CICS OTE and CICS-DB2 performance analysis

郑新 (xinzheng@cn.ibm.com)
CICS TS Development
IBM中国研发中心
Agenda

• CICS support OTE
  – Before OTE and Threadsafe
  – Concept of CICS OTE
  – CICS OTE improve CICS-DB2 performance
  – CICS OTE benefits
  – Preparation for OTE

• CICS Tools help exploit OTE

• Summary
Before OTE and Threadsafe

- CICS had a practical limit to processing capability
  - Effective limit was individual processor speed
- Propagation of CICS to handle increased workloads
- Large applications became problematic
  - Resource sharing
  - Potential to split 1 region into 3 or 4
    - AOR x2
    - FOR & possibly QOR
  - Application affinities
- Management of large number of CICS regions can become cumbersome.
Success story enabled OTE and Threadsafe

Case #1:
- Prior to production implementation reduced the MIPS requirement;
- Transactions performance improved as below;

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Response Time Savings</th>
<th>CPU Usage Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR3#</td>
<td>37%</td>
<td>65%</td>
</tr>
<tr>
<td>TR4#</td>
<td>24%</td>
<td>25%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Response Time Savings</th>
<th>CPU Usage Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>DALC</td>
<td>35%</td>
<td>50%</td>
</tr>
<tr>
<td>HALC</td>
<td>22%</td>
<td>49%</td>
</tr>
</tbody>
</table>
Success story enabled OTE and Threadsafe

Case #1

• Changed 1 common module to Threadsafe and use OTE:
  – Module called by many applications
  – Initial implementation in 3 regions

* Estimated annual savings in chargeback costs: $882,000
CICS TS Open Transaction Environment

• Objectives
  – Enable applications on CICS TS use non CICS APIs (OPENAPI)
  – Open CICS TS to new types of client
  – Early support of new technology, eg Java Virtual Machine (JVM)

• Function
  – Enable applications on CICS TS execute under own Task Control Block
  – Allow CICS to better exploit multiple processors
  – Improved performance for CICS application with DB2, MQ

Stage 1
CICS TS V1.3
JVM

Stage 2
CICS TS V2.2
CICS-DB2

Stage 3
CICS TS V3
XPLINK, FC, MQ

Stage 4
CICS TS V4
Terminology

• THREADSAFE – A program is threadsafe if it is reentrant or protected from multiple simultaneous execution by some form of mutual exclusion.

• Quasi-reentrant Program - A CICS program that runs on CICS’ QR TCB. CICS has only 1 QR TCB that is shared by all tasks. This provides “free” serialization to shared resources.

• TCB (Task Control Block) – A z/OS control block which represents a dispatchable unit of work.
  - TCBs represent tasks, such as user programs, executing within an address space.

• OPENAPI - additional APIs possible under Open TCBs
  - Use of MVS services
  - Use of a specified set of POSIX services via MVS Unix System Services
Threadsafe vs. Quasireentrancy

• True multitasking within a single CICS region
  – Applications can run concurrently on separate TCBs
• Overhead of TCB switching is reduced
• CICS wait times are significantly reduced
  – Wait on (re)dispatch is reduced
• Serialization to nonsystem managed shared resources managed by application
Terminology

• Open TCBs
  - A new class of CICS TCB available for use by applications
  - No subdispatching under Open TCBs, blocking by applications allowed
  - CICS will switch between an Open TCB and the QR TCB as required
  - There are several different types or modes of Open TCB.

• Open TCB modes
  - Mode J8/J9 TCBs used by the CICS-JVM interface
  - Mode L8 is a key 8 TCB used for OPENAPI TRUEs and OPENAPI programs
    - Support for OPENAPI TRUEs (CICS-DB2 interface) added in CICS TS 2.2
  - Mode L9 is a key 9 TCB used for OPENAPI programs
  - Mode X8/X9 TCB used for C/C++ XPLINK support
TRNA is non-threadsafe
L8001 TCB

CALL DB2

CHANGE MODE

CALL DB2

CHANGE MODE

CALL DB2

CHANGE MODE

EXEC SQL

CHANGE MODE

EXEC SQL

CHANGE MODE

EXEC CICS

Threadsafe Commands

CALL DB2

EXEC CICS SEND

CHANGE MODE

TRNB is threadsafe
L8002 TCB

CALL DB2

EXEC SQL

CHANGE MODE

EXEC SQL

CHANGE MODE

EXEC SQL

CHANGE MODE

CALL DB2

EXEC CICS SEND

CHANGE MODE

SEND RETURN

SEND RETURN

SEND RETURN
CICS-DB2 performance improved by OTE and Threadsafe

Case #2:

• New application still in development
• Convert 4 modules to Threadsafe
  – No application changes
• All other modules left as is
• Perform limited, unstructured test
  – Done at peak hours
CICS-DB2 performance improved by OTE and Threadsafe

Case #2 Results:

|                          | QUASIRENT |               |               | THREADSAFE |               |               |               |               |               |
|--------------------------|-----------|---------------|---------------|------------|---------------|---------------|---------------|---------------|
|                          | Response  | CPU           | TCB Switch    | Wait       | Response      | CPU           | TCB Switch    | Wait         |
|                          | Time      |               | Count         | Time       | Time          |               | Count         |              |
| Balances by Account      | 0.0477    | 0.0185        | 56            | 0.0045     | 0.0507        | 0.0173        | 8             | 0.0020       |
| Balances by FC Core#     | 0.0826    | 0.0319        | 88            | 0.0056     | 0.0478        | 0.0286        | 12            | 0.0013       |
| Holdings By Account      | 0.2922    | 0.0946        | 622           | 0.0762     | 0.2298        | 0.0801        | 378           | 0.0284       |
| Holdings by Group #      | 0.3409    | 0.1009        | 650           | 0.1065     | 0.2564        | 0.0908        | 380           | 0.0358       |

Savings

<table>
<thead>
<tr>
<th></th>
<th>QUASIRENT</th>
<th></th>
<th></th>
<th>THREADSAFE</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Response</td>
<td>CPU</td>
<td>TCB Switch</td>
<td>Wait</td>
<td>Response</td>
<td>CPU</td>
<td>TCB Switch</td>
<td>Wait</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td></td>
<td>Count</td>
<td>Time</td>
<td>Time</td>
<td></td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>Balances by Account</td>
<td>-0.0031</td>
<td>0.0012</td>
<td>48</td>
<td>0.0025</td>
<td>-6.42%</td>
<td>6.59%</td>
<td>85.7%</td>
<td>56.3%</td>
</tr>
<tr>
<td>Balances by FC Core#</td>
<td>0.0348</td>
<td>0.0033</td>
<td>76</td>
<td>0.0043</td>
<td>42.11%</td>
<td>10.42%</td>
<td>86.4%</td>
<td>76.2%</td>
</tr>
<tr>
<td>Holdings by Account</td>
<td>0.0624</td>
<td>0.0145</td>
<td>244</td>
<td>0.0477</td>
<td>21.36%</td>
<td>15.35%</td>
<td>39.2%</td>
<td>62.7%</td>
</tr>
<tr>
<td>Holdings by Group #</td>
<td>0.0845</td>
<td>0.0101</td>
<td>270</td>
<td>0.0707</td>
<td>24.78%</td>
<td>10.04%</td>
<td>41.5%</td>
<td>66.4%</td>
</tr>
</tbody>
</table>
CICS-DB2 performance improved by OTE and Threadsafe

Case #3:
- New application still in development
- Convert 5 modules to Threadsafe
  - No application changes
  - 1 module common to all transactions
- **Net 2 programs changed per transaction**
- All other modules left as is
- **Structured test**
  - Performance group changes
  - Done at off peak hours
  - Volume test
CICS-DB2 performance improved by OTE and Threadsafe

Case 3 Results:

<table>
<thead>
<tr>
<th>Test</th>
<th>WR7A</th>
<th>WR9A</th>
<th>WRX6</th>
<th>WRLF</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>QR (40 TPS)</td>
<td>182</td>
<td>121</td>
<td>191</td>
<td>358</td>
<td>852</td>
</tr>
<tr>
<td>OTE (40 TPS)</td>
<td>133</td>
<td>88</td>
<td>171</td>
<td>262</td>
<td>655</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td>49</td>
<td>32</td>
<td>20</td>
<td>95</td>
<td>197</td>
</tr>
<tr>
<td>QR (48 TPS)</td>
<td>207</td>
<td>138</td>
<td>222</td>
<td>418</td>
<td>985</td>
</tr>
<tr>
<td>OTE (48 TPS)</td>
<td>155</td>
<td>103</td>
<td>194</td>
<td>309</td>
<td>761</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td>52</td>
<td>35</td>
<td>28</td>
<td>109</td>
<td>224</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test</th>
<th>WR7A</th>
<th>WR9A</th>
<th>WRX6</th>
<th>WRLF</th>
</tr>
</thead>
<tbody>
<tr>
<td>QR (40 TPS)</td>
<td>0.0430</td>
<td>0.0314</td>
<td>0.0668</td>
<td>0.0984</td>
</tr>
<tr>
<td>OTE (40 TPS)</td>
<td>0.0252</td>
<td>0.0252</td>
<td>0.0748</td>
<td>0.0748</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td>0.0177</td>
<td>0.0062</td>
<td>-0.0080</td>
<td>0.0236</td>
</tr>
<tr>
<td>QR (48 TPS)</td>
<td>0.0580</td>
<td>0.0430</td>
<td>0.1281</td>
<td>0.1508</td>
</tr>
<tr>
<td>OTE (48 TPS)</td>
<td>0.0417</td>
<td>0.0375</td>
<td>0.1615</td>
<td>0.0912</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td>0.0163</td>
<td>0.0055</td>
<td>-0.0335</td>
<td>0.0595</td>
</tr>
</tbody>
</table>
CICS-DB2 performance improved by OTE and Threadsafe

Case 3 Results:

**WMTP: 360 View & Convergence Testing (48 TPS)**

ThreadSafe All Regions
Total Consumption = 993 MIPS

QUASIRENT All Regions
Total Consumption = 1218 MIPS

SAVINGS
~225 MIPS (18.5%)
Benefits of OTE and Threading Safe

• Usually multiple Open TCBs in a region
  – Application code can now overlap in a multiprocessor environment
  – TCB is owned for the lifetime of the task
    • It is reused by subsequent tasks
  – Application will wait for QR TCB less often
    • Dispatcher waits reduced

• Other TCBs still perform their own function
  – Switching is automatic

Save MIPS saving money, Save response times save customers!
CICS-DB2 enable OTE – System Preparation

• Prepare your CICS region for OTE
  – DFHSIT options
    • FORCEQR=NO
    • MAXOPENTCBS
    • RENTPGM=PROTECT
  – DB2CONN options
    • TCBLIMIT
• Prepare all OPENAPI software versions & settings
  – DB2 V6
  – WMQ V5.3.1 & V6
CICS-DB2 enable OTE – Program preparation

Make program Threadsafe:
• Program is reentrant
  – RENT option in Enterprise Cobol
  – Linked with RENT option
  – All COBOL routines (statically or dynamically) must also Threadsafe

• Access to shared storage is serialized
  – Via CICS ENQ/DEQ process
CICS-DB2 enable OTE – CICS RDO preparation

CICS Program attributes settings:

• **CONCURRENCY (QUASIRENT | THREADSAFE)**
  - Applies to applications, TRUEs, GLUEs, URMs, PLT
    • QUASIRENT (the default) means the code must run under QR TCB
    • THREADSAFE means the code may run under QR or an open TCB
  - Tells CICS if application logic is threadsafe or not
  - CICS handles threadsafe issues of its API.

• **API (CICSAPI | OPENAPI)** - implemented in CICS TS 3.1
  - CICSAPI (the default) means the program only uses CICS permitted APIs
  - OPENAPI means the program requires an Open TCB to use other APIs
    • OPENAPI requires CONCURRENCY(THREADSAFE)
The program for transaction BLUE is defined THREADSAFE, API= CICSAPI

The program for transaction RED is defined THREADSAFE, OPENAPI, EXECKEY=CICS
Candidates for Threadsafe CICSAPI & OPENAPI

- **Note: OPENAPI TRUEs must run CICS key on an L8 TCB**
  - A user key threadsafe OPENAPI program calling DB2 will switch from L9 to L8 then back to L9 for each DB2 request. Same applies to WMQ and sockets
  - A user key threadsafe CICSAPI program running on an L8 TCB will remain on the L8 TCB to call DB2 or WMQ or sockets.

- **Candidates for CICSAPI with THREADSAFE**
  - SQL programs with some non-threadsafe API
  - SQL programs with USER key
  - Mixed FC and DB2 and/or WMQ and/or socket applications
    - FC relies on the DB2 or WMQ or sockets call to push the task onto the L8 TCB

- **Candidates for OPENAPI with THREADSAFE**
  - SQL programs with CICS key
  - CPU intensive programs
Choosing candidate applications to exploit OTE

CICS Tools can help – CICS IA

• Are my programs using shared resources?
  – CWA
  – Global user exit global work areas
  – Storage acquired explicitly by the application program with the GETMAIN SHARED option
  – Data only Load module

• Which non threadsafe CICS commands is my program using?

• Which TCB did my CICS commands run on?
CICS Interdependency Analyzer for z/OS (CICS IA)

Key features

– Captures CICS application relationships:
  • Resources used by a transaction - Programs, Files, TSQs, TDQs plus DB2, MQ, IMS plus Web services, Natural and Adabas
  • Transactions with affinities and their type / lifetime
  • Unused resources
  • Sequencing of transactions within an application
  • Command flow shows detailed TCB switching within a transaction

– Relationship data loaded onto a DB2 database or UDB

– CICS Explorer plug-in integrates with CICS run-time and other tools

New in CICS IA V3.1 (Sept 2009)

• Supports all new and updated CICS TS V4.1 resources, including Events, Atom feeds, Bundles, XML mappings, etc

• Fully supported plug-in for the CICS Explorer

• Command Flow feature

• Natural program interactions and ADABAS usage

• Migration queries for CICS TS V4.1.

• Collect Affinity and Dependency data at the same time
Threadsafe Dynamic Analysis report - Summary

<table>
<thead>
<tr>
<th>APPLID</th>
<th>Program</th>
<th>Linkedit Date</th>
<th>Execution Key</th>
<th>Concurrency</th>
<th>APIST</th>
<th>Storage Protect</th>
<th>CICS</th>
<th>LIB Dataset Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>IYDZZ328</td>
<td>EMSCONTA</td>
<td>---------- USER</td>
<td>QUASIRENT</td>
<td>CICS API</td>
<td>ACTIVE</td>
<td>0650</td>
<td>CICSIAD.TEST.LOADLIB</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Date</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Key</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total CICS calls:</td>
<td>13</td>
<td>Threadsafe: 1</td>
<td>Non-Threadsafe: 7</td>
<td>Indeterminate Threadsafe: 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 calls:</td>
<td>0</td>
<td>MQ calls: 0</td>
<td>IMS calls: 0</td>
<td>Threadsafe Inhibitor calls: 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Calls:</td>
<td>0</td>
<td>Threadsafe Inhibitor calls: 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IYDZZ328</td>
<td>EMSTESTS</td>
<td>---------- USER</td>
<td>QUASIRENT</td>
<td>CICS API</td>
<td>ACTIVE</td>
<td>0650</td>
<td>CICSIAD.TEST.LOADLIB</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Date</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Key</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total CICS calls:</td>
<td>64</td>
<td>Threadsafe: 34</td>
<td>Non-Threadsafe: 26</td>
<td>Indeterminate Threadsafe: 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 calls:</td>
<td>0</td>
<td>MQ calls: 0</td>
<td>IMS calls: 0</td>
<td>Threadsafe Inhibitor calls: 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Calls:</td>
<td>0</td>
<td>Threadsafe Inhibitor calls: 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Threadsafe Dynamic Analysis Report

**CICS INTERDEPENDENCY ANALYZER VERSION 2.2.0**

2007/10/19:12.22.05 PAGE 3

**Program Dynamic Analysis - THREADSAFE DETAIL LISTING FOR CICS TS 3.2**

<table>
<thead>
<tr>
<th>APPLID</th>
<th>Program</th>
<th>Linkedit</th>
<th>Execution Date</th>
<th>Key</th>
<th>Execution</th>
<th>Concurrency</th>
<th>APIST</th>
<th>Storage</th>
<th>CICS</th>
<th>LIB Dataset 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>Threadsafe</th>
<th>CMD</th>
<th>Function</th>
<th>Type</th>
<th>Resource</th>
<th>Offset</th>
<th>Program</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>IYDZZ328 EMSTESTS</td>
<td>USER</td>
<td>QUASIRENT</td>
<td>CICSAPI</td>
<td>ACTIVE</td>
<td>0650</td>
<td>CICSIAD.TEST.LOADLIB</td>
<td></td>
</tr>
<tr>
<td>*</td>
<td>CICS ADDRESS</td>
<td>E76</td>
<td>3380</td>
<td>1</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CICS ADDRESS</td>
<td>TCTUA</td>
<td>E76</td>
<td>3380</td>
<td>1</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CICS ADDRESS</td>
<td>TCTUA</td>
<td>1152</td>
<td>3380</td>
<td>1</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CICS DEFINE</td>
<td>COUNTER</td>
<td>TESTDCOUNTER</td>
<td>1BE0</td>
<td>3380</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>CICS DELETE</td>
<td>COUNTER</td>
<td>TESTDCOUNTER</td>
<td>1F2C</td>
<td>3380</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>CICS DELETE</td>
<td>COUNTER</td>
<td>TESTDCOUNTER</td>
<td>1F78</td>
<td>3380</td>
<td>1</td>
<td>N</td>
</tr>
</tbody>
</table>

**Total CICS calls:** 64  
**Threadsafe:** 34  
**Non-Threadsafe:** 26  
**Indeterminate Threadsafe:**

**DB2 calls:** 0  
**MQ calls:** 0  
**IMS calls:** 0

**Dynamic Calls:** 0  
**Threadsafe Inhibitor calls (*):** 5
Threadsafe Analysis using the CICS Explorer – IA plugin
NEW - Command Flow

Displays commands in time order alongside summary of TCB Modes used and any TCB mode switches.

- Command with non-zero response code decorated with warning.
- Codes shown on selection.
- TCB Mode switches decorated with red switch arrow.
Identifying OTE Candidates

• **Start Small but Strong**
  – Keep initial candidates to a minimum
    • Dedicate time to smaller working set
    • Increases accuracy and success
    • Simplified candidate program identification

• **Start big – look small**
  – Region Level – High DB2 usage
    • Transaction Level – High DB2 Users
      - Program Level – High SQL counts

• **Expand scope as experience dictates**
Choosing candidate applications to exploit OTE
CICS Statistics & Monitoring

• Statistics can be used to identify a candidate
  – CICS Dispatcher Statistics
    • Open TCB (L8) time vs. QR TCB time

• DB2 Statistics
  – DB2 Entry Exit Count

• Monitoring data can be used to identify a candidate
  – TCB switches per task is high
Choosing candidate applications to exploit OTE

CICS Tools can help – CICS PA

• Which TCBs did my transaction use?
  – How many TCB switches (change modes) occurred?
    • What was the Change Mode delay time?
  – How much Dispatch and CPU time did they use?
  – Performance Summary, List and List Extended Reports, …
  – Sample Report Forms …
    • CPU and TCB Usage, TCB Delays, Change Mode Delays, …

• Why did my transaction take so long?
  – Wait Analysis Report, Performance List Reports, …

• Which Transaction(s) used GETMAIN SHARED?

• Where did my transaction go?
  – Cross-System Report, …
  – Performance List, DB2 and WebSphere MQ Reports, …
Choosing candidate applications to exploit OTE
CICS Tools can help – CICS PA

- CICS Monitoring Facility
- CICS statistics
- System Logger: CICS journalling
- CICS TG Statistics SMF111
- DB2
- WebSphere MQ
- OMEGAMON XE for CICS SMF112

CICS Performance Analyzer

- Accounting data for attached CICS tasks
- SMF data sets
- Tape

- Historical database (HDB)
- Comma-separated value (CSV) files

- Formatted reports

- DB2 tables

- Use this interactive interface, or submit your own CICS PA batch jobs
Choosing candidate applications to exploit OTE
CICS Tools can help – CICS PA
Identified OTE Candidate

• Test under Threadsafe
  – Repeatable test
  – Drive concurrency

• Analyze the effect of each Threadsafe change
• Maintain a running scorecard of each change
  – Show before and after
  – Show calculated savings
More application enabled Threadsafe using OTE

• Potential for cost savings that could be passed to the business units
• Negligible investment needed to realize savings
  – Application rewrites to a minimum
• Satisfy new client requirements within the existing infrastructure
• Increase the lifetime of the existing infrastructure
  – Defer creation of additional regions to handle workload
Summary

• Concept of CICS OTE
• CICS OTE effect CICS-DB2
• Preparation for OTE
• Identify application for OTE
• CICS Tools help exploit OTE
Questions?
Who Wants to Win a Prize?

谁想赢得奖品？
哪些CICS工具能帮助更好使用OTE?

A: CICS IA
B: CICS PA
C: CICS CM
D: A和B
Thank you!

CICS
Putting the S in SOA

ibm.com/cics