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# Migrating to a CICS Based SOA Environment

IBM System z Tools to Help You Simplify Migration to any  
New/Upgrade Release of CICS Transaction Server

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## Preface

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# Agenda

- CICS TS Release Review
- Tools to Support Version to Version Migrations
  - CICS Interdependency Analyzer
  - CICS Configuration Manager
  - CICS Performance Analyzer
- CICS Version Migration Scenario
  - ▶ Scenario 1 – Migrating to V3.1, resources in CSD
- More information





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# CICS™ TS Release Review



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# CICS Integration Enhancements

CICS TS V2.2	CICS TS V2.3	CICS TS V3.1
<p>EJB support</p> <ul style="list-style-type: none"><li>- Session Beans</li><li>- EJB deployment tooling</li><li>- JNDI (COS or LDAP)</li></ul> <p>Link 3270 Bridge</p> <p>ECI over TCP/IP</p> <p>SOAP for CICS</p>	<p>EJB Support</p> <ul style="list-style-type: none"><li>- Performance enhancements</li><li>- JNDI caching</li><li>- Improved monitoring</li><li>- IIOP Authentication</li></ul> <p>CCI Connector for CICS</p>	<p>Web services</p> <p>Web service assistants</p> <p>HTTP 1.1</p> <p>HTTP outbound API</p> <p>Transport layer security</p> <p>SSL performance</p> <p>Additional cipher suites</p>



# CICS Application Transformation Enhancements

CICS TS V2.2	CICS TS V2.3	CICS TS V3.1
<p>SDK for z/OS™ 1.3.1</p> <ul style="list-style-type: none"> <li>- JVM Resetable mode</li> <li>- JDBC 2.0</li> </ul> <p>XML for COBOL™ &amp; PLI™</p>	<p>SDK for z/OS 1.4.1</p> <ul style="list-style-type: none"> <li>-Continuous mode</li> <li>-Shared Class Cache</li> <li>-Storage Protection</li> <li>-zSeries Application Assist Processor™</li> </ul> <p>JCICS APIs</p> <ul style="list-style-type: none"> <li>-WEB</li> <li>-Document</li> <li>-Extract</li> </ul> <p>Debugging Enhancements</p>	<p>SDK for z/OS 1.4.2</p> <p>LE assembler</p> <p>Channels &amp; Containers</p> <p>New example application</p>



# CICS Enterprise Management Enhancements

CICS TS V2.2	CICS TS V2.3	CICS TS V3.1
<p>CICS DB2™ enhancements</p> <ul style="list-style-type: none"> <li>- OTE exploitation</li> <li>- Group Attach</li> <li>- RMI purge</li> </ul> <p>Sign-on retention</p> <p>CF rebuild and duplexing</p>	<p>Additional Thread Safe commands</p> <ul style="list-style-type: none"> <li>- ASKTIME</li> <li>- FORMATTIME</li> <li>- DOCUMENT</li> </ul> <p>MRO timeout</p> <p>TN3270 address display</p> <p>Statistics enhancements</p> <p>CPSM Enhancements</p> <ul style="list-style-type: none"> <li>- Definitional Web User Interface</li> <li>- Workload Management for LINK3270 bridge</li> </ul>	<p>OTE exploitation</p> <ul style="list-style-type: none"> <li>- OPENAPI</li> </ul> <p>XPLINK for C &amp; C++</p> <p>Thread Safe Web Cmds</p> <p>CPSM enhancements</p> <ul style="list-style-type: none"> <li>- User favorites</li> <li>- Group profiles</li> <li>- Filters</li> <li>- Result set warnings</li> <li>- BATCHREP access</li> </ul>



# Migration Differences

- CICS TS 2.2
  - ▶ Translator support for pre-Language Environment compilers is withdrawn
- CICS TS 2.3
  - ▶ CICS interfaces for the VS COBOL II, OS PL/I and C/370 runtimes are removed
    - Will need run-time libraries distributed with LE to execute current load modules
  - ▶ CICS interfaces for OS/VS COBOL are maintained
    - CICS will create reentrancy environment when program is loaded
- CICS TS 3.1
  - ▶ OS/VS COBOL support has been removed







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# Tools to Support Version to Version Migrations

## *Overview*



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# CICS Tools Support for Version to Version Migration

- All tools exploit CICS TS 3.1 functions where relevant
  - ▶ Support and new function exploitation at General Availability
- Improved speed of version to version migration projects
  - ▶ Prepare for migration: prioritize and optimize
    - Application understanding
      - CICS Interdependency Analyzer™
    - Performance and application analysis to improve design and performance
      - **CICS Performance Analyzer™**
  - ▶ Improve speed of migration
    - Migrate through Test, Quality Assurance regions and into production faster
      - **CICS Configuration Manage™ for improved productivity and control of CICS resource definitions**
      - CICS Interdependency Analyzer for improved quality of testing



# CICS Tools Support New Function Exploitation

- Identify candidate applications for new function exploitation
  - ▶ Make applications thread safe
    - CICS Interdependency Analyzer helps understand applications that conform to thread safe standards
    - **CICS Performance Analyzer** reports can show CPU usage by your thread safe CICS applications
  - ▶ Enable CICSplex SM
    - CICS Interdependency Analyzer identifies affinities
    - **CICS Configuration Manager** can simplify management of resource definitions in a CICSplex environment
- Improved efficiency to support SOA implementations
  - ▶ Use CICS IA, PA and CM to help implement web services
  - ▶ CICS Operations management tools help move closer to 24/7 operation, a key requirement for SOA.





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# CICS Configuration Manager

## *Overview*



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# What's the problem?

- Configuring CICS systems consists of
  - ▶ Server configuration
  - ▶ Resource provisioning
  - ▶ Application deployment
- All three require creation/modification of CICS resource definitions
- Definitions must be migrated from development, to test, to production environments
- Topology of CICS regions can be complex; different topologies in each environment can require changes to the definitions
- Definitions can be stored in CSD files or CICSplex™ SM data repositories
- Migration to an new version of CICS Transaction Server adds an extra dimension of complexity

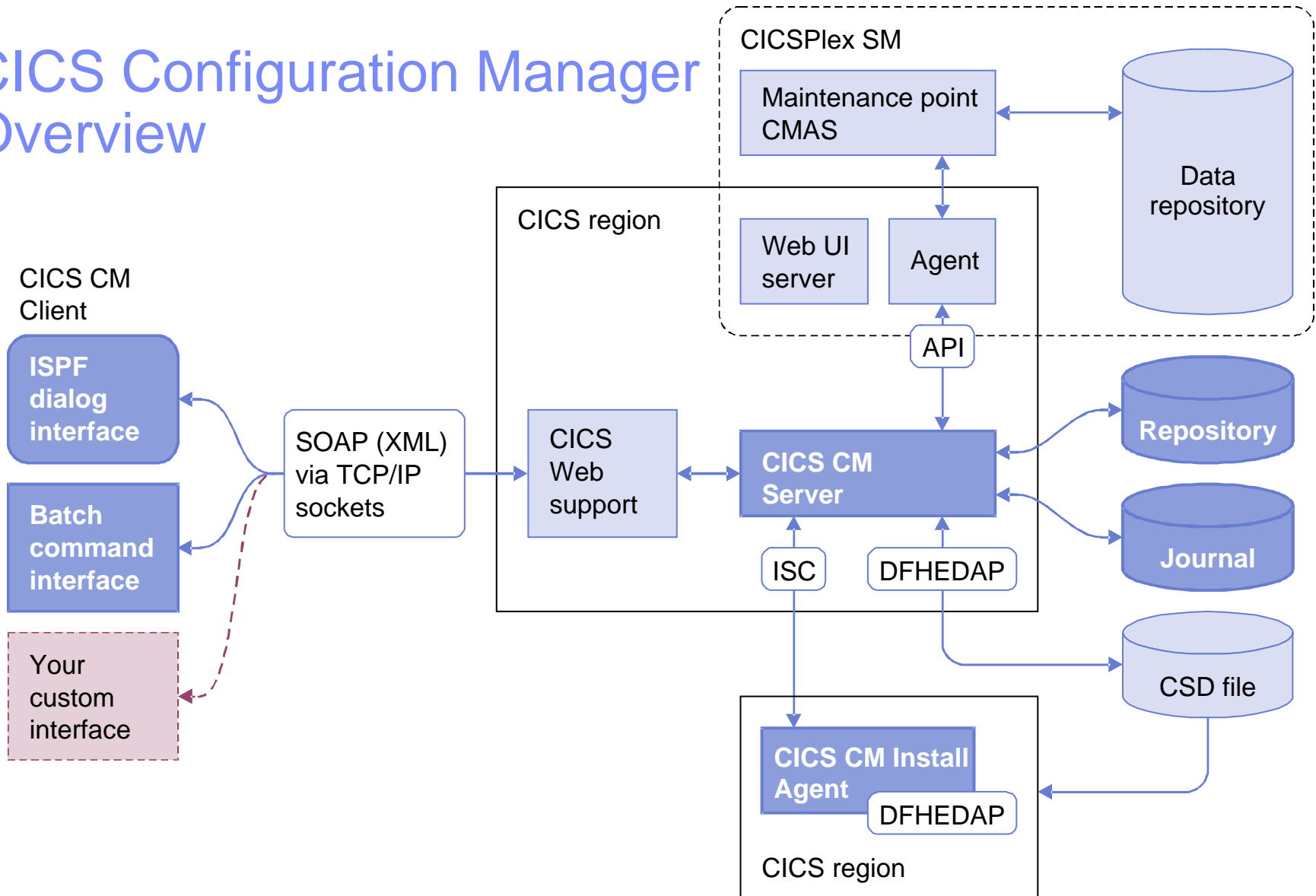


# What is CICS Configuration Manager?

- CICS Configuration Manager for z/OS enables you to
  - ▶ Manage CICS resource definitions in CSDs within your enterprise from a single point of control
  - ▶ Manipulate definitions seamlessly across CSD files and CICSplex System Manager data repositories
  - ▶ Create, edit, compare, copy, move and remove definitions, individually or in groups
  - ▶ Edit definitions whether the CICS regions that use them are active or inactive
  - ▶ Migrate multiple definitions in a single step with the option to transform definitions automatically to match the target environment
  - ▶ Use the audit trail to generate reports and back out changes to any previous version of the definitions
  - ▶ Create reports to identify redundant definitions, analyze resource definition status, relationships and history, across any combination of CSD files and data repositories
  - ▶ Take advantage of the optional change control capability where approval is required from authorized users before migrating definitions
  - ▶ Use an XML SOAP API and batch facility for scripting and integration with your existing applications
- Current release – CICS Configuration Manager for z/OS V1.1
  - ▶ GA April 2005
  - ▶ Product number - 5697-I78



# CICS Configuration Manager Overview



# Configuration Manager Benefits

- Helps IT Managers, System Programmers and Application Developers to be more productive, as it:
  - ▶ Improves productivity of day-to-day CICS system management and administration.
  - ▶ Simplifies managing new application development through test and deployment.
  - ▶ Improves change control and auditability.
  - ▶ Ease migration between releases of CICS Transaction Server, especially to Version 3.1
  - ▶ Simplifies CICS systems administration thus lowering costs and reducing downtime due to administrative errors.







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# Tools to Simplify Migration

*CICS Performance Analyzer*



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# CICS PA Overview

- CICS Performance Analyzer for z/OS
  - ▶ Comprehensive Performance Reporting and Analysis for CICS
    - Including DB2, WebSphere MQ™, and MVS™ System Logger
  - ▶ Extensive Tabular Reports and Extract Data Sets
  - ▶ Historical Database (HDB)
    - Trending and Capacity Planning
  - ▶ ISPF Dialog to build, maintain, and submit reports and extracts
- Part of IBM systems management strategy
  - ▶ Complements IBM online monitors for a complete solution
    - Tivoli® OMEGAMON™ XE for CICS on z/OS™
  - ▶ Complements other IBM batch performance analysis tools (e.g. IMS™ PA)
  - ▶ Complements IBM enterprise wide historical trend analysis solution (Tivoli Decision Support for z/OS™) with detailed CICS analysis for fast online problem resolution, CICS tuning and capacity planning
- Current release - CICS PA V1.4
  - ▶ 5655-F38



# Performance management process

## Tasks

- Real-time monitoring
  - ▶ Alerts
- Data analysis
  - ▶ Trend analysis to determine possible outcomes
- Capacity planning
  - ▶ Modelling to determine effect on the end-user response time
- Tuning
  - ▶ Deriving extra capacity

## CICS-specific tools

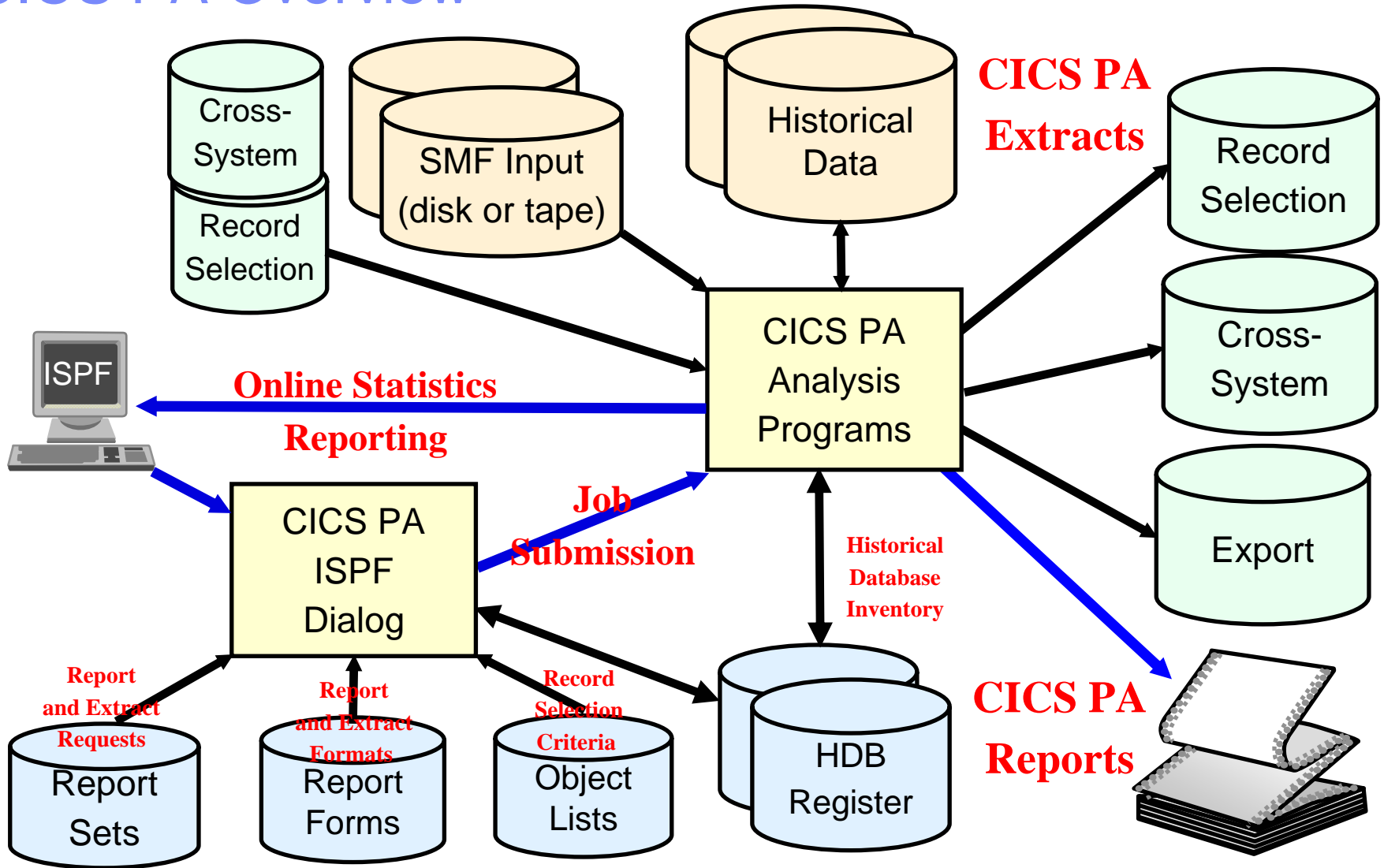
OMEGAMON  
XE for CICS

CICS  
Performance  
Analyzer

Other tools



# CICS PA Overview



# CICS PA at a Glance

- ISPF Dialog to build, maintain, submit reports
  - ▶ Tailor your reports easily using Report Forms
  - ▶ Extensive online help available, field descriptions, ...
- CICS PA reports and data extracts analyze all aspects of your CICS systems, including ...
  - ▶ CICS application performance
  - ▶ CICS system resource usage
  - ▶ Cross-System performance
  - ▶ Transaction Resource Usage
  - ▶ External Subsystems used by your CICS applications ...
    - including WebSphere MQ, DB2 and IMS (DBCTL)
  - ▶ MVS Workload Manager (WLM)
  - ▶ Exception events that cause performance degradation
- CICS PA Statistics online reporter provides comprehensive reporting of CICS Statistics data
- CICS PA Historical Database
  - ▶ Flexible and easy-to-use facility for collecting and managing historical performance data for your CICS systems
  - ▶ Data can be exported into DB2 or CSV format
  - ▶ Helps trending and capacity planning
- Extract Data Sets
  - ▶ Cross-System Work
  - ▶ Export for further processing using PC tools
  - ▶ Record Selection for faster processing

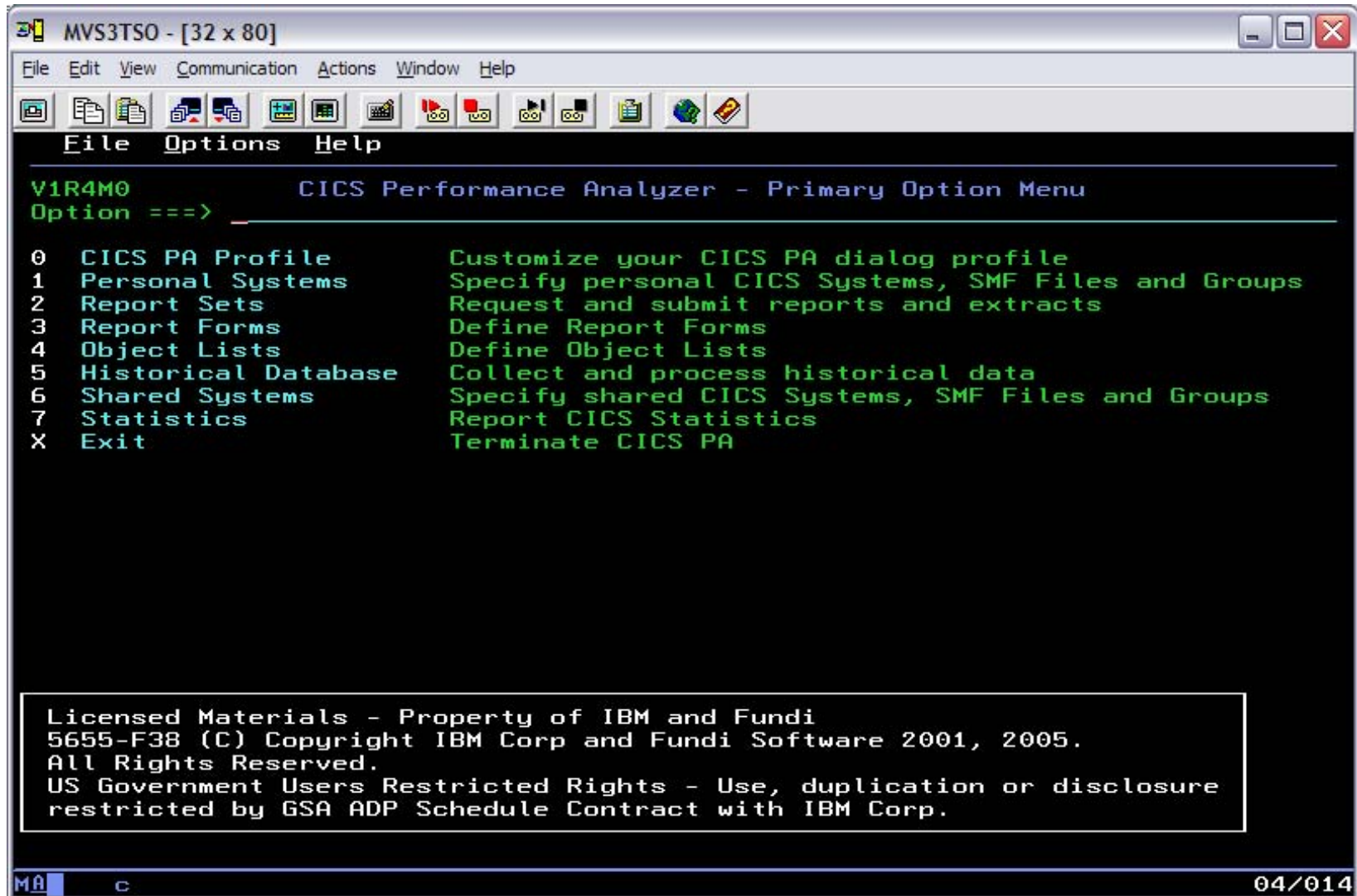


# CICS Performance Analyzer – Unique capabilities

- Ease of use
  - ▶ No additional setup or customization required – will process your existing SMF data
  - ▶ Familiar CICS terms and concepts
  - ▶ No additional overhead – SMF data collection overhead only
- Powerful and flexible analysis capabilities
  - ▶ ISPF Dialog to build, maintain, submit reports
    - Over 130+ sample reports provided to meet your analysis requirements
  - ▶ Tailor your reports easily to meet your analysis needs
  - ▶ Extensive online help available, including field descriptions
- Comprehensive data coverage and a variety of reports
  - ▶ Extensive Tabular Reports and Graph Reports
  - ▶ Cross-System Work for complete transaction performance tracking
- Historical database capability to aid trend analysis and capacity planning
- Customizable extracts capability to improve speed of processing



# CICS PA Overview



The screenshot shows a terminal window titled "MVS3TSO - [32 x 80]" with a menu for the CICS Performance Analyzer. The menu is titled "CICS Performance Analyzer - Primary Option Menu" and lists several options. A copyright notice is displayed in a box at the bottom of the terminal.

```
MVS3TSO - [32 x 80]
File Edit View Communication Actions Window Help
File Options Help
V1R4M0          CICS Performance Analyzer - Primary Option Menu
Option ==>
0  CICS PA Profile      Customize your CICS PA dialog profile
1  Personal Systems    Specify personal CICS Systems, SMF Files and Groups
2  Report Sets         Request and submit reports and extracts
3  Report Forms        Define Report Forms
4  Object Lists        Define Object Lists
5  Historical Database  Collect and process historical data
6  Shared Systems      Specify shared CICS Systems, SMF Files and Groups
7  Statistics          Report CICS Statistics
X  Exit               Terminate CICS PA

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MA  C  04/014
```

# Tailoring the Performance LIST Report Format

```

File Edit Confirm Upgrade Options Help
                                EDIT LIST Report Form - FCLIST          Row 1 to 20 of 209
Command ====> _____ Scroll ====> PAGE

Description . . . . List Report Form _____ Version (VRM): 620
Title . . . Transaction File Control Usage

Enter "/" to select action. Scroll Right for more data.

Field
Name      Type      Description
-----
TRAN      _____ Transaction identifier
USERID    _____ User ID
d PROGRAM  _____ Program name
d TASKNO   _____ Transaction identification number
STOP      TIMET      Task stop time
RESPONSE  _____ Transaction response time
DISPATCH TIME      Dispatch time
CPU       TIME      CPU time
d SUSPEND  TIME      Suspend time
d DISPWAIT TIME      Redispatch wait time
FCWAIT    TIME      File I/O wait time
a FCAMCT   _____ File access-method requests
EOR       _____ ----- End of Report -----
EOX       _____ ----- End of Extract -----
mm FCADD   _____ File ADD requests
FCBROWSE  _____ File Browse requests
FCDELETE  _____ File DELETE requests
FCGET     _____ File GET requests
FCPUT     _____ File PUT requests
mm FCTOTAL _____ File Control requests

```



# Requesting a Performance List Report - Default Format

V1R2M0 CICS Performance Analyzer  
Performance List

LIST0001 Printed at 15:17:27 1/21/2002 Data from 11:10:29 2/04/1999 APPLID IYK2Z1V1 Page 1

Tran	SC	Term	Userid	RSID	Program	TaskNo	Stop Time	Response Time	Dispatch Time	User CPU Time	Suspend Time	DispWait Time	FC Wait Time	FCAMRq	IR Wait Time
CSSY	U		CBAKER		DFHAPATT	16	11:10:29.803	.0139	.0007	.0006	.0133	.0000	.0000	0	.0000
CSSY	U		CBAKER		DFHAPATT	17	11:10:29.809	.0185	.0010	.0014	.0175	.0001	.0000	0	.0000
CSSY	U		CBAKER		DFHAPATT	18	11:10:29.861	.0674	.0196	.0027	.0479	.0269	.0000	0	.0000
CGRP	U		CBAKER		DFHZCGRP	12	11:10:30.194	.4123	.0420	.0074	.3702	.3223	.0000	0	.0000
CSSY	U		CBAKER		DFHAPATT	15	11:10:30.207	.4204	.0568	.0100	.3636	.1744	.0000	0	.0000
CSSY	U		CBAKER		DFHAPATT	13	11:10:30.456	.6743	.0728	.0134	.6015	.4000	.0000	0	.0000
CSSY	U		CBAKER		DFHAPATT	10	11:10:30.531	.7498	.1910	.0228	.5588	.1997	.0000	0	.0000
CSSY	U		CBAKER		DFHAPATT	14	11:10:31.121	1.3344	.3202	.0378	1.0142	.2626	.0000	1	.0000
CSSY	U		CBAKER		DFHAPATT	11	11:10:31.211	1.4292	.1497	.0313	1.2794	.3461	.0000	0	.0000
CPLT	U		CBAKER		DFHSIPLT	7	11:10:45.642	15.9915	.3383	.0369	15.6532	.0155	.0000	0	.0000
CSSY	U		CBAKER		DFHAPATT	III	11:10:45.856	16.0761	9.3488	2.3435	6.7273	1.1645	.9522	2059	.0000
CWBG	S		CBAKER		DFHWBGB	24	11:10:46.196	.0262	.0248	.0041	.0013	.0012	.0000	0	.0000
CRSQ	S		CBAKER		DFHCRQ	25	11:10:46.856	.0818	.0449	.0040	.0369	.0367	.0000	0	.0000
CXRE	S		CBAKER		DFHZXRE	27	11:10:47.134	.2255	.0243	.0049	.2011	.2009	.0000	0	.0000
CLR2	TO	R11	CBAKER		DFHLUP	29	11:10:48.317	.0263	.0030	.0020	.0232	.0000	.0000	0	.0232
CSFU	S		CBAKER		DFHFCU	26	11:10:48.471	1.6968	1.5899	.1136	.1069	.0294	.0000	0	.0000
CSAC	TO	SAMA	CBAKER		DFHACP	31	11:10:51.227	.5217	.0028	.0011	.5189	.0002	.0000	0	.0000
CLQ2	U		CBAKER		DFHLUP	28	11:10:51.840	3.8259	.0818	.0068	3.7441	.0035	.0000	0	3.7344
CEMT	TO	SAMA	CBAKER		DFHEMTP	32	11:10:51.942	.1877	.1842	.0264	.0035	.0030	.0000	0	.0000
CEMT	TO	SAMA	CBAKER		DFHEMTP	33	11:10:52.549	.0091	.0068	.0026	.0023	.0001	.0000	0	.0000
CEMT	TO	SAMA	CBAKER		DFHEMTP	34	11:10:53.074	.0092	.0068	.0025	.0024	.0000	.0000	0	.0000
CSAC	TO	SAMA	CBAKER		DFHACP	35	11:10:54.113	.5109	.0042	.0012	.5067	.0001	.0000	0	.0000
CSAC	TO	SAMA	CBAKER		DFHACP	36	11:10:55.159	.5150	.0011	.0011	.5139	.0001	.0000	0	.0000

.....



# Tailoring the Performance LIST Report Format ...

```

File  Edit  Confirm  Upgrade  Options  Help
                                EDIT LIST Report Form - FCLIST          Row 1 to 16 of 209
Command ==>> _____ Scroll ==>> PAGE

Description . . . . List Report Form _____ Version (VRM): 620

Title . . . Transaction File Control Usage

Enter "/" to select action. Scroll Right for more data.

      Field
      Name      Type      Description
      _____
      TRAN      _____ Transaction identifier
      USERID    _____ User ID
      STOP      TIMET      Task stop time
      RESPONSE _____ Transaction response time
H DISPATCH TIME      Dispatch time
      CPU       TIME      CPU time
      FCWAIT   TIME      File I/O wait time
      FCAMCT   _____ File access-method requests
      FCADD    _____ File ADD requests
      FCBROWSE _____ File Browse requests
      FCDELETE _____ File DELETE requests
      FCGET    _____ File GET requests
      FCPUT    _____ File PUT requests
      FCTOTAL  _____ File Control requests
      EOR      _____ ----- End of Report -----
      . . .
      EOX      _____ ----- End of Extract -----
  
```



# CICS PA - Performance Summary Report

V1R3M0

CICS Performance Analyzer

Performance Summary

SUMM0001 Printed at 12:46:48 7/23/2003

Data from 11:10:29 2/04/1999 to 08:10:06 2/16/1999

Page

1

Tran	#Tasks	Avg Response Time	Max Response Time	Avg Dispatch Time	Avg User CPU Time	Avg Suspend Time	Max Suspend Time	Avg DispWait Time	Avg FC Wait Time	Avg FCAMRq	Avg IR Wait Time	Avg SC24UHWM	Avg SC31UHWM
AADD	18	.0115	.0945	.0099	.0020	.0016	.0114	.0008	.0003	1	.0000	949	0
ABRW	1033	.0789	36.6088	.0027	.0015	.0762	36.6061	.0000	.0000	6	.0007	1008	0
ADDD	1	.0482	.0482	.0350	.0049	.0132	.0132	.0125	.0000	0	.0000	0	0
AINQ	11	.0021	.0040	.0017	.0014	.0004	.0021	.0000	.0000	1	.0001	928	0
AMNU	15	.0245	.1724	.0223	.0027	.0022	.0194	.0010	.0000	0	.0000	422	177
AUPD	17	.0183	.0665	.0118	.0032	.0065	.0505	.0010	.0017	0	.0007	968	0
B	2	.0028	.0031	.0027	.0015	.0001	.0001	.0000	.0000	0	.0000	0	0
BING	1	.0024	.0024	.0023	.0016	.0001	.0001	.0000	.0000	0	.0000	0	0
BINQ	1	.0027	.0027	.0027	.0015	.0001	.0001	.0000	.0000	0	.0000	0	0
CALL	25	2.3633	8.2455	.0074	.0021	2.3559	8.2300	.0013	.0000	0	.0000	0	1056
CATA	17	.0285	.0882	.0119	.0055	.0167	.0828	.0002	.0000	0	.0000	0	0
CATD	6	.0372	.0590	.0159	.0056	.0213	.0306	.0024	.0000	0	.0000	0	0
CATR	2	.0290	.0296	.0283	.0047	.0006	.0009	.0006	.0000	0	.0000	0	0
CBAM	11	11.2041	51.3803	.0147	.0054	11.1894	51.3196	.0016	.0000	3	.0000	0	1865
CBTR	2	.0179	.0334	.0176	.0029	.0003	.0006	.0003	.0000	0	.0000	0	0
CEBR	1	575.916	575.916	.0061	.0046	575.910	575.910	.0003	.0000	0	.0000	0	0
CECI	61	1.7234	72.8971	.0194	.0043	1.7039	72.8839	.0004	.0000	0	.0000	3	21295
CEDA	98	1.9304	51.4018	.0602	.0218	1.8702	50.2257	.0008	.0086	53	.0000	0	0
CEMT	137	19.1960	592.514	.0154	.0062	19.1806	592.359	.0043	.0000	0	.0000	0	0
CESD	12	.1128	1.2902	.0211	.0021	.0917	1.0858	.0916	.0000	0	.0000	0	0
CESF	6	.0180	.0468	.0175	.0042	.0004	.0009	.0004	.0000	0	.0000	0	0
CESN	36	.0242	.2046	.0233	.0081	.0008	.0060	.0006	.0000	0	.0000	0	0
CETR	1	.8982	.8982	.1132	.0132	.7850	.7850	.0068	.0000	0	.0000	0	0
CGRP	2	.5862	.7601	.0571	.0076	.5291	.6880	.4134	.0000	0	.0000	0	0
CITS	5	.0111	.0153	.0058	.0035	.0053	.0091	.0001	.0000	0	.0000	0	0
CLQ2	2	2.0731	3.8259	.0628	.0068	2.0103	3.7441	.0820	.0000	0	1.9054	0	0
CLR2	2	.0604	.0946	.0030	.0020	.0574	.0915	.0000	.0000	0	.0135	0	0

# CICS PA – Transaction Report

VIR2M0

CICS Performance Analyzer  
Transaction Group

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TRGP0001 Printed at 12:03:17 11/12/2002 Data from 11:10:29 2/04/1999 to 08:10:06 2/16/1999 Page 14

Tran	Userid	SC	Origin	Erdg Tran	Client IP Address	Request Type	Program	Term	LUName	Foty T/Name	Conn Name	APPLID	R Task T	Stop Time	Response Time
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	617 T	11:30:11.47	.2545
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	618 T	11:30:11.51	.0385
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	619 T	11:30:21.65	.3538
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	620 T	11:30:21.67	.0289
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	621 T	11:30:28.02	.3097
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	622 T	11:30:29.44	1.4267
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	623 T	11:30:33.46	.2828
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	624 T	11:30:34.63	1.1731
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	625 T	11:30:42.85	.0023
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	626 T	11:30:43.18	.3228
CEDA	CBAKER	TO	BRIDGE	CWBA		AP:	DFHEDAP	}AAJ	}AAJ	B/}	}AAJ	IYK2Z1V3	627 T	11:31:26.83	43.9778
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	674 T	11:31:01.84	.2718
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	675 T	11:31:01.92	.0769
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	676 T	11:31:15.03	.2997
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	677 T	11:31:15.06	.0376
CWXN	CBAKER	U	SOCKET		9.20.45.17	AP:	DFHWBKN					IYK2Z1V3	678 T	11:31:17.75	.2561
CWBA	CBAKER	U	WEB		9.20.45.17	AP:	DFHWBTTA					IYK2Z1V3	679 T	11:31:17.93	.1787



# CICS PA - Cross-System Work Report - Default ...

V1R2M0

CICS Performance Analyzer  
Cross-System Work

CROS0001 Printed at 12:09:28 1/24/2002 Data from 11:10:51 2/04/1999 to 08:10:28 2/16/1999

Page 3

Tran	Userid	SC	TranType	Term	LUName	Request Type	Program	Fcty T/Name	Conn Name	NETName	UOW Seq	APPLID	R Task	Stop Time	Response Time	A B
ABRW	BRENNER	TP	U	S23D	IGCS23D	AP:	DFHÚABRW	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	61	T 11:13:20.275	.0080	
CMSI	CBAKER	TO	UM	R11	IYK2Z1V1	FS:F---	DFHMIRS	T/R11	CJB1	GBIBMIYA.IGCS23D	1	IYK2Z1V3	57	T 11:13:20.274	.0044	
ABRW	BRENNER	TP	U	S23D	IGCS23D	AP:	DFHÚABRW	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	62	T 11:13:21.332	.0064	
CMSI	CBAKER	TO	UM	R11	IYK2Z1V1	FS:F---	DFHMIRS	T/R11	CJB1	GBIBMIYA.IGCS23D	1	IYK2Z1V3	58	T 11:13:21.331	.0039	
CEDA	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEDAP	T/S23D		GBIBMIYA.IGCS23D	3	IYK2Z1V1	72	T 11:16:28.284	1.1025	
CEDA	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEDAP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	72	C 11:16:27.181	3.0046	
CEDA	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEDAP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	72	C 11:16:24.177	2.2127	
CEDA	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEDAP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	72	C 11:16:21.964	46.5125	
CEDA	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEDAP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	72	C 11:15:35.451	.6794	
CEMT	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEMTP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	140	T 11:21:24.062	51.3442	
CEMT	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEMTP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	140	C 11:20:32.718	8.3481	
CEMT	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEMTP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	140	C 11:20:24.370	.0042	
CEMT	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEMTP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	174	T 11:21:28.662	1.1930	
CEMT	BRENNER	TO	U	S23D	IGCS23D	AP:	DFHEMTP	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	174	C 11:21:27.469	.0041	
RMST	BRENNER	TO	U	S23D	IGCS23D	TR:CJB3		T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	178	T 11:22:38.447	48.9210	
STAT	CBAKER	TO	U	R11	IYK2Z1V1	AP:	DFH0STAT	S/S23D	CJB1	GBIBMIYA.IGCS23D	1	IYK2Z1V3	349	T 11:22:38.433	66.7720	
RMST	BRENNER	TO	U	S23D	IGCS23D	TR:CJB3		T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	178	C 11:21:49.526	10.0524	
RMST	BRENNER	TO	U	S23D	IGCS23D	TR:CJB3		T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	178	C 11:21:39.473	7.8027	
RMST	BRENNER	TO	U	S23D	IGCS23D	TR:CJB3		T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	178	C 11:21:31.671	.0110	
STAT	BRENNER	TO	U	S23D	IGCS23D	AP:	DFH0STAT	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	195	T 11:22:52.663	2.0203	
STAT	BRENNER	TO	U	S23D	IGCS23D	AP:	DFH0STAT	T/S23D		GBIBMIYA.IGCS23D	1	IYK2Z1V1	195	C 11:22:50.642	8.9745	

# MVS Workload Activity Reports - Summary

Service Class		APPLID	Phase	#Tasks	Response Time			
					Average	Std Dev	90% Peak	Maximum
-----								
CICSDFLT	SCSCPAA1	BTE	51	.0377	.1073	.1753	.5600	
	SCSCPAA1	EXE	1533	.0316	.0781	.1316	1.1133	
	SCSCPAA4	BTE	17	111.043	457.767	697.900	1887.44	
	SCSCPAA4	EXE	8239	.0204	.0569	.0934	1.2754	
	SCSCPJA7	EXE	810	.0035	.0043	.0090	.0297	
	SCSCPLA1	BTE	8816	.3441	20.0989	26.1108	1887.18	
	SCSCPLA2	BTE	6954	.4033	22.6318	29.4172	1887.33	
	SCSCPJA7	BTE	6624	.0356	.0792	.1371	1.2963	
	SCSCPJA7	EXE	4680	.0412	.0891	.1555	1.1289	
CICSDFLT	*Total*	BTE	27142	.3005	19.8410	25.7367	1887.44	
	*Total*	EXE	10582	.0207	.0587	.0960	1.2754	
CICSWORK	SCSCPJA7	BTE	32	58.9871	333.661	486.741	1887.47	
* Grand Total *	*	BTE	27174	.3696	22.8968	29.7233	1887.47	
* Grand Total *	*	EXE	10582	.0207	.0587	.0960	1.2754	

- by MVS WLM Service Class and Report Class
  - ▶ Applid, WLM Completion phase, Number of tasks, ...
  - ▶ Response time ...
    - Average, Std Deviation, Peak percentile, Maximum, ...



# DB2 Reports - List

V1R2M0 CICS Performance Analyzer  
DB2 - List

DB2R0001 Printed at 10:14:46 2/13/2002 Data from 13:31:17 1/24/2002 to 13:32:08 1/24/2002 Page 1

Tran/SSID	Userid/Authid	Program/Planname	APPLID	UOW Task	R Seq	T Term	LUName	..DB2 Wait Time.. Connect	DB2 Thread	User CPU ReqCnt	Start Time	Stop Time	Response Time	A B	
WR0S	RAIMAN	CRWWPPOS	STM4IRA1	34695	1	T	<ADQ STM4IRT1	.0000	.0000	18	.3112	13:31:23.053	13:31:34.349	11.2956	

CH1G STM4IRA1 CRWWPPOS STM4IRA1 34695 Thread Identification ID=ENTRWROS0037 NETName=USIBMSY.LE000081 UOWID=16372A6C7E14  
~~Begin Time: 13:31:23.056 1/24/02 End Time: 13:31:35.378 1/24/02~~

*CMF performance data*

Class1: Thread Time Elapsed= 12.3218 CPU= .310480  
 Class2: In-DB2 Time Elapsed= 11.2359 CPU= .309914  
 Class3: Suspend Time Total = 6.5988 I/O= 2.3726 Lock/Latch= 4.2262 Other= .0000  
 Buffer Manager Summary GtPgRq= 8120 SyPgUp= 8  
 Locking Summary Suspnd= 11 DeadLk= 0 TmeOut= 0 MxPgLk= 1  
 SQL DML Query/Update Sel= 2 Ins= 0 Upd= 0 Del= 0  
 SQL DML 'Other' Des= 0 Pre= 0 Ope= 3 Fet= 13 Clo= 0

WRNO	RAIMAN	CRWWPPNO	STM4IRA1	34869	1	T	<ACY STM4IRT1	.0000	.0000	67	.0114	13:31:38.853	13:31:45.875	7.0220	
------	--------	----------	----------	-------	---	---	---------------	-------	-------	----	-------	--------------	--------------	--------	--

CH1G STM4IRA1 CRWWPPNO STM4IRA1 34869 Thread Identification ID=ENTRWRO0051 NETName=USIBMSY.LE000081 UOWID=1637397E8927  
~~Begin Time: 13:31:38.854 1/24/02 End Time: 13:31:45.888 1/24/02~~

*Associated DB2 Accounting data*

Class1: Thread Time Elapsed= 6.9534 CPU= .010208  
 Class2: In-DB2 Time Elapsed= 6.8909 CPU= .008283  
 Class3: Suspend Time Total = 6.3783 I/O= .0000 Lock/Latch= 6.3783 Other= .0000  
 Buffer Manager Summary GtPgRq= 173 SyPgUp= 36  
 Locking Summary Suspnd= 2 DeadLk= 0 TmeOut= 0 MxPgLk= 15  
 SQL DML Query/Update Sel= 1 Ins= 12 Upd= 11 Del= 0  
 SQL DML 'Other' Des= 0 Pre= 0 Ope= 12 Fet= 21 Clo= 10

## Lotus™ 123 Graph using CICS PA

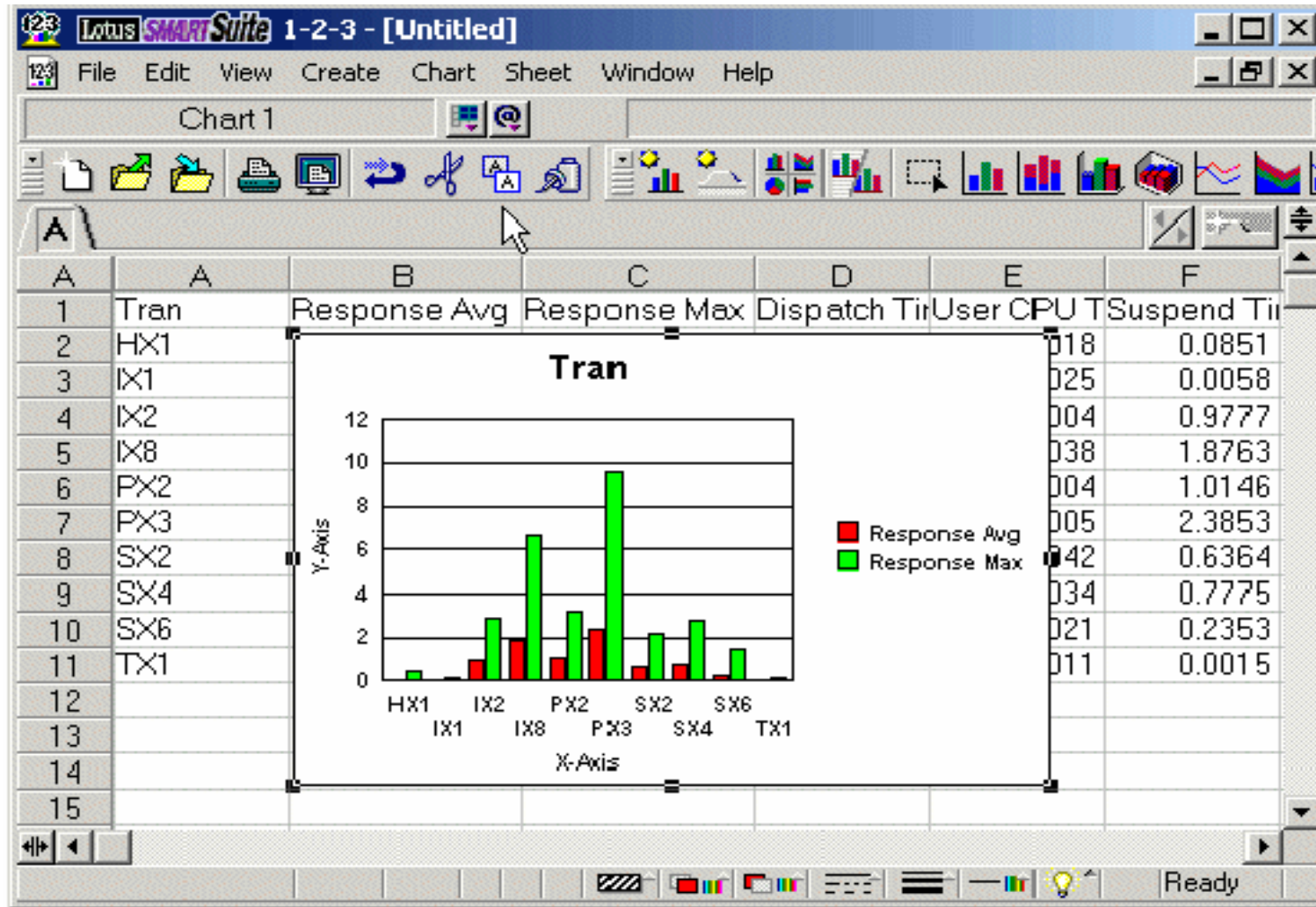


Figure 4-7 Lotus 1-2-3 chart





# Excel Graph using CICS PA

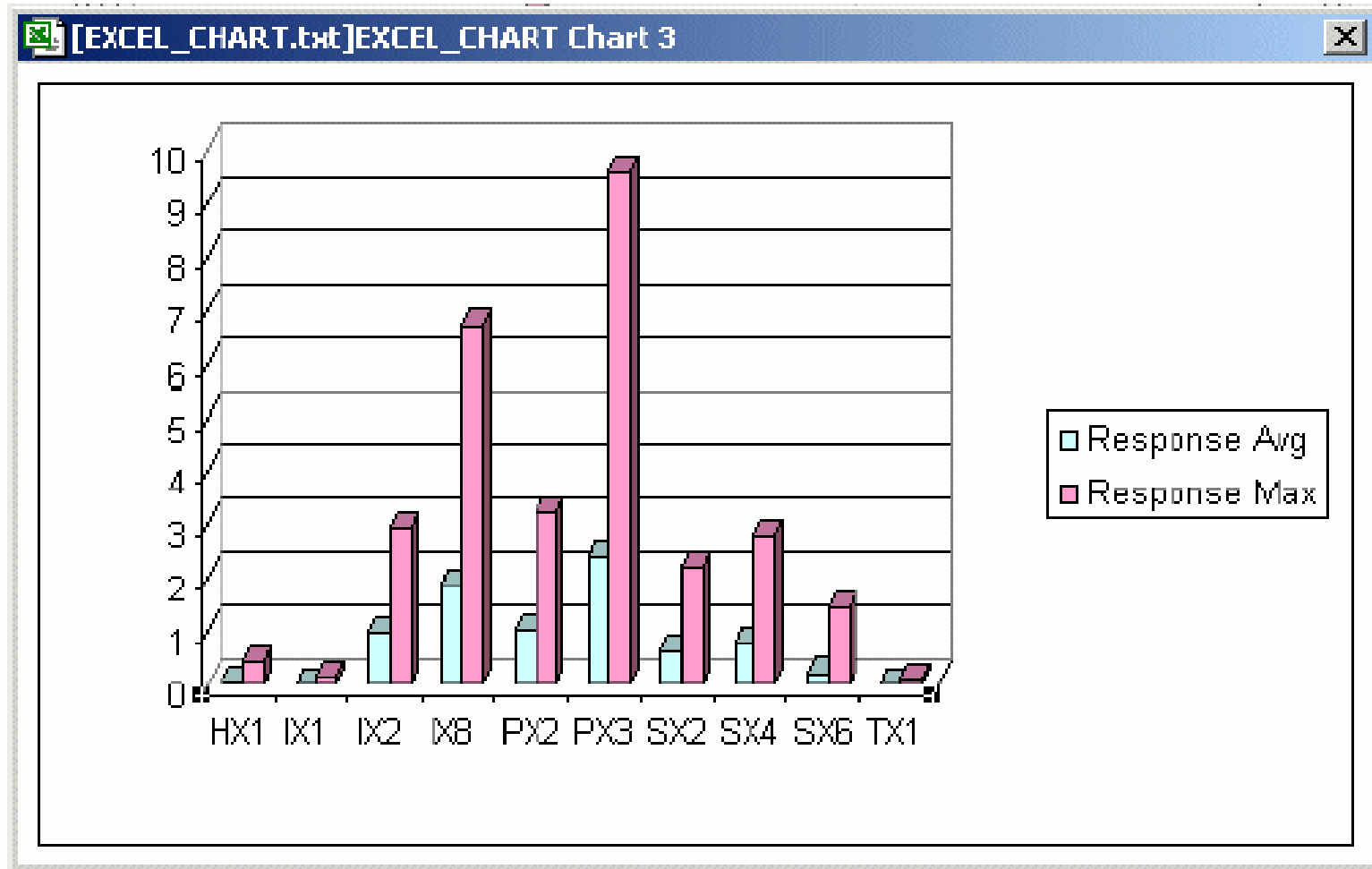


Figure 4-15 Microsoft Excel chart





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# CICS Version To Version Migration Scenario



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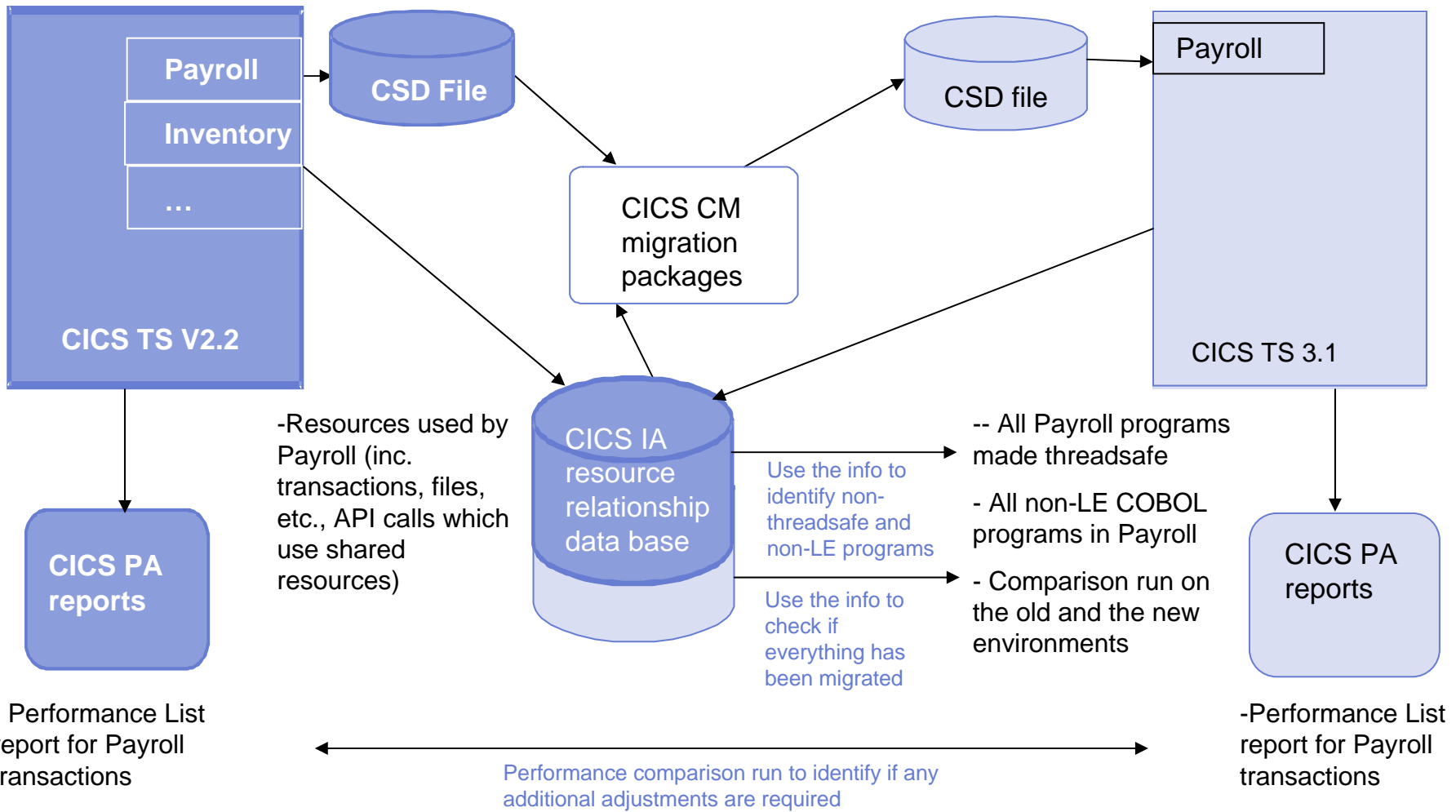


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# Scenario 1: Migration to CICS TS 3.1 - CICS resource definitions remain on CSD in target environment



# Migration to CICS TS 3.1 - CICS resource definitions remain on CSD in target environment



- Performance List report for Payroll transactions

-Performance List report for Payroll transactions



# Scenario 1: Migration to CICS TS 3.1 - CICS resource definitions remain on CSD in target environment

1. CICS IA identifies resources for each set of applications that needs to be migrated (in runtime and via the load lib scanner). This info can be used to:
  1. Identify non-LE and OS VS Cobol programs. If any are found, Debug Tool Utilities & Advanced Functions can be used to convert these.
  2. Identify applications which do not conform to threadsafe standards. In order to improve performance (if needed) on CICS TS 3.1, CICS applications need to conform to threadsafe standards
  3. Identify a group of resources for each application which need to be migrated from the current CICS TS test environment to CICS TS 3.1 test environment. This info will be used by CICS CM.
2. Use CICS CM to build change packages based on the information provided by CICS IA to migrate resources to CICS TS 3.1 test regions. CICS CM transformation rules can also be applied to enable transformation of resource attributes during migration to target CSD.
3. Before switching into production you might want to run CICS IA in the new environment, and use the info to compare resources in the two environments, to check if everything you need has been migrated.
4. Following the migration, CICS PA Performance List reports can be run for comparison between the two environments.



# Status of OS/VS COBOL and COBOL II with CICS:

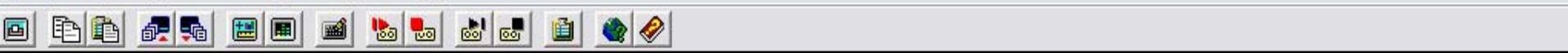
- CICS TS 2.2 announcement:
  - ▶ Translator support for the earlier (pre-Language Environment) compilers is withdrawn in this release
  - ▶ “It is planned that run-time support for OS/VS COBOL programs, regardless of run-time library used, and for any other programs running under pre-Language Environment run-time libraries will be withdrawn in the next release.”
- CICS TS 2.3
  - ▶ OS/VS COBOL load module must run with the LE runtime
  - ▶ Any modules attempting to use the OS/VS COBOL runtime will abend at initialization
- CICS TS 3.1
  - ▶ CICS interfaces for the VS COBOL II, OS PL/I and C/370 runtimes are removed
    - Will need run-time libraries distributed with LE to execute current load modules
  - ▶ CICS interfaces for the OS/VS COBOL are removed
    - CICS will terminate any OS/VS COBOL program with an APCE abend



# Identifying OS/VS COBOL programs with CICS IA

- What the CICS IA scanner provides for is as follows :-
- It attempts to find the language type from the Language byte in the API call. if it has not identified it from the API call then it checks the prologue (stub) for DFHYA for Assembler etc.
- It reports the following types
  - ▶ ASSEMBLER - Assembler language constant
  - ▶ COBOL II - COBOL II language constant (or any COBOL after OS/VS, COBOL FOR MVS etc,)
  - ▶ C/370 - C/370 language constant
  - ▶ COBOL - COBOL language constant (OS/VS COBOL)
  - ▶ PL/I - PL/I language constant
- We also identify if the program is runnable under LE/370.
- The CICS IA scanner will identify OS/VS COBOL programs and informs you whether they have been linked with LE or not.





Display Filter View Print Options Help

SDSF OUTPUT DISPLAY DNET002A JOB07094 DSID 101 LINE 0 COLUMNS 01- 80  
COMMAND INPUT ==> SCROLL ==> PAGE

\*\*\*\*\* TOP OF DATA \*\*\*\*\*

1CICS INTERDEPENDENCY ANALYZER Version 1.3.0  
LOAD MODULE SCANNER - SUMMARY LISTING OF USER.LOADLIB

0

Module Name	Module Length	Module Language	Language Version	Possible statements... Affinities	Dependencies	MVS P
ABMSET	00000178			0	0	
ABNDPROG	00000308	ASSEMBLER		0	4	
ADCASM01	00004068	COBOL II	LE	0	1	
ADCCOM1	00007198			0	0	
ADC01	00002568	COBOL II	LE	0	5	
ADC02	00001860			0	0	
ADC03	00001498			0	0	
ADDER	000012A8	COBOL II	LE	0	0	
ADDER1	00000658	COBOL II	Non LE	0	0	
ADINTFD	0001AA50	COBOL II	LE	3	5	
ADINTF2D	0001ED30	COBOL II	LE	3	5	
ADM01	00000590			0	0	
ADOBP	0001CF18			0	0	
ADQUERYA	00008DE0	COBOL II	LE	0	42	
ASMBINAR	000004D0	ASSEMBLER		0	0	
ASMBLR	000004A8	ASSEMBLER		0	0	
ASMLE	000004B8	ASSEMBLER		0	0	
ATTRADD	00004CD0	COBOL II	LE	2	2	
BALNPROG	00001360	COBOL II	LE	0	1	
BB01PROG	000006E8	COBOL II	Non LE	0	0	
BB02PROG	00000610	COBOL II	Non LE	0	0	



# How CICS IA can help with making programs threadsafe ?

A threadsafe program:

- Must be written to threadsafe standards.
  - ▶ Must use appropriate serialization techniques when accessing any shared resources.
- Must be Language Environment-conforming or assembler programs.
- Must be capable of executing concurrently on multiple TCBs
- Cannot rely on QR to serialize access to shared resources and storage.
  - ▶ Use serialization techniques
    - Compare and swap
    - Enqueue/Dequeue
  - ▶ All programs accessing a shared resource must be threadsafe.



## What are the shared resources ?

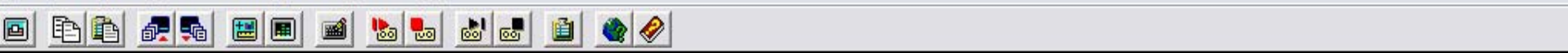
- Typical examples of shared resources are the CICS CWA, global user exit global work areas and storage acquired explicitly by the application program with the shared option.
- You can check whether your application programs use these types of shared storage by looking for occurrences of the following EXEC CICS commands:
  - ▶ ADDRESS CWA
  - ▶ EXTRACT EXIT GASET
  - ▶ GETMAIN SHARED
- CICS IA collects and records this information



## What else can CICS IA do ?

- CICS IA reports the current TCB mode for each EXEC CICS (or DB2, MQ, DLI) call.
- Users who are converting their programs to threadsafe can use this during testing to assist in finding out which TCB modes their program runs in. This helps to identify programs that have CICS API calls that are not threadsafe and cause TCB mode swapping.
- Users can run a query on the relationship DB2 database for the list of API calls that are not threadsafe to identify programs that use these calls.





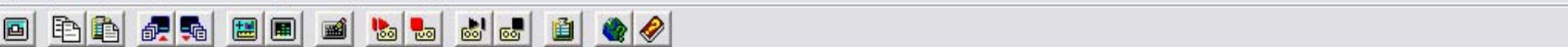
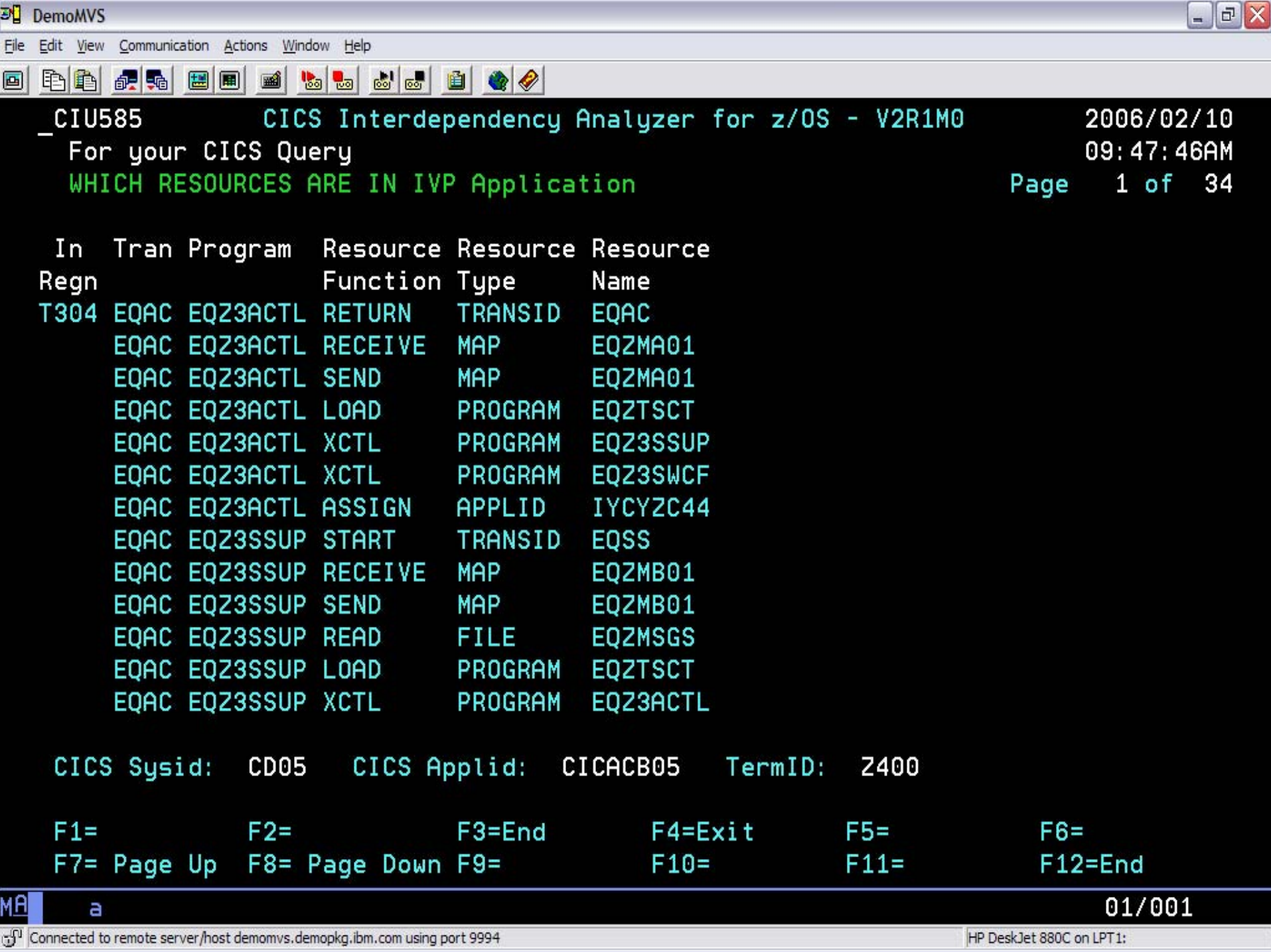
Display Filter View Print Options Help

SDSF OUTPUT DISPLAY TEAM30IA JOB01443 DSID 101 LINE 333 COLUMNS 02- 81  
COMMAND INPUT ==> SCROLL ==> CSR

Module Name - CAT000 /	Load Module Length - 00002750 /	Module Entry Point
Offset	Storage Content (HEX)	EDF DEBUG Possibl
00000180	0A02E0000700004100	00951 WRITEQ
000001A2	0602F8002700008000	00872 READ
000001B3	0E02E0002700000100	00812 LINK
000001C4	0606E0002700004000	00778 REWRITE
000001D5	0606E0002700004000	00736 REWRITE
000001E6	0602F8002700008400	00684 READ
000001F7	0A04E8002700008900	00597 READQ
00000208	0A02E8000700004100	00552 WRITEQ
00000219	0A04E8002700008900	00512 READQ
0000022A	0E02E0002700000100	00487 LINK
0000023B	0E02E0002700000100	00326 LINK
0000024C	0606E0002700004000	00225 REWRITE
0000025D	0602F8002700008400	00213 READ
0000026E	0A0680000700002100	00189 DELETEQ
0000027F	0A02E8000700004500	00176 WRITEQ
00000290	0A04E8002700008900	00165 READQ
000002A1	0E02E0002700000100	00158 LINK
000002B2	0606E0002700004000	00124 REWRITE
000002C3	0602F8002700008400	00106 READ
000002D4	0A04E8002700008900	00086 READQ

Total possible Affinity commands = 8  
Total possible Dependency commands = 20  
Total possible MVS POSTs = 0

Module Name - CAT000T / Load Module Length - 00002750 / Module Entry Point



CIU585 CICS Interdependency Analyzer for z/OS - V2R1M0 2006/02/10  
 For your CICS Query 09:47:46AM  
 WHICH RESOURCES ARE IN IVP Application Page 1 of 34

In Regn	Tran	Program	Resource Function	Resource Type	Resource Name
T304	EQAC	EQZ3ACTL	RETURN	TRANSID	EQAC
	EQAC	EQZ3ACTL	RECEIVE	MAP	EQZMA01
	EQAC	EQZ3ACTL	SEND	MAP	EQZMA01
	EQAC	EQZ3ACTL	LOAD	PROGRAM	EQZTSCT
	EQAC	EQZ3ACTL	XCTL	PROGRAM	EQZ3SSUP
	EQAC	EQZ3ACTL	XCTL	PROGRAM	EQZ3SWCF
	EQAC	EQZ3ACTL	ASSIGN	APPLID	IYCYZC44
	EQAC	EQZ3SSUP	START	TRANSID	EQSS
	EQAC	EQZ3SSUP	RECEIVE	MAP	EQZMB01
	EQAC	EQZ3SSUP	SEND	MAP	EQZMB01
	EQAC	EQZ3SSUP	READ	FILE	EQZMSG5
	EQAC	EQZ3SSUP	LOAD	PROGRAM	EQZTSCT
	EQAC	EQZ3SSUP	XCTL	PROGRAM	EQZ3ACTL

CICS Sysid: CD05 CICS Applid: CICACB05 TermID: 2400

F1= F2= F3=End F4=Exit F5= F6=  
 F7= Page Up F8= Page Down F9= F10= F11= F12=End

zShow50 - [32 x 80]

File Edit View Communication Actions Window Help

File Settings Help

Edit Change Package 00000006

Command ==> \_\_\_\_\_

Name . . . . . : 00000006

Description . . : Change Package for devt to QA

Change package settings

Approval profile . . . . . + \_\_\_\_\_

External reference . . : CM0050

Choose a processing command and press Enter

- 1 1. Package Package CICS resources into the change package
- 2 2. List List CICS resources assigned to the change package
- 3 3. Ready Ready or unready the package for processing
- 4 4. Approve Approve or disapprove the change package
- 5 5. Migrate Migrate the change package
- 6 6. Install Install the package's resources into CICS regions
- 7 7. Newcopy Newcopy the package's maps, partitionsets or programs
- 8 8. Backout Backout a previous migrate of the change package
- 9 9. History Display the change package processing history

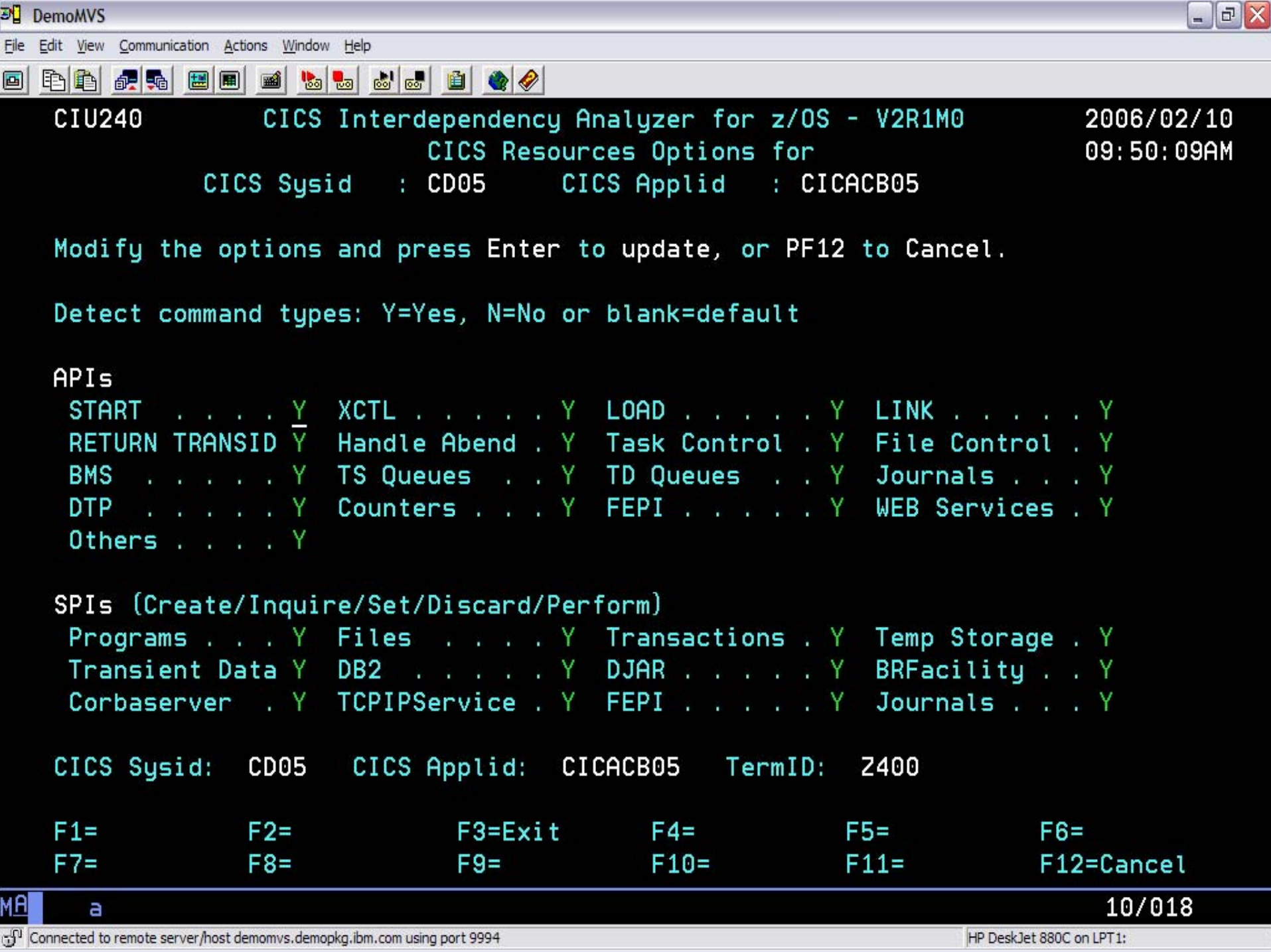
Migration scheme . . . DVT20A + (Required for options 1-8)

MA e 24 / 038

Connected to remote server/host zshow50.pdl.pok.ibm.com using port 9993 gbhurl89 3240/02/A on gbhurl89

start 100% 09:37 Friday 17/02/2006

Infop... Satis... 2 N... 4 I... p... Adob... CICS... Micro...



CIU240 CICS Interdependency Analyzer for z/OS - V2R1M0 2006/02/10  
CICS Resources Options for 09:50:09AM  
CICS Sysid : CD05 CICS Applid : CICACB05

Modify the options and press Enter to update, or PF12 to Cancel.

Detect command types: Y=Yes, N=No or blank=default

APIs

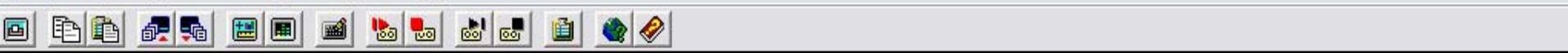
START . . . . Y XCTL . . . . Y LOAD . . . . Y LINK . . . . Y  
RETURN TRANSID Y Handle Abend . Y Task Control . Y File Control . Y  
BMS . . . . Y TS Queues . . Y TD Queues . . Y Journals . . . Y  
DTP . . . . Y Counters . . . Y FEPI . . . . Y WEB Services . Y  
Others . . . . Y

SPIs (Create/Inquire/Set/Discard/Perform)

Programs . . . Y Files . . . . Y Transactions . Y Temp Storage . Y  
Transient Data Y DB2 . . . . Y DJAR . . . . Y BRFacility . . Y  
Corbaserver . Y TCPIPService . Y FEPI . . . . Y Journals . . . Y

CICS Sysid: CD05 CICS Applid: CICACB05 TermID: Z400

F1= F2= F3=Exit F4= F5= F6=  
F7= F8= F9= F10= F11= F12=Cancel



File Systems Confirm Options Help

EDIT Report Set - PERFREP Row 1 of 35

Display Filter View Print Options Help

SDSF OUTPUT DISPLAY TEAM30X JOB01451 DSID 104 LINE 66 COLUMNS 02- 81  
COMMAND INPUT ==> SCROLL ==> CSR

LSTX0001 Printed at 9:56:40 2/10/2006 Data from 14:47:16 6/27/2003 to 15:16:5  
Top 20 Worst CPU Times by Transaction ID

Tran	User	CPU Time	Userid	TaskNo	Stop Time	Response Time	Dispatch Time	Dispatch Count	User CP Time
CEMT	.0018	CICSUSER	28422	15:14:44.154	.3375	.0026	2	.001	
CEMT	.0018	CICSUSER	28422	15:09:52.808	.5832	.0022	2	.001	
CEMT	.0018	CICSUSER	28422	15:14:45.694	.3493	.0021	2	.001	
CEMT	.0018	CICSUSER	28422	15:09:53.339	.2546	.0021	2	.001	
CEMT	.0018	CICSUSER	28422	15:14:40.159	.4766	.0031	2	.001	
CEMT	.0018	CICSUSER	28422	15:14:45.345	.3982	.0021	2	.001	
CEMT	.0018	CICSUSER	28422	15:14:45.997	.3024	.0021	2	.001	
CEMT	.0018	CICSUSER	28422	15:09:52.224	.9178	.0021	2	.001	
CITS	.0014	CICSUSER	46082	15:11:35.274	.0069	.0024	3	.001	
CITS	.0014	CICSUSER	46640	15:11:44.148	.0070	.0055	3	.001	
CITS	.0014	CICSUSER	48628	15:12:12.167	.0045	.0012	3	.001	
CITS	.0014	CICSUSER	49197	15:12:19.178	.0033	.0017	3	.001	
CITS	.0014	CICSUSER	46144	15:11:36.328	.0101	.0026	3	.001	
CITS	.0013	CICSUSER	41663	15:10:00.296	.0037	.0037	2	.001	
CITS	.0013	CICSUSER	41688	15:10:01.174	.0035	.0015	3	.001	
CITS	.0013	CICSUSER	49281	15:12:20.169	.0071	.0026	3	.001	
CITS	.0013	CICSUSER	45352	15:11:24.194	.0120	.0013	4	.001	
CITS	.0012	CICSUSER	45423	15:11:25.160	.0036	.0016	3	.001	
CITS	.0012	CICSUSER	49028	15:12:17.169	.0068	.0035	3	.001	



# Summary

IBM System z tools help you ease the migration path to CICS TS V3.1 and then continue to provide ongoing productivity benefits:

- Help manage application availability
- Improve day-to-day administration of CICS systems and applications
- Provide detailed information to support application reuse projects, including SOA implementations
- Improve application understanding and provide audit trails to help achieve regulatory compliance (e.g. SOX)

