICS provides support for application and systems programmers by providing a command level interface to CICS functions. The systems programmer has a SET and INQUIRE interface available to manipulate run time parameters in the CICS system.

CICS has provide a set of Java CICS class, known as JCICS, to allow the Java programmer access to CICS facilities.

CICS provides a Dynamic Scripting Feature Pack to allow scripting languages such as PHP and Groovy to execute inside of CICS and gain access to CICS facilities via the JCICS class library.

The WebSphere Operational Decision Manager rules execution engine now executes inside of CICS.

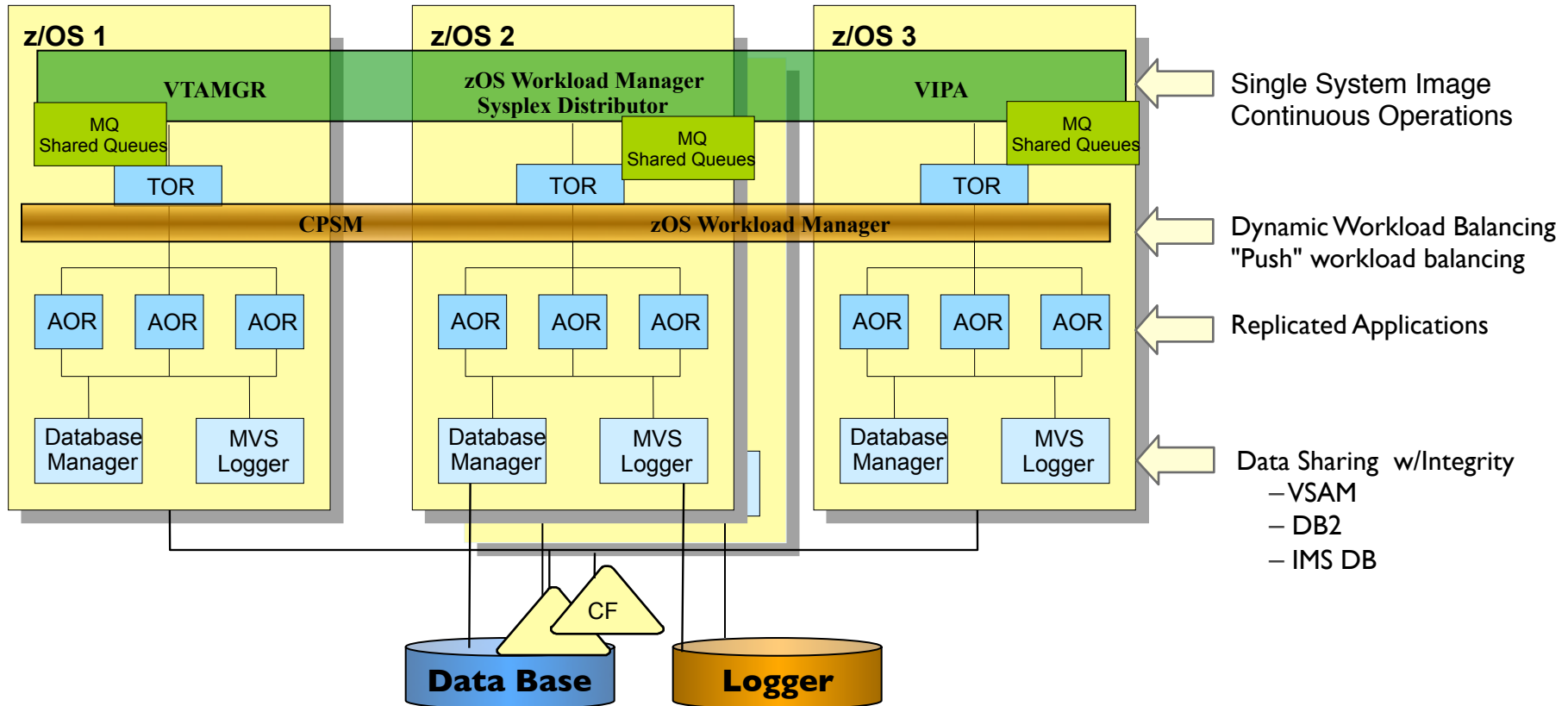
Current CICS Platform Functions...

- Programming languages supported in CICS
 - ✓ Assembler
 - ✓ COBOL
 - ✓ PL/I
 - ✓ C
 - ✓ C++
 - ✓ Java
 - ✓ PHP
 - ✓ Groovy
 - ✓ Rexx

Notes

This chart shows the programming languages that CICS currently supports.

CICS in a Parallel Sysplex



Notes

This chart shows how CICS may be configured across a parallel sysplex to eliminate single points of failure.

Relationship between CICS and WebSphere Application Server

- WebSphere Application Server for z/OS
 - ✓ a complete implementation of the foundation of the WebSphere platform on z/OS through support of JEE run-time for new web-centric applications on z/OS
 - ✓ a strong integration server for the integration of heterogeneous back-ends in new business function
- CICS Transaction Server
 - ✓ Enable the efficient and optimized reuse and extension of existing CICS applications and business logic
 - ✓ Allow core business logic in CICS to fit seamlessly into broader e-business solutions
 - ✓ Provide a run-time for Enterprise logic written using mixed languages and Application Development skills
 - ✓ Common Application Development Tooling, Containers, Connectors

From CICS Product Positioning presentation 2002

Notes

This chart show the relationship of IBM' s WebSphere Application Server versus CICS. The two products are complimentary and allow for the reuse of existing applications across the enterprise.

CICS Transaction Server for z/OS V5.1

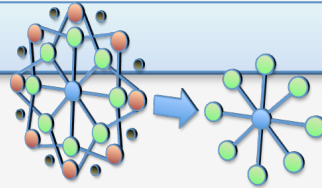
Operational Efficiency

Greater capacity per CICS region

- More tasks per region
- Greater 64bit storage usage and threadsafe support
- Java 7 support

Increased 24x7 availability

- No IPL required to update SVCs
- SSL refresh without restart



Reduced complexity

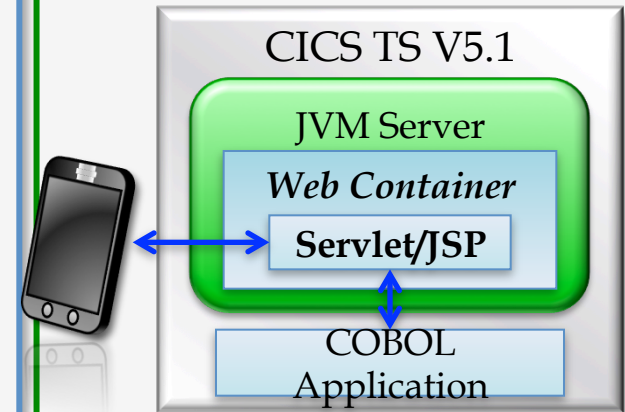
- Simplified configuration options

Better control of critical system resources

- Policy based management

Service Agility

Web Container embedded within CICS: co-locate back-end applications with front-end interfaces



Application

Faster & easier deployment of CICS applications & resources

- Single package deployment
- Improved lifecycle management
- Measure application resource usage



Platform

Faster & easier management of CICS application environment

- Manage regions as a single entity
- Simplify application deployment
- Easier migration from Test -> Prod.



Policy

Respond faster to unwanted behaviour

- Protect critical resources
- Prevent system failures
- Maintain SLAs

Through Cloud Enablement

Notes

This chart shows the functions available in the latest release of CICS Transaction Server V5.1

CICS Explorer

Notes

This section will discuss the functions available in the CICS Explorer.

CICS Explorer

- “The New Face Of CICS”
 - ✓ A new user interface for interacting with CICS
 - ✓ Built on the Eclipse Rich Client Platform
 - ✓ Rich UI allows more sophisticated methods of interaction
- Offers similar functionality as existing interfaces
 - ✓ Web UI, CICS resource changes
- And some functionality you can't do through existing interfaces
 - ✓ Transaction Tracking, Event Binding Editor, OSGi bundle deployment

```

1 TA
STATUS: RESULTS - OVERTYPE TO MODIFY
Tas(0000027) Tra(CONL) Sus Tas Pri( 255 )
Sta(U) Use(SYSSTC) Uow(C5835834D0CF76CB)
Tas(0000029) Tra(CO10) Sus Tas Pri( 255 )
Sta(U) Use(SYSSTC) Uow(C580599583B68543) Hty(USERWAIT)
Tas(0000030) Tra(CO1E) Sus Tas Pri( 255 )
Sta(U) Use(SYSSTC) Uow(C5805997C0210783) Hty(USERWAIT)
Tas(0000043) Tra(CSKL) Sus Tas Pri( 255 )
Sta(S) Use(SYSSTC) Uow(C580599A802B2189) Hty(USERWAIT)
Tas(0000149) Tra(CEMT) Fac(0094) Run Ter Pri( 255 )
Sta(T0) Use(DDS0363) Uow(C583C447F3D427C1)

RESPONSE: NORMAL
SYSID=C22F APPLID=CICSACB6
TIME: 08.46.31 DATE: 02/09/10
PF 1 HELP 3 END 5 VAR 7 SBH 8 SFH 9 MSG 10 SB 11 SF
01/008
  
```

The screenshot shows the IBM CICS Explorer interface. On the left, a tree view shows the CICS resource structure. The main window displays a table of transactions with columns for Region, Task ID, Transaction ID, Dispatch Status, and User ID. The selected transaction is CICSOR2 with Task ID 0000041 and Transaction ID CO10, which is in a SUSPENDED state.

Region	Task ID	Tran...	Dispatch Status	User ID	Sus...
CICSAOR1	0000028	CONL	RUNNING	SYSSTC	USE
CICSAOR1	0000050	CSKL	SUSPENDED	SYSSTC	USE
CICSAOR1	0000051	CO10	SUSPENDED	SYSSTC	USE
CICSAOR1	0000058	CO1E	SUSPENDED	SYSSTC	USE
CICSAOR2	0000026	CONL	RUNNING	SYSSTC	USE
CICSAOR2	0000041	CO10	SUSPENDED	SYSSTC	USE
CICSAOR2	0000050	CO1E	SUSPENDED	SYSSTC	USE
CICSAOR3	0000021	CONL	RUNNING	SYSSTC	USE
CICSAOR3	0000033	CO10	SUSPENDED	SYSSTC	USE
CICSAOR3	0000035	CO1E	SUSPENDED	SYSSTC	USE
CICSAOR4	0000027	CONL	RUNNING	SYSSTC	USE
CICSAOR4	0000029	CO10	SUSPENDED	SYSSTC	USE
CICSAOR4	0000030	CO1E	SUSPENDED	SYSSTC	USE
CICSAOR4	0000038	CSKL	SUSPENDED	SYSSTC	USE
CICSAOR5	0000027	CONL	RUNNING	SYSSTC	USE
CICSAOR5	0000029	CO10	SUSPENDED	SYSSTC	USE

On the right, the 'Program Definition (TEST) test' details are shown, including basic information like Name, Version, and Enabled status, and storage options.

Notes

As a newcomer into a CICS environment or as an experienced user moving roles, CICS System Management can be a daunting challenge. Prior to the CICS Explorer, to perform each task could require the use of different disconnected interfaces. These applications were often ISPF-based panels and written to do a specific function, each of which required custom knowledge to operate.

As well as basic CICS System Management, the definition and operation of regions and their installed resources, a typical CICS shop uses a number of tools, either obtained from IBM, third-party vendors, or developed in-house. These tools might have their own interfaces and way of presenting or manipulating the CICS runtime.

Providing an integration platform so that all of the tools and applications that a user needs to perform a business task work together coherently in an integrated environment was one of the driving forces behind the creation of the CICS Explorer. The benefit of CICS Explorer is to help new users become familiar with the platform, to present a single and re-usable way of accessing and manipulating CICS to promote consistency, and to allow tools that are built by IBM, vendors, and customers alike to be able to extend and enhance in a unified way.

The CICS Explorer is based on the Eclipse Rich Client Platform (RCP). Eclipse RCP is a cross platform framework for building and deploying PC desktop applications

CICS Explorer...

- **Simplify CICS**
 - ✓ Single user interface for CICS & CICSplex SM
 - Common, intuitive, Eclipse-based tooling environment for new and experienced
 - Architects and Developers
 - System administrators and System programmers
 - Operators

- **Integration platform - Value of the sum exceeds the part**
 - ✓ First class cross tooling integration
 - ✓ Consistent views across tooling
 - ✓ Consolidated tooling with a central view into the CICS world
 - ✓ Supports CICS runtime, CICS tools, CICS connectors, plus other IBM and third-party software

- **Software Development Kit (SDK)**
 - ✓ Provides separately packaged plug-ins for any Eclipse-based environment
 - ✓ API allows 3rd parties to extend or integration existing capability
 - ✓ Layered architecture allows Eclipse-independent components to be used in any environment

Notes

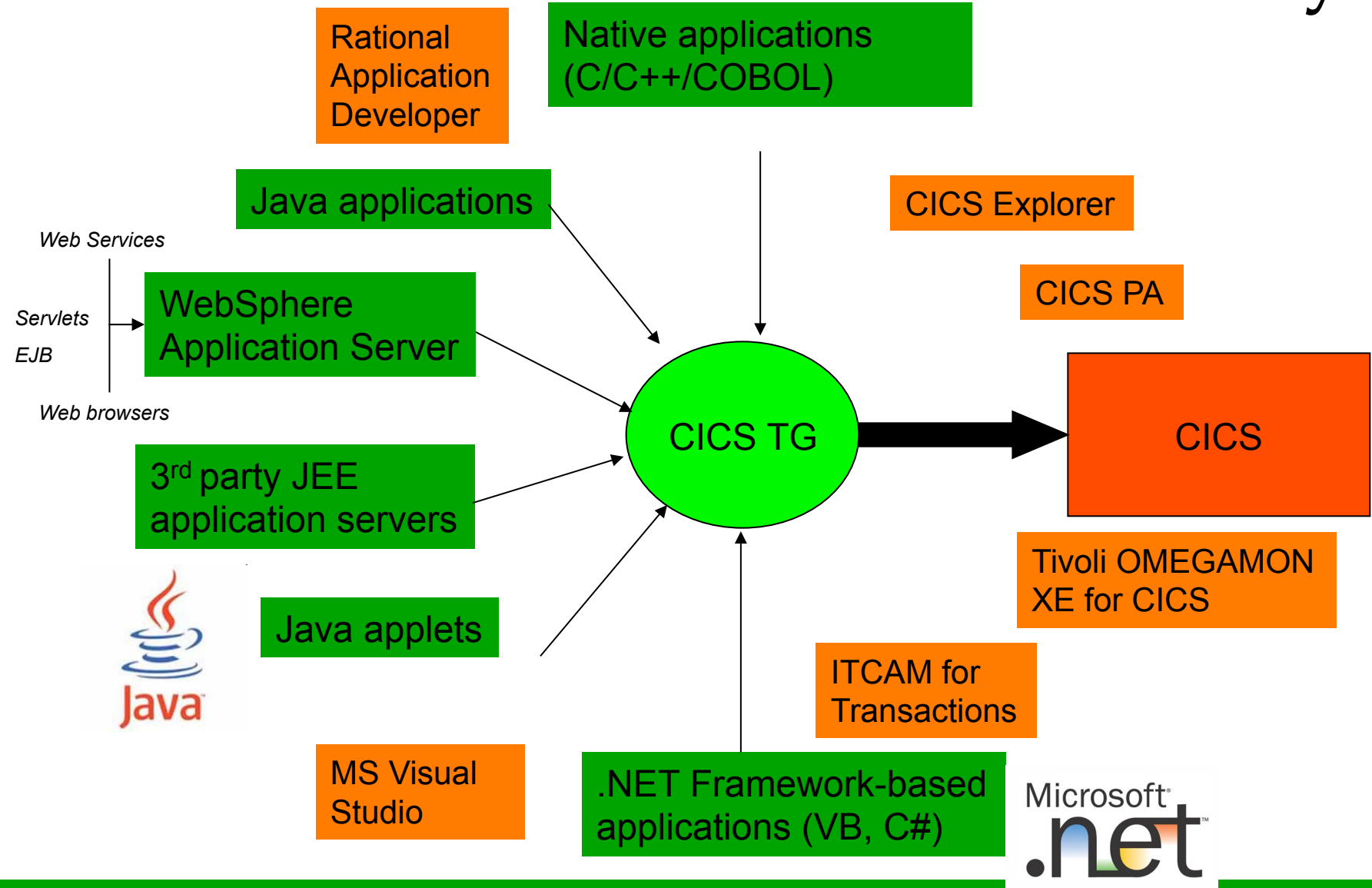
The CICS Explorer can be extended by plug-in providers using the Explorer API/ SDK. Using the Explorer API/ SDK customers can develop their own dedicated plug-ins to satisfy requirements particular to them. Using this framework maintains the consistency of the interface and integrates with the rest of the functionality that is provided in the Explorer and is the mechanism by which IBM and vendors provide plug-ins for their value-add tools.

CICS Connectors

Notes

This section will discuss the functions available in the CICS connectors.

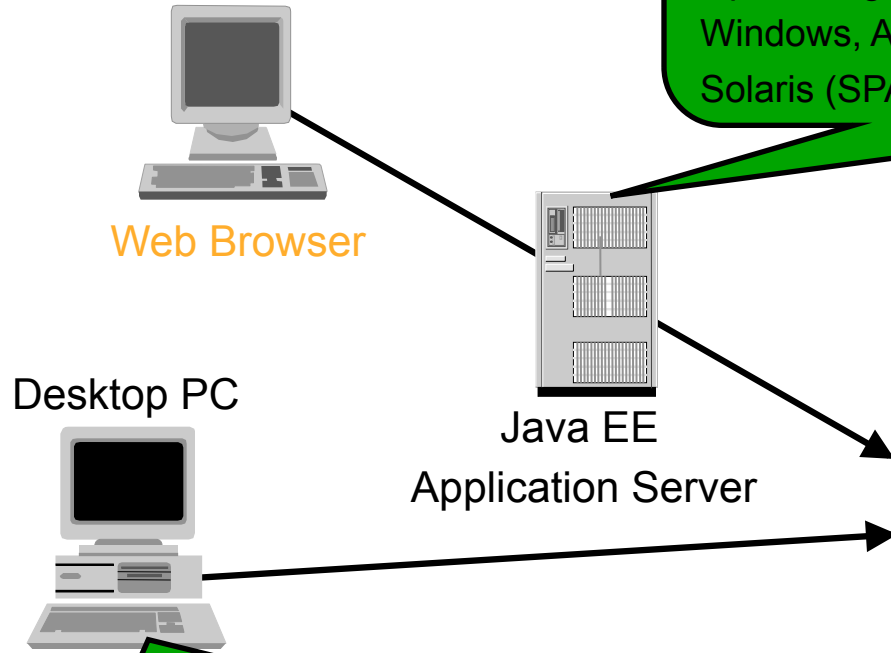
What is the CICS Transaction Gateway?



Notes

This charts shows the clients of the CICS Transaction Gateway (shown in green) and the tools that support the CICS Transaction Gateway (shown in orange).

CICS Transaction Gateway



CICS TG for Multiplatforms

Multi-user server gateway for Java/JEE + native clients
Open integration with JEE (WAS) and .NET
Windows, AIX, Linux on System z/POWER/Intel,
Solaris (SPARC), HP-UX (Itanium)

CICS TG for z/OS

Multi-user server gateway for Java/JEE + native clients
**** PREMIERE product ****

CICS TG Desktop Edition

Single-user/desktop only

Windows, AIX, Linux on System Z /
POWER / Intel, Solaris, HP-UX (Itanium)
Desktop workload / no JEE support

Supported CICS servers

CICS TS for z/OS V3.1 / 3.2 / 4.1 / 4.2 / 5.1
CICS TS for VSE V1.1.1 + CICS/VSE v2.3
TxSeries for Multiplatforms V6.1 / 6.2 / 7.1
CICS TS for i/iSeries V5.4 / 6.1 / 7.1

Notes

This chart shows the differences between the three different version of the CICS Transaction Gateway.

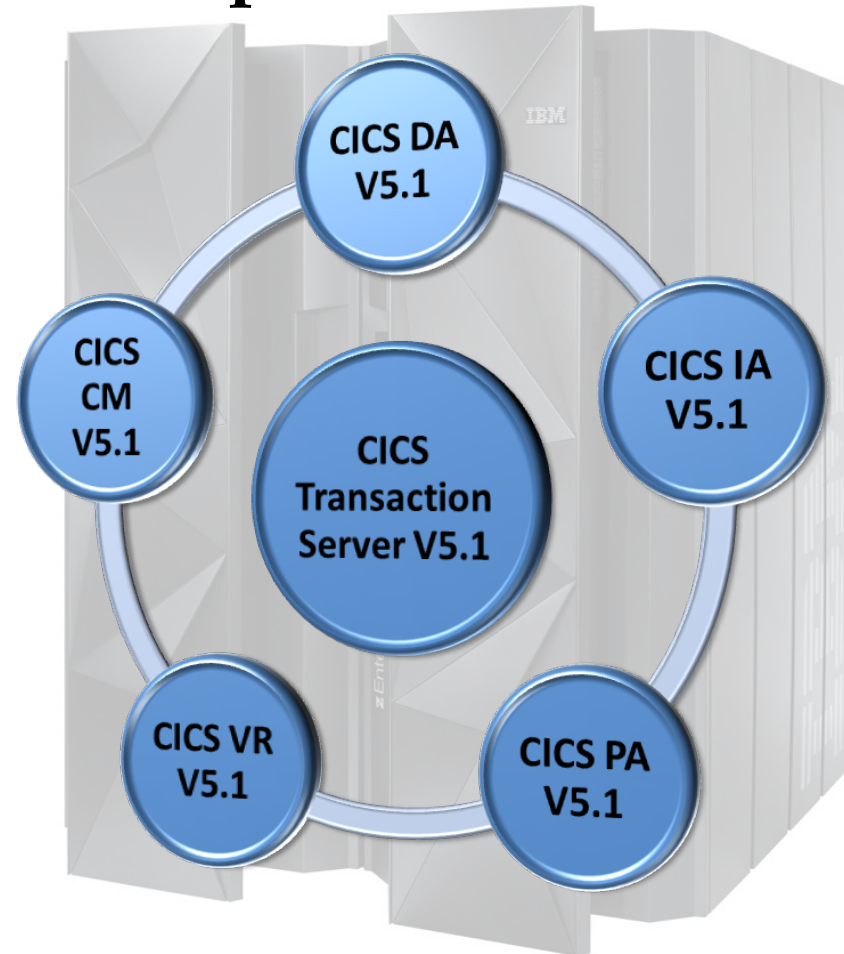
CICS Tools

CICS Tools V5.1 deliver the complete solution

CICS Tools V5.1 provide the foundation to cloud-enable CICS TS V5.1 applications and runtime

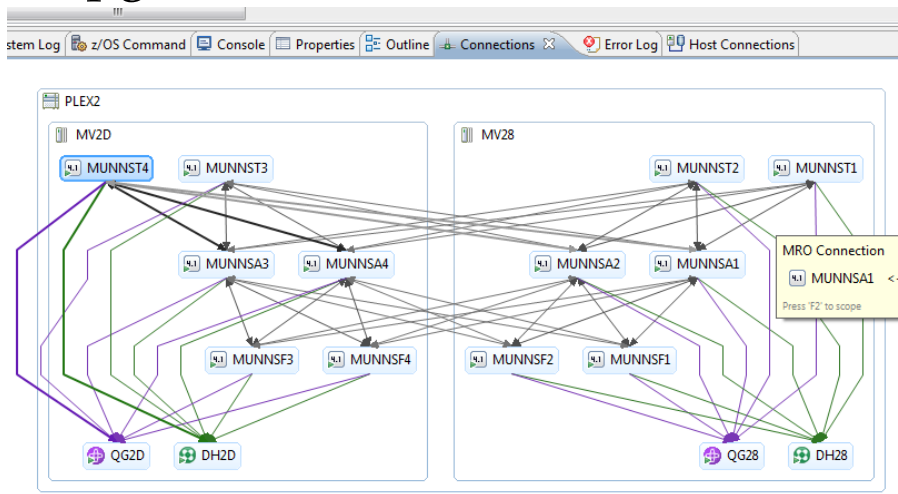
- CICS Interdependency Analyzer
- CICS Deployment Assistant
- CICS Configuration Manager
- CICS Performance Analyzer
- CICS VSAM Recovery

Fully integrated with the CICS Explorer



CICS Deployment Assistant for z/OS V5.1

- Intuitive CICS Explorer plug-in
- Visualize and manage your CICS
- Discover regions and sus-systems
- Validate CICS topology and options
- Automation creates new CICSplex
- Plexify and clone CICS regions
- Start and stop a CICS region
- Cheat sheets for CICS version upgrades



What's new?

Support for CICS® TS V5.1

- Enriched discovery of over 30 entities
- Improved visualization with tagging and filtering
- Connections view with scoping
- Export model for external reporting
- CICS TS V5.1 upgrade cheat sheet
- Tagging and filtering of model elements
- New navigators
- Clone JCL improvements
- IPv6 support
- Virtual IP addressing support
- Serviceability enhancements

Notes

CICS Deployment Assistant can discover, model, visualize, and deploy new and existing CICS regions, using automation and policy-driven advice built on your own and IBM's knowledge and experience, giving you access to the latest IBM CICS technology faster and easier than ever before.

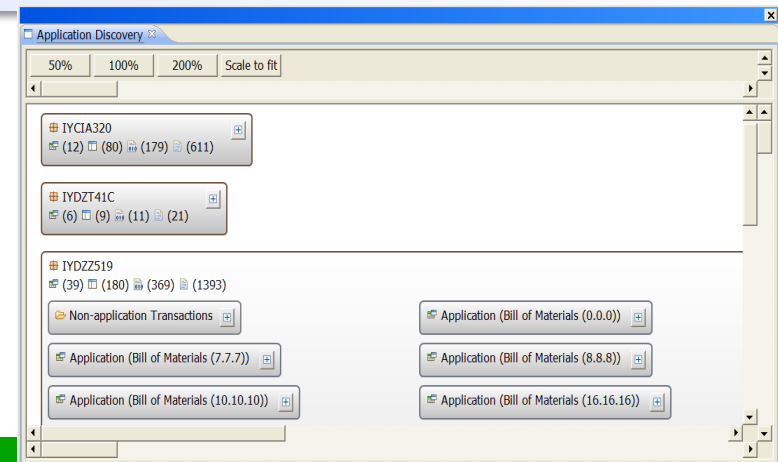
CICS Interdependency Analyzer for z/OS V5.1

- Captures all CICS application relationships
- Intuitive CICS Explorer plug-in
- Centralized data access using DB2® database
- See *uses* and *where used* relationships
- Powerful comparison feature
- Command Flow for 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

What's new?

Support for CICS TS 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



Notes

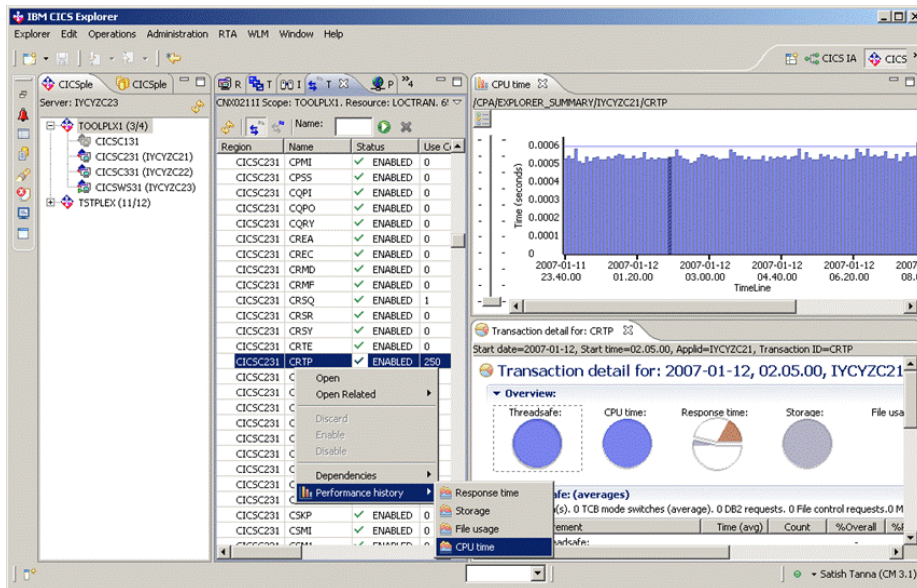
CICS Interdependency Analyzer is a discovery tool that helps you to understand the relationships, dependencies, and flows of CICS Transaction Server applications, giving you the insight to update, modernize, and optimize them with confidence.

CICS Performance Analyzer for z/OS V5.1

- Comprehensive Performance Reporting and Analysis for CICS including DB2, WebSphere MQ, and MVS System Logger
- Extensive Tabular Reports
- Plug-in for CICS Explorer
- Historical Database (HDB)
- Trending and Capacity Planning
- Statistics and Statistics Alerts

What's new?

- CICS TS V5.1 support
- Application, Platform, and Policy
- Plug-in enhancements:
 - Application centric view
 - Customizable sheet views
 - Wait Analysis
 - Improved Navigation
 - Export and Import capability
- Batch statistics reporting for CICS TG
- Statistics filtering
- CPU totals on MQ reports
- Data management improvements



Notes

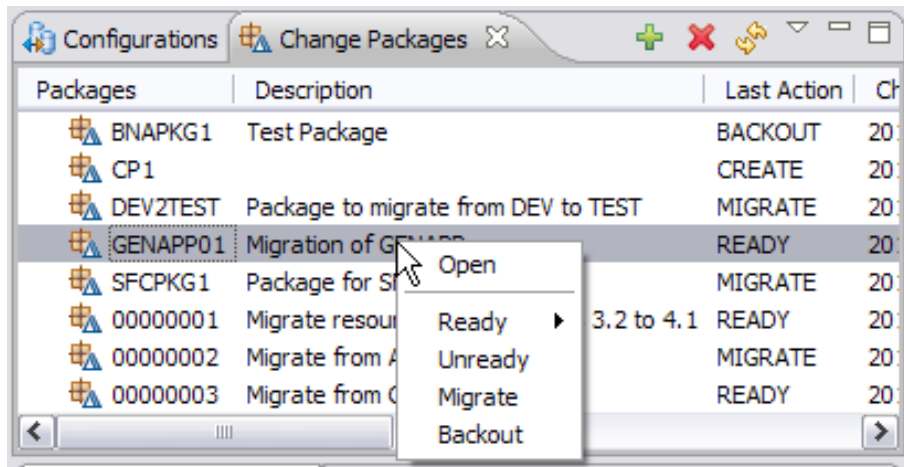
CICS PA is a system and application performance reporting and analysis solution that is built to address the needs of everyone involved in performance analysis, system tuning, and planning capacity for CICS Transaction Server for z/OS. It provides the level of detail and flexibility to improve CICS system performance, lower maintenance costs, and strategically plan IT investments.

CICS Configuration Manager for z/OS V5.1

- Create, Update, Delete, Copy, Replicate CICS resource definitions
- Change management through the life-cycle stages, e.g. development, test, production
- Create customized reports to identify redundant definitions, show resource relationships and change management history
- Audit, back-out and change authorization capabilities

What's new?

- CICS TS V5.1 support
- Application, Platform, and Policy resources
- Enhanced plug-in with Packaging and Deployment Analysis
- Sort in Package view and Ready list
- COMMAND STACK to support Add/Remove of CSD Groups to
- Remove empty Group from the CSD List
- SSL support for plug-in connection
- Audit trail for Install and NewCopy



Notes

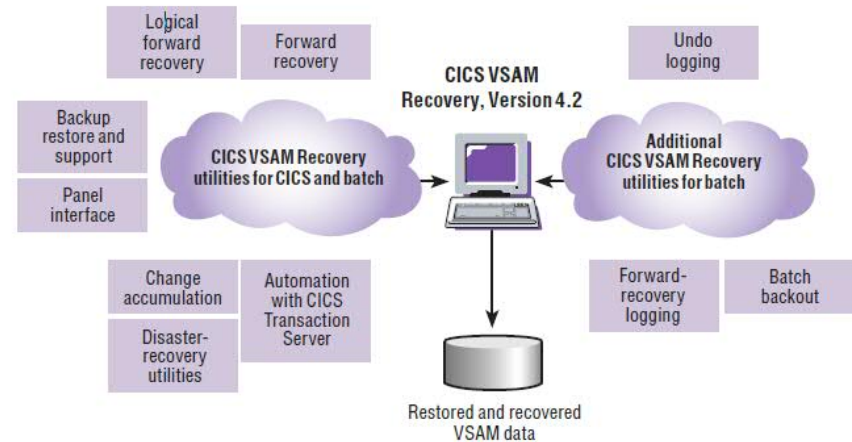
CICS Configuration Manager is a tool for administering and maintaining CICS resource definitions, providing comprehensive audit, reporting, and life-cycle change management control facilities, useable by all who build, manage, and deploy complex mainframe CICS applications.

CICS VSAM Recovery for z/OS V5.1

- Change accumulation
- Export and Import commands
- Batch support including logging
- NOTIFY support for IBM and non-IBM backups
- Supports backups created by Backup-While-Open (BWO)
- Automated recovery
- Pre-allocates the target data set prior to restore
- Authorization management
- Test-only forward recovery and backout
- Disaster recovery report
- Panel Interface usability enhancements

What's new?

- **Replication logging**
- **Batch logging enhancements**
- **Batch backout improvements**
- **Migration utility enhancements**
- **Logstream printing and other usability enhancements**




Notes

CICS VR is used to recover CICS and batch VSAM data from physical or logical corruption. This helps you recover from errors quickly, reducing the need for offline processing to exceed its batch window, and so improves the availability of your online CICS systems.

Google us or check us out at:

 ibm/developerworks/cicsdev

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 twitter.com/IBM_CICS


 youtube.com/cicsfluff

 youtube.com/cicsexplorer

 themasterterminal.com

 twitter.com/IBM_System_z

 [CICS Explorer Forum ibm.com/developerworks/forums/forum.jspa?forumID=1475&start=0](http://ibm.com/developerworks/forums/forum.jspa?forumID=1475&start=0)

 [CICS-L list Forum
listserv.uga.edu/archives/cics-l.html](http://listserv.uga.edu/archives/cics-l.html)



I ♥ CICS