Four Smart, Fast and Safe Steps to Threadsafe using CICS Tooling

Diana Blair
IBM
blaird@us.ibm.com

Thursday, August 5, 2010: 1:30 PM - 2:30 PM
Preface

The following are trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM, CICS, CICS/ESA, CICS TS, CICS Transaction Server, CICSplex, DB2, MQSeries, OS/390, S/390, WebSphere, z/OS, zSeries, Parallel Sysplex.

Java, JavaBeans, and all Java-based trademarks and logos are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, and service names and logos may be trademarks or service marks of others.
Session Agenda

• Threadsafe Review
  • TCB Mode Switching
  • Threadsafe Risks
  • Threadsafe Challenges
  • Threadsafe Checklist for your CICS Enterprise
• “Threadsafe Considerations for CICS” Redbook Update
• CICS Tools Four Step Process for Applications
  • Step 1 - Identify candidates and capture baseline
  • Step 2 - Analyze program behavior and make modifications
  • Step 3 - Change program definitions to threadsafe
  • Step 4 - Test and benchmark results
• Reference Material
• Questions
Threadsafe Review

• Why make Applications threadsafe?
  • Improve performance
    • CICS QR TCB is CPU constrained
    • Application tasks are waiting excessively for the QR TCB
    • CICS region in general is CPU constrained
    • Take advantage of multiple engines
  • Reduce cost by reducing the instruction path length
    • Each TCB switch is approximately 2,000 instructions
    • In CICS V3.2† and above, non-threadsafe DB2 and MQ transactions switch TCBs for each SQL statement or MQ command
Threadsafe Review

- **TCB Mode Switching**
  - **Non-threadsafe**
    - Programs run on the Quasi-reentrant (QR) TCB
    - TCB mode switch to the L8 occurs on each SQL/MQ command
      - *CICS V3.2+ and above - MQ runs on the L8*
    - Each TCB switch is approximately 4,000 instructions roundtrip
  - **Threadsafe**
    - Program starts on the QR TCB
    - SQL/MQ commands cause a TCB mode switch to the L8 TCB
    - Stay on the L8 TCB until a non-threadsafe CICS command is encountered
    - Non-threadsafe CICS commands switch back to the QR
    - SQL/MQ command is required to switch back to the L8
Threadsafe Review
CICS API/Threadsafe – CICS 3.2

TRNA is non-threadsafe

L8001 TCB

TRNA
EXEC SQL/MQ
CHANGE MODE

DB2/MQ
CHANGE MODE

DB2/MQ
CHANGE MODE

DB2/MQ
CHANGE MODE

SEND
RETURN

QR TCB

TRNB
EXEC SQL/MQ
CHANGE MODE

EXEC CICS Threadsafe Commands

DB2/MQ

EXEC CICS SEND CHANGE MODE

TRNB is threadsafe

L8002 TCB
Threadsafe Review

- **TCB Mode Switching**
  - **Open API, Threadsafe, CICS Key**
    - Program starts on the L8 TCB
    - Stays on the L8 TCB until a non-threadsafe CICS command is encountered
    - Non-threadsafe CICS commands automatically switch back to the QR
    - Once the non-threadsafe CICS command is processed, a TCB mode switch occurs back to the L8
  - **Open API, Threadsafe, User Key**
    - Program starts on the L9 TCB
    - Stays on the L9 TCB until a non-threadsafe command is encountered
    - Non-threadsafe CICS commands switch back to the QR
    - Once the non-threadsafe CICS command is processed, a TCB mode switch occurs back to the L9
    - SQL/MQ commands switch to the L8, then switch right back to the L9
    - Not recommended for programs with SQL, MQ or IP CICS Sockets
Threadsafe Review
Threadsafe vs OPENAPI, Threadsafe

Blue = CICSAPI, Threadsafe
Red = OPENAPI, Threadsafe, CICS Key
OPENAPI CICS - User Key
SQL, MQ and IP CICS Sockets (not recommended)

QR TCB

EXEC CICS non-threadsafe

EXEC CICS non-threadsafe

EXEC CICS non-threadsafe

Program start

EXEC CICS threadsafe

EXEC CICS threadsafe

EXEC RETURN

EXEC SQL/MQ

EXEC SQL/MQ

EXEC SQL/MQ

EXEC SQL/MQ

EXEC SQL/MQ

EXEC SQL/MQ

EXEC SQL/MQ

EXEC SQL/MQ
Threadsafe Review
Exception - Storage Protection

- **STGPROT=NO**
  - OPENAPI programs will run under L8 TCBs
    - regardless of their EXECKEY value
  - CICS operates without any storage protection
    - runs in a single storage key (key 8)
Threadsafe Review

- Threadsafe Risks
  - Data Integrity
    - Programs must be reentrant to run on multiple TCBs
      - QR provided serialization by default since only 1 copy of the program could run at a time
      - Threadsafe allows the program to have multiple copies running on multiple TCBs at the same time
    - Programs must be coded to CICS threadsafe standards
    - Access to shared storage must be serialized or eliminated
Threadsafe Review

- **Threadsafe Challenges – Program Requirements**
  - Capable of being invoked on multiple TCBs concurrently
  - Normally read-only, they do not in general overwrite themselves
    - However they could overwrite themselves if updates are serialized correctly
    - For example, serialized update access to shared storage
  - Cannot rely on quasi-reentrancy for serialization
  - Must use serialization techniques to access shared resources with integrity
    - Compare and swap (CS)
    - Enqueue/dequeue to access shared resources with integrity
Threadsafe Review

- **Threadsafe Challenges – Program Requirements**
  - All programs accessing the same shared resource must be made threadsafe
    - For example, existing program's reliance on quasi-reentrancy to serialize access to the CWA is made invalid if just one other program can run concurrently on another TCB and access the same CWA field
  - Sometimes referred to as fully MVS reentrant programs
    - MVS reentrant is often misunderstood to mean that programs do not overwrite themselves. We add the term threadsafe as an indicator in CICS to run multiple copies of the program on multiple TCBs
Threadsafe Review

- **Threadsafe Challenges – CICS Environment**
  - Threadsafe your CICS environment before you begin with Applications
  - Use “Threadsafe Considerations for CICS Redbook” as a Threadsafe Project Guide, SG24-6351
Threadsafe Review
Threadsafe Checklist for your CICS Enterprise

Task | Description
--- | ---
1 | Migrate to DB2 V7 or later
   | *User Dynamic plan exit name DFHD2PXT defined as threadsafe*
2 | Install pre-req CICS PTFs
3 | Install pre-req DB2 PTFs
4 | Review SIT parameters
   | *FORCEQR*
   | *Emergency stopgap to shift programs back onto the QR TCB to provide resource serialization*
   | *Must not be set to yes for threadsafe*
   | *FCQRONLY*
   | *Yes (default) - Force all CICS API user application programs specified as threadsafe to run file control requests under the CICS QR TCB*
   | *No – Run programs as specified with concurrency parameter.*
Threadsafe Review
Threadsafe Checklist for your CICS Enterprise

Task   Description

5   Address your exits

- Identify all your exits (CICS IA)
- Contact vendors if necessary about their exits
- Review each exit for non threadsafe commands (CICS IA)
- Review each exit for use of shared resources (CICS IA)
- Make any coding adjustments and test (CICS IA/PA)
- Define them as threadsafe (CICS CM)
- Define phase one Global user exits as threadsafe by overriding with the threadsafe keyword on the EXEC CICS ENABLE command (CICS V3.2)
# Threadsafe Review

## Threadsafe Checklist for your CICS Enterprise

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Review system parameters and make adjustments</td>
</tr>
<tr>
<td></td>
<td>- MAXOPENTCBS (make sure you do not over allocate)</td>
</tr>
<tr>
<td></td>
<td>- TCBLIMIT</td>
</tr>
<tr>
<td></td>
<td>- THREADLIMIT</td>
</tr>
<tr>
<td></td>
<td>- MXT</td>
</tr>
<tr>
<td></td>
<td>- RENTPGM=PROTECT (recommended but not required)</td>
</tr>
<tr>
<td>7</td>
<td>For best results, upgrade to CICS TS V3.2 or CICS TS V4.1</td>
</tr>
<tr>
<td>8</td>
<td>Retest exits in a threadsafe environment (CICS PA/IA)</td>
</tr>
</tbody>
</table>
Threadsafe Considerations for CICS
Redbook Update Draft

http://www.redbooks.ibm.com/redpieces/abstracts/sg246351.html

- SG24-6351-03
- Chapter 5 – CICS Migration Tools
  - Rewritten
- CICS Explorer Plug-ins
  - CICS PA
  - CICS IA
  - CICS CM
CICS Tools 4 Step Process for Applications

- Step 1 - Identify candidates and capture baseline
- Step 2 - Analyze program behavior and make modifications
- Step 3 - Change program definitions to threadsafe
- Step 4 - Test and benchmark results
CICS Tools 4 Step Process for Applications

Step 1 - Identify candidates and capture baseline

- Determine best candidates
  - Target transactions with biggest payback relative to effort
  - Applications/transactions using the most CPU due to switching
  - How many switches (change modes) occurred?
  - What was the delay as the result?
  - How much CPU time did they use?
  - What is this costing me?
- Run test script to establish baseline SMF 110 data
  - Use as input to benchmark results in Step 4
CICS Tools 4 Step Process for Applications

Step 1 - Identify candidates and capture baseline

**Tooling**

- CICS Performance Analyzer
- CICS Statistics –
  - DFH0STAT
  - Shutdown statistics
- SMF 110 records – Key fields
  - DSCHMDLY
    - *Wait time for redispacht caused by TCB mode switch*
    - *TCB mode switch count*
    - TCB/CPU timings
CICS Tools 4 Step Process for Applications

Step 1 - Identify candidates and capture baseline

CICS Performance Analyzer

- SMF 110 data
- Supplied reports
  - CPU Usage, Delays, Change Mode Delays
  - TCB Analysis Report
  - Wait Analysis
- Historical Database
  - Optionally DB2
- CSV files
- Excel Spreadsheet charts and graphs
- CICS Explorer Extracts
CICS Tools 4 Step Process for Applications

Step 2 - Analyze behavior and make modifications

- Determine good candidate programs based on program behavior
  - What programs can be made threadsafe without program modification?
  - Which commands are threadsafe or not in a program?
  - What programs have commands requiring investigation?
    - Are there commands causing potential data integrity issues?
  - What commands need serialization wrapped around them?
  - What is the offset of the suspect command into the load module?
CICS Tools 4 Step Process for Applications

Step 2 - Analyze behavior and make modifications

- What TCB does the command currently run on?
- What commands will cause a TCB mode switch because the API is not threadsafe and must run on the QR TCB?
- Which transactions use GETMAIN SHARED, who GETMAINed it, and where?
- Are transactions FREEMAINing shared storage?
- What is the affect on the transaction flow after you change the program(s) to threadsafe compliance?
CICS Tools 4 Step Process for Applications

Step 2 - Analyze behavior and make modifications

Tooling

- CICS Interdependency Analyzer
- CICS Load Module Scanner – DFHEISUP
  - Modified DFHEIDTH table (Redbook)
    - Commands to create or address a shared resource may not necessarily be confined to the programs that access or update it
- Aux Trace
  - Chronological view of the transaction run in that region
- CEDF
- CICS Statistics - DFH0STAT (Redbook)
CICS Tools 4 Step Process for Applications

Step 2 - Analyze behavior and make modifications

CICS Interdependency Analyzer

- DB2 database
- Resource relationships based on real time capture
- CICS IA Explorer
  - Threadsafe Queries
- Dynamic Threadsafe Analysis Report
- Command Flow
  - Chronological view of the transaction
- Load Module/CSECT Scanner reports
CICS Tools 4 Step Process for Applications

Step 3 - Change program definitions to threadsafe

- Change resource definitions to make programs threadsafe from quasirent
- Install
- Newcopy
- Maintain audit history of CICS resource modifications
- Back-out to previous state if required
CICS Tools 4 Step Process for Applications

Step 3 - Change program definitions to threadsafe

Tooling

- CICS Configuration Manager
- CICS Explorer
- CPSM - BAS
- RDz
- CEDA
- CEMT
CICS Tools 4 Step Process for Applications

Step 3 - Change program definitions to threadsafe

CICS Configuration Manager

- Simplify management of CICS resources
- Controlled management of CICS resources definitions
- Create transformation rules for mass changes to threadsafe
- Can be across multiple regions and/or environments
- Package change, promote and install
- Maintain audit history of CICS resource modifications
- Compare resources across multiple definitions
- Back-out-to-previous state if required
CICS Tools 4 Step Process for Applications

• Step 4 - Test and benchmark results
  • Test
    • Use the same test script as used in Step 1
    • Make program and definition changes as required in Steps 2 and 3
    • Run test script
    • Repeat the process outlined in Steps 1 and 2
    • Review the results after every change
    • Update databases for PA and IA with the collected data
CICS Tools 4 Step Process for Applications

• Step 4 - Test and benchmark results

• Benchmark
  • SMF 110 – Baseline and Change Results data
    • CICS PA Transaction Profiling report to verify results
    • Write your own report to compare baseline to Change Results
  • Rerun reports and queries from Step 2 to compare results
  • Analyze Chronological flow of Transaction
    • CICS IA Command Flow
    • CICS Aux Trace
    • Verify improvement in switching
  • Send report to management to show improvement
CICS Tools 4 Step Process for Applications

• Step 4 - Test and benchmark results

• Benchmark
  • What if the benchmark does not show improvement?
    • You could still be experiencing high TCB mode switches
      • Review CICS PA Transaction Profiling report for switch improvement
    • You may have non-threadsafe commands intermingled with SQL and/or MQ
      • Review the CICS IA Command Flow to look for commands causing a TCB mode switch
CICS Tools 4 Step Process for Applications

• Step 4 - Test and benchmark results

Tooling
• CICS Performance Analyzer
• CICS Interdependency Analyzer
• CICS Statistics –
  • DFH0STAT
  • Shutdown statistics
• SMF 110 records – Key fields
  • DSCHMDLY
    • Wait time for redispatch caused by TCB mode switch
    • TCB mode switch count
    • TCB/CPU timings
CICS Tools 4 Step Process for Applications

• Application Case Scenario
  • Redbook application for DB2
    • COBOL
    • DB2
    • VSAM
    • DRIVERP – driver program that performs setup work
    • WORKM - program that performs the DB2/VSAM work
CICS PA Explorer - Threadsafe Chart
TXM1 is not Threadsafe
CICS PA Explorer - Threadsafe Detail View

TXM1 is not Threadsafe
CICS PA Explorer - Detail View

File Usage

![CICS PA Explorer - Detail View](image-url)
CICS PA Explorer - PA to IA Integration
CICS IA Explorer - Edit query
CICS IA Explorer - Edit query

Edit query "All programs that issue an ADDRESS CWA"
Add, remove or change criteria for which resources to include or exclude

Name: All programs that issue an ADDRESS CWA

Show

Filter results

Command

Command is ADDRESS
Resource name is CWA%

Offset of Conn

ADDPOOL
ADDRESS
ALLOCATE
ASSIGN
BIF DIGEST
BUILD
BUILD WSACONTEXT
CALL
CONNECT
CONVERSE
CREATE
CSDADD
CSDADD GROUP TO
CSDALTER

OK
Cancel
CICS IA Explorer - TXM1 Used Resources
CWA Offset results
## Detail Dynamic Threadsafe Analysis Report

**Quasirent**

<table>
<thead>
<tr>
<th>Program Dynamic Analysis - THREADSAFE DETAIL LISTING FOR CICS TS 3.1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>APLID</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Dynamic Calls

<table>
<thead>
<tr>
<th>CMD</th>
<th>Function</th>
<th>Type</th>
<th>Resource</th>
<th>Offset</th>
<th>Type</th>
<th>Length</th>
<th>Count</th>
<th>Threadsafe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Total CICS calls: 10
- Non-Threadsafe: 8
- Indeterminate Threadsafe: 2
- Threadsafe Inhibitor calls: 0

#### Dynamic Calls:
- 0

#### CICS Total Calls: 10
- MQ Calls: 0
- IMS Calls: 0

---

**Note:** The image contains a table and text related to dynamic thread safe analysis for CICS. The table details various function calls and their associated data from the program dynamic analysis report. The primary language is English, and the content is descriptive of the analysis results.
CICS IA Explorer – Select Command Flow runs for transaction TXM1
CICS IA Explorer - Select Command Flow Run
WORK0B Quasirent TXM1 capture
## CICS IA Explorer - Command Flow execution

**WORK0B Quasirent TXM1 capture**

<table>
<thead>
<tr>
<th>Task Control Block (TCB)</th>
<th>Previous...</th>
<th>Command Time Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of transaction Transaction()</td>
<td>QR</td>
<td>QR</td>
</tr>
<tr>
<td>Address</td>
<td>QR</td>
<td>QR</td>
</tr>
<tr>
<td>Select Table(PLAN=WORKSHNT,SECTIONNUMBER=0001,STMTNUMBER=0135)</td>
<td>L8</td>
<td>QR</td>
</tr>
<tr>
<td>Asctime abstime TIME()</td>
<td>QR</td>
<td>L8</td>
</tr>
<tr>
<td>Formattime TIME()</td>
<td>QR</td>
<td>QR</td>
</tr>
<tr>
<td>Read File(FILEA)</td>
<td>QR</td>
<td>QR</td>
</tr>
<tr>
<td>Select Table(PLAN=WORKSHNT,SECTIONNUMBER=0002,STMTNUMBER=0173)</td>
<td>L8</td>
<td>QR</td>
</tr>
<tr>
<td>Read File(FILEA)</td>
<td>QR</td>
<td>L8</td>
</tr>
<tr>
<td>Select Table(PLAN=WORKSHNT,SECTIONNUMBER=0002,STMTNUMBER=0173)</td>
<td>L8</td>
<td>QR</td>
</tr>
<tr>
<td>Read File(FILEA)</td>
<td>QR</td>
<td>L8</td>
</tr>
<tr>
<td>Select Table(PLAN=WORKSHNT,SECTIONNUMBER=0002,STMTNUMBER=0173)</td>
<td>L8</td>
<td>QR</td>
</tr>
<tr>
<td>Read File(FILEA)</td>
<td>QR</td>
<td>L8</td>
</tr>
<tr>
<td>Select Table(PLAN=WORKSHNT,SECTIONNUMBER=0002,STMTNUMBER=0173)</td>
<td>L8</td>
<td>QR</td>
</tr>
<tr>
<td>Read File(FILEA)</td>
<td>QR</td>
<td>L8</td>
</tr>
<tr>
<td>Select Table(PLAN=WORKSHNT,SECTIONNUMBER=0002,STMTNUMBER=0173)</td>
<td>L8</td>
<td>QR</td>
</tr>
</tbody>
</table>
CICS CM Explorer - View of program
WORKM Quasirent
CICS CM Explorer – Detail Attributes
WORKM Quasirent

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>CICSAPI</td>
</tr>
<tr>
<td>Cefr</td>
<td>YES</td>
</tr>
<tr>
<td>Concurrency</td>
<td>QUASIRENT</td>
</tr>
<tr>
<td>Datalocation</td>
<td>BELOW</td>
</tr>
<tr>
<td>Execute</td>
<td>USER</td>
</tr>
<tr>
<td>Language</td>
<td>N_A</td>
</tr>
<tr>
<td>Reload</td>
<td>NO</td>
</tr>
<tr>
<td>Resident</td>
<td>NO</td>
</tr>
<tr>
<td>Status</td>
<td>ENABLED</td>
</tr>
<tr>
<td>Usage</td>
<td>NORMAL</td>
</tr>
<tr>
<td>Usecopy</td>
<td>NO</td>
</tr>
<tr>
<td>Java</td>
<td></td>
</tr>
<tr>
<td>Hotpoool</td>
<td>NO</td>
</tr>
<tr>
<td>Jvm</td>
<td>NO</td>
</tr>
<tr>
<td>JVMclass</td>
<td>DFHJVMPR</td>
</tr>
<tr>
<td>Remote</td>
<td></td>
</tr>
<tr>
<td>Dynamic</td>
<td>NO</td>
</tr>
<tr>
<td>Executionset</td>
<td>FULLAPI</td>
</tr>
<tr>
<td>Remotename</td>
<td></td>
</tr>
<tr>
<td>Remotesystem</td>
<td></td>
</tr>
<tr>
<td>Transid</td>
<td></td>
</tr>
</tbody>
</table>

Overview | Remote | Java | Attributes
CICS CM Explorer - Install Program WORKM
CICS CM Explorer - View History
## CICS CM ISPF - Compare Resources

<table>
<thead>
<tr>
<th>Compare</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command</td>
<td>WORKM</td>
</tr>
<tr>
<td></td>
<td>WORKSHOP</td>
</tr>
<tr>
<td>Location</td>
<td>REDTOOLS.REDDDEV31.DFHCSD</td>
</tr>
<tr>
<td>Change Date</td>
<td>2009/11/30 11:00:35</td>
</tr>
<tr>
<td>Description</td>
<td>CICS Threadsafe Redbook Pr</td>
</tr>
</tbody>
</table>

### Properties
- **Language**: N_A
- **Reload**: NO
- **Resident**: NO
- **Usage**: NORMAL
- **UseLPACopy**: NO
- **Status**: ENABLED
- **CEDF**: YES
- **DataLocation**: BELOW
- **ExecKey**: USER
- **Concurrency**: QUASIUREMENT
- **API**: CICSAPI
- **Remote Attributes**
  - **Dynamic**: NO
  - **RemoteSystem**: 
  - **RemoteName**: 
  - **TransID**: 
  - **ExecutionSet**: FULLAPI
- **JVM Attributes**
  - **JVM**: NO
  - **NO**
CICS IA Explorer - Command Flow execution
WORK03 Threadsafe TXM1 capture
CICS IA Explorer - Command Flow execution
WORK02 Threadsafe TXM1 capture
### Detail Dynamic Threadsafe Analysis Report

**WORKM Threadsafe**

<table>
<thead>
<tr>
<th>APPLID</th>
<th>Program</th>
<th>Linkedit</th>
<th>Execution</th>
<th>Concurrency</th>
<th>APIST</th>
<th>Storage</th>
<th>CICS</th>
<th>LIB</th>
<th>Dataset</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CMD</th>
<th>Function</th>
<th>Type</th>
<th>Resource</th>
<th>Offset</th>
<th>Program</th>
<th>Use</th>
<th>Count</th>
<th>Threadsafe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IYDZEJ02 DRIVERM 0001-01-01 USER**

- **QUASIENT CICSAPI INACTIVE 0660 REDTOOLS.WORKSEM.LOADLIB2**
  - CICS ADDRESS: CBA
  - CICS DEQUEUE: ENQNAME ADDR: 7A2 1950 1 I
  - CICS ENQUEUE: ENQNAME ADDR: 6EA 1950 1 I
  - CICS READ: FILE: 994 1980 1 Y
  - CICS SEND: TEXT: SEND TEXT: 9DE 1980 1 Y
  - CICS WRITEQ: TSQUEUE OUTPUQ: 5EE 1920 1 N

**Total CICS calls:** 10

- **Threadsafe:** 4
- **Non-Threadsafe:** 6
- **Indeterminate Threadsafe:** 0

**DB2 calls:** 0
**MQ calls:** 0
**IMS calls:** 0
**Dynamic Calls:** 0

**Threadsafe Inhibitor calls:** 2

---

**IYDZEJ02 WORKM 0001-01-01 USER**

- **THREADSAFE CICSAPI INACTIVE 0660 REDTOOLS.WORKSEM.LOADLIB2**
  - CICS ADDRESS: CBA
  - CICS DEQUEUE: ENQNAME ADDR: 7A2 1950 1 I
  - CICS ENQUEUE: ENQNAME ADDR: 6EA 1950 1 I
  - CICS READ: FILE: 994 1980 1 Y
  - CICS SEND: TEXT: SEND TEXT: 9DE 1980 1 Y
  - CICS WRITEQ: TSQUEUE OUTPUQ: 5EE 1920 1 N

**Total CICS calls:** 45

- **Threadsafe:** 16
- **Non-Threadsafe:** 13
- **Indeterminate Threadsafe:** 16

**DB2 calls:** 8
**MQ calls:** 0
**IMS calls:** 0
**Dynamic Calls:** 0

**Threadsafe Inhibitor calls:** 8
### CICS PA ISPF Interface - Transaction Profiling

#### Default report

**V3R1M0**

**V3R1M0**

**PROF0001** Printed at 0:37:37 2/22/2010

**CICS Performance Analyzer**

**Transaction Profiling**

<table>
<thead>
<tr>
<th>Tran</th>
<th>#Tasks</th>
<th>Report Time</th>
<th>Dispatch Time</th>
<th>Avg User Time</th>
<th>Avg CPU Time</th>
<th>Avg Suspend Time</th>
<th>Avg Dispwait Time</th>
<th>Avg FC Wait Time</th>
<th>Avg FCAMRq Count</th>
<th>Avg IR Wait Time</th>
<th>Avg SC24UHWM Count</th>
<th>Avg SC31UHWM Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXM1</td>
<td>Report</td>
<td>3583</td>
<td>0.0371</td>
<td>0.0296</td>
<td>0.0215</td>
<td>0.0076</td>
<td>0.0028</td>
<td>0.0000</td>
<td>100</td>
<td>0.0000</td>
<td>0</td>
<td>34016</td>
</tr>
<tr>
<td>TXM1</td>
<td>Baseline</td>
<td>3465</td>
<td>0.5621</td>
<td>0.0518</td>
<td>0.0378</td>
<td>0.5103</td>
<td>0.1480</td>
<td>0.0000</td>
<td>100</td>
<td>0.0000</td>
<td>0</td>
<td>34000</td>
</tr>
<tr>
<td>Delta</td>
<td>+118</td>
<td>-0.5250</td>
<td>-0.0222</td>
<td>-0.0163</td>
<td>-0.5028</td>
<td>-0.1453</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>+16</td>
</tr>
<tr>
<td>Change%</td>
<td>+3.41</td>
<td>-93.39</td>
<td>-42.92</td>
<td>-43.13</td>
<td>-98.51</td>
<td>-98.13</td>
<td>0.00</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>+0.05</td>
</tr>
<tr>
<td>Total</td>
<td>Report</td>
<td>3583</td>
<td>0.0371</td>
<td>0.0296</td>
<td>0.0215</td>
<td>0.0076</td>
<td>0.0028</td>
<td>0.0000</td>
<td>100</td>
<td>0.0000</td>
<td>0</td>
<td>34016</td>
</tr>
<tr>
<td>Baseline</td>
<td>3465</td>
<td>0.5621</td>
<td>0.0518</td>
<td>0.0378</td>
<td>0.5103</td>
<td>0.1480</td>
<td>0.0000</td>
<td>100</td>
<td>0.0000</td>
<td>0</td>
<td>34000</td>
<td></td>
</tr>
<tr>
<td>Delta</td>
<td>+118</td>
<td>-0.5250</td>
<td>-0.0222</td>
<td>-0.0163</td>
<td>-0.5028</td>
<td>-0.1453</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>+16</td>
</tr>
<tr>
<td>Change%</td>
<td>+3.41</td>
<td>-93.39</td>
<td>-42.92</td>
<td>-43.13</td>
<td>-98.51</td>
<td>-98.13</td>
<td>0.00</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>+0.05</td>
</tr>
</tbody>
</table>
EDIT SUMMARY Report Form - CPUSUMTS  Row 1 of 13 More: >

Command ==>> ___________________________ Scroll ==>> PAGE

Description  . . . Transaction Threadsafe CPU  Version (VRM): 620

Selection Criteria:  
- Performance  

<table>
<thead>
<tr>
<th>Field</th>
<th>Sort</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRAN</td>
<td>K A</td>
<td>Transaction identifier</td>
</tr>
<tr>
<td>TASKCNT</td>
<td></td>
<td>Total Task count</td>
</tr>
<tr>
<td>RESPONSE</td>
<td>AVE</td>
<td>Transaction response time</td>
</tr>
<tr>
<td>RESPONSE</td>
<td>MAX</td>
<td>Transaction response time</td>
</tr>
<tr>
<td>DISPATCH</td>
<td>TIME AVE</td>
<td>Dispatch time</td>
</tr>
<tr>
<td>CPU</td>
<td>TIME AVE</td>
<td>CPU time</td>
</tr>
<tr>
<td>SUSPEND</td>
<td>TIME AVE</td>
<td>Suspend time</td>
</tr>
<tr>
<td>QRCPUCPU</td>
<td>TIME AVE</td>
<td>CICS QR TCB CPU time</td>
</tr>
<tr>
<td>L8CPU</td>
<td>TIME AVE</td>
<td>CICS L8 TCB CPU time</td>
</tr>
<tr>
<td>DSCMDLY</td>
<td>TIME AVE</td>
<td>Redisp mount wait caused by change-TCB mode</td>
</tr>
<tr>
<td>DSCMDLY</td>
<td>COUNT AVE</td>
<td>Redisp mount wait caused by change-TCB mode</td>
</tr>
</tbody>
</table>

Page width . . 132

End of Report
CICS PA ISPF Interface - Transaction Profiling report
Using modified form

<table>
<thead>
<tr>
<th>Tran</th>
<th>#Tasks</th>
<th>Avg Response</th>
<th>Max Response</th>
<th>Avg Dispatch</th>
<th>Avg User</th>
<th>Avg CPU</th>
<th>Avg Suspend</th>
<th>Avg QR CPU</th>
<th>Avg L8 CPU</th>
<th>Avg DSCHMDLY</th>
<th>Avg DSCHMDLY</th>
<th>Avg Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXM1</td>
<td>Report</td>
<td>3583</td>
<td>0.371</td>
<td>5.399</td>
<td>0.0296</td>
<td>0.0215</td>
<td>0.0076</td>
<td>0.0005</td>
<td>0.0210</td>
<td>0.0027</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baseline</td>
<td>3465</td>
<td>0.5621</td>
<td>2.7829</td>
<td>0.0518</td>
<td>0.0378</td>
<td>0.5103</td>
<td>0.0243</td>
<td>0.0135</td>
<td>0.1324</td>
<td>406</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delta</td>
<td>+118</td>
<td>-0.5250</td>
<td>-2.2430</td>
<td>-0.0222</td>
<td>-0.0163</td>
<td>-0.5028</td>
<td>-0.0239</td>
<td>+0.0075</td>
<td>-0.1297</td>
<td>-0.402</td>
<td>406</td>
</tr>
<tr>
<td></td>
<td>Change%</td>
<td>+3.41</td>
<td>-93.39</td>
<td>-80.60</td>
<td>-42.92</td>
<td>-43.13</td>
<td>-98.51</td>
<td>-98.00</td>
<td>+55.78</td>
<td>-97.94</td>
<td>-99.01</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Report</td>
<td>3583</td>
<td>0.371</td>
<td>5.399</td>
<td>0.0296</td>
<td>0.0215</td>
<td>0.0076</td>
<td>0.0005</td>
<td>0.0210</td>
<td>0.0027</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baseline</td>
<td>3465</td>
<td>0.5621</td>
<td>2.7829</td>
<td>0.0518</td>
<td>0.0378</td>
<td>0.5103</td>
<td>0.0243</td>
<td>0.0135</td>
<td>0.1324</td>
<td>406</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delta</td>
<td>+118</td>
<td>-0.5250</td>
<td>-2.2430</td>
<td>-0.0222</td>
<td>-0.0163</td>
<td>-0.5028</td>
<td>-0.0239</td>
<td>+0.0075</td>
<td>-0.1297</td>
<td>-0.402</td>
<td>406</td>
</tr>
<tr>
<td></td>
<td>Change%</td>
<td>+3.41</td>
<td>-93.39</td>
<td>-80.60</td>
<td>-42.92</td>
<td>-43.13</td>
<td>-98.51</td>
<td>-98.00</td>
<td>+55.78</td>
<td>-97.94</td>
<td>-99.01</td>
<td></td>
</tr>
</tbody>
</table>
CICS PA Explorer - Threadsafe Detail View

TXM1 is Threadsafe
This RedBook focuses on the new CICS Explorer.

The first part of the RedBook overviews the CICS Explorer, along with all the CICS Tools plug-ins.

The second part of the RedBook focuses on different scenarios in which the CICS Explorer can be used, along with the CICS Tools plug-ins to resolve different problems.
CICS Explorer SDK Redbook SG24-7819-00

- This Redbook® focuses on the new CICS Explorer SDK
- The first part of the Redbook gives an overview of the CICS Explorer, along with an overview of PlugIns and Eclipse
- The second part of the Redbook focuses on the SDK and how to write a PlugIn and how to Extend the Explorer via PlugIns
- Two Demos are included
Reference

- Redbooks:
  - Threaadsafe Considerations for CICS, SG24-6351-02
  - CICS Interdependency Analyzer
- Support Pac:
  - IBM CICS Explorer for Windows SupportPac –New Face of CICS
    http://tinyurl.com/6o6n9v
- Running OMEGAMON XE for CICS as threadsafe
- Try CICS tools for free for 60 days
  www.ibm.com/software/os/zseries/trials/cicstools
- Contact your Local IBM Representative
- Program numbers (license):
  - 5697-J23: CICS Interdependency Analyzer
Reference

Tools WEB sites

- CICS tools, including library: www.ibm.com/cics/tools
- WebSphere zSeries tools: www.ibm.com/software/websphere/zadportal
- Try CICS tools for free for 60 days www.ibm.com/software/os/zseries/trials/cics/tools

Support Pacs


Business Article


Program numbers (licence):
- 5697-J23: CICS Interdependency Analyzer
- 5697-N40: CICS Performance Analyzer
- 5697-I78: CICS Configuration Manager
- 5655-P30: CICS VSAM Recovery
- 5697-I76: CICS VSAM Transparency
- 5697-I94: CICS Batch Application Control
- 5655-K01: IBM Session Manager
- 5655-I05: CICS OTTO
CICS Communities and Information

- CICS Transaction Server V4.1
- CICS Explorer home page
  - Remember this link [ibm.com/cics/explorer](http://ibm.com/cics/explorer)
- CICS Explorer Forum
  - [http://tinyurl.com/68bndw](http://tinyurl.com/68bndw)
  - IBM developerWorks forum with FAQs, Links and resources, ISV Contributions, etc. Ask questions, suggest improvements, report problems, chat
- New! CICS Hub on the Rational COBOL Café
- Twitter
  - Subscribe to the [IBM System z channel](https://twitter.com/IBM_System_z) to get CICS Explorer news flashes
- CICS Blog
  - Comment and opinion at [TheMasterTerminal.com](http://www.themasterterminal.com)
- CICS eNews
  - Subscribe for news about CICS and related products
- YouTube channels
  - [CICS Explorer](http://www.youtube.com/cicsexplorer) - Videos, demos and other cool stuff
  - [CICSFluff](http://www.youtube.com/cicsfluff) - Other CICS videos
Sources of Information

• Web
  • CICS IA
    • home page ibm.com/cics/ianaly
  • CICS Tools
    • Home page ibm.com/cics/tools/
    • Trial download ibm.com/software/os/zseries/trials/cicstools/
  • CICS Explorer
    • Home page ibm.com/cics/explorer
    • Download page http://ibm.com/cics/explorer/download
  • CICS TS home page ibm.com/cics
• Demos and animations
  • CICS Explorer demo - featuring Threadsafe Analysis using the CICS PA and CICS IA perspectives - http://www.youtube.com/watch?v=Jk3YdvI8lno
  • CICS Explorer animation - http://www.youtube.com/watch?v=-NzWwUi5ILw
Thank You!
Any questions?