Monitoring CICS® TS Version 5 Application Performance

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August 13, 2015

Session 17265
Agenda

• What is an Application?
• CICS TS Version 5 Application ‘Review’
• Application Monitoring Challenges
  – Monitoring Resource Usage
  – Monitoring Performance Problems
What is an Application?

• ‘Programmatic’ resources
  – Programs (ASM, Java, COBOL, etc.)
  – Displays (BMS maps, document templates)
  – Libraries, transactions, URIMAPs, etc.

• ‘Data’ resources
  – Files
  – Queues
  – Data bases
  – etc.

• ‘Communication’ resources
  – Connections, sessions, TCPIP Services, IPCONNs, etc.
What is the CICS TS Version 5 Application?

- A collection of related CICS resources
  - Those directly associated with the Application – the code
  - Those required by the Application – the dependencies
- Some resources may be ‘versioned’
  - Changes in the Application provide a new version
- Managed as a single entity (by CPSM)
  - Actions affect Application as a whole
    - Install, Enable, Disable, Discard
- Deployed (installed) on a pre-defined set of CICS regions (Platform)
CICS TS Version 5 Application Review

• What are the pieces that make up a CICS Application?
  – Three basic parts
    • The Platform – where is Application is to execute
    • The Bundles – groups of resources needed to execute
      – Created resources (those built by the application)
      – Existing resources (those needed to pre-defined)
    • The Policy – how is the Application supposed to behave
CICS TS Version 5 Application Review

• Platforms – Regions where an application should be installed
  – Regions may exist in more than one platform
  – Regions within a platform are assigned a type
  – Regions are selected and grouped using System groups
  – Consider the diagram:

– Different resources may be installed in different ‘types’ of regions
Bundles – Defined resources vs. Existing resources

- A defined resource is one that is to be created as part of the Application
- A existing resource is one that is provided by the CICS regions (pre-defined)
- Some combination of both are needed for the Application to execute

Simple application may be just a collection of existing programs or transactions that are designated entry points

Complex application may be hundreds of defined resources dynamically created and torn down as needed
CICS TS Version 5 Application Review

- Bundles – Defined Resources
  - The CICS resources dynamically created when the Application is installed
  - They include the versioned resources
    - PROGRAM and LIBRARY definitions
  - Other resources that can be defined using bundles
    - Transactions, URIMAPs, Files, JVM Servers, OSGi
    - TCPIP Services, Pipelines, WebServices, Events
    - Explorer built XML stream for these resources contains the RDO attributes used to create the resource when installed
CICS TS Version 5 Application Review

- Bundles – Existing Resources
  - Those CICS resources that must be available to the Platform (pre-defined)
  - These are linked into the Bundle and may be:
    - Required – if they are not present on the Platform, the Application fails
    - Optional – may emit message if resource is unavailable
  - Types of dependent resources:
    - ATOMSERVICE, DB2CONN, DB2ENTRY, DB2TRAN, DOCTEMPLATE, ENQMODEL, EPADAPTER, EPADAPTERSET, EVENTBINDING, FILE, JOURNALMODEL, JVMSERVER, LIBRARY, MAPSET, MQCONN, PARTITIONSET, PIPELINE, PROCESSTYPE, PROGRAM, SCACOMPOSITE, TCPIPSERVICE, TDQUEUE, TRANSACTION, TSQMODEL, URIMAP, WEBSERVICE, XMLTRANSFORM
    - (Note that this includes resources that may also be created)
CICS TS Version 5 Application Review

- Policy – How should an application behave
  - CICS provides Policy to automatically perform an action against an application task based upon performance criteria
  - Actions are:
    - Issue a message
    - Emit an Event
    - ABEND the task
CICS TS Version 5 Application Review

• Application Policy criteria
  – There are 35 ‘choices’ across . . .
  • Time (CPU and elapsed)
  • Storage (size/requests for task and shared areas)
  • TD requests
  • TS (size/requests for aux and main)
  • Database (SQL) and file requests (browse, read, write, etc.)
  • Program LINKs
  • Transaction STARTs
• Accessing an Application
  – Access to a CICS Application is through an Entry Point (Operation)
    • Availability of Entry Points determines if an application can be executed
    • May be a program, a URIMAP, or a TRAN ID (TS53 Open Beta)
  – An Application may also be invoked programmatically using the CICS API
    • EXEC CICS LINK PROGRAM() to program defined as an entry point
      – Always gets the highest version of the program available
    • EXEC CICS INVOKE APPLICATION() OPERATION()
      – Operation is effectively the name of the entry point
      – Can also specify a version to run (and whether it must match or be ‘at least’
        » MAJORVERSION(), MINORVERSION(), MATCH | MINIMUM
      – Gets same ‘input’ as a link (COMMAREA/CHANNEL)
Application Monitoring Challenges

• Entry to an application isn’t necessarily through transaction IDs anymore
  – CICS Application Entry Points
    • TRAN IDs (new with CICS TS53 Open Beta)
    • Programs
      – LINK/XCTL from other CICS programs
      – EXEC CICS INVOKE APPLICATION() OPERATION()
    • URIMAPs (WEBSERVICEs)
      – If you relied on reviewing usage or performance data based upon transaction IDs, it might not be available (if you don’t use the transaction ID entry method)
Application Resource Monitoring Challenges

• CICS Applications contain “Private” resources
  – Running multiple versions of applications requires greater ‘privacy’
  – Private resources belong to an application (not to the public)

• Consider the following pair of applications . . .

  – ProgramA and ProgramB are public, Program2 and Program3 are private
Application Resource Monitoring Challenges

• Private resources belonging to an application
  – LIBRARIES associated with CICS Applications are unavailable outside the application
  – Programs that are not application entry points cannot be the target of LINK/XCTL from outside the application
  – These are unavailable from the CICS Explorer, CEMT INQUIRE or EXEC CICS INQUIRE
  – Only available in statistics report (DFHSTUP)
Application Resource Monitoring

- Statistics Data for Private Programs and Libraries
  - Contains same data as Public resources . . . plus . . .
    - Platform Name
    - Application Name
    - Application Major, Minor and Micro Versions
    - Operation (entry points only)
# Application Resource Monitoring

- **Application Program Statistics**
  - DFHSTUP Report (TYPE=PROGRAM)

## Platform Details
- **Platform**: Platform_DEV69PF_CTS52
- **Application**: application.psbappl
- **Major version**: 1
- **Minor version**: 0
- **Micro version**: 0

## Program Statistics

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Monitoring CICS TS Version 5 Application Performance – Session 17265

August 13, 2015

17
Application Resource Monitoring

- Application Program Statistics
  - CICS Explorer (CICS Cloud Perspective)
Application Resource Monitoring

- Application Program Statistics
  - MVCICS Explorer (CPROG View)
### Application Resource Monitoring

- Application Library Statistics
  - DFHSTUP Report (TYPE=LIBRARY)

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Application Resource Monitoring

- Application Library Statistics
  - CICS Explorer (CICS Cloud Perspective)

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Monitoring CICS TS Version 5 Application Performance – Session 17265
Application Resource Monitoring

- Application Library Statistics
  - MVCICS Explorer (CLIBR view)
Application Performance Challenges

• Entry points may not be traditional TRAN IDs
  – Many current monitoring techniques are based on the transaction ID
    • Vendor monitor products
    • Home grown monitors and reports
  – This can include CPU charge-back systems
Application Performance Monitoring Data

• CICS Provides data in SMF110 to identify applications

451 (TYPE-C, 'ACAPPLNM', 64 BYTES)
The 64-character name of the application in the application context data.

452 (TYPE-C, 'ACPLATNM', 64 BYTES)
The 64-character name of the platform in the application context data.

453 (TYPE-A, 'ACMAJVER', 4 BYTES)
The major version of the application in the application context data, expressed as a 4-byte binary value.

454 (TYPE-A, 'ACMINVER', 4 BYTES)
The minor version of the application in the application context data, expressed as a 4-byte binary value.

455 (TYPE-A, 'ACMICVER', 4 BYTES)
The micro version of the application in the application context data, expressed as a 4-byte binary value.

456 (TYPE-C, 'ACOPERNM', 64 BYTES)
The 64-character name of the operation in the application context data.
### Application Performance Monitoring Data

- Sample data from DFHMOLS

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Monitoring CICS TS Version 5 Application Performance – Session 17265

August 13, 2015
Application Performance Monitoring Data

- Batch reporting to provide key performance data
  - Total CPU for the application in a period (chargeback)
  - Average times for key application performance fields
    - CPU/Response/Suspend time
    - File control calls / Storage HWM

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Online Application Performance Data

- Monitors must change too
  - MVCICS Workloads
- New selection criteria
  - Application Name
  - Version
  - Platform
- Provides performance indicators (over time)
- Used in to determine SLAs and resolve problems
Online Application Performance Data

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</table>

Monitoring CICS TS Version 5 Application Performance – Session 17265

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August 13, 2015
Online Application Performance Data

- Expanding the interval to see where the problem lies
  - Exception and file waits overlap and consume most of the average response time
Online Application Performance Data

• Drilling down further
  – All of the exception time for this interval was spent waiting for file strings
  – ... but who (or is that whom)?
Online Application Performance Data

- Expansion of the large interval (15 minutes) down to single minute slices shows the offending set of tasks for this application (in red)
Online Application Performance Data

- Further expansion of individual tasks show some with extended response time

<table>
<thead>
<tr>
<th>Task ID</th>
<th>Time</th>
<th>Task Name</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>98351</td>
<td>2014/08/26 13:30:05</td>
<td>PSFB</td>
<td>2.37063 6.00420</td>
</tr>
<tr>
<td>98352</td>
<td>2014/08/26 13:30:05</td>
<td>PSFB</td>
<td>1.28507 6.00420</td>
</tr>
<tr>
<td>98372</td>
<td>2014/08/26 13:30:05</td>
<td>PSFB</td>
<td>3.05047 6.00420</td>
</tr>
<tr>
<td>98376</td>
<td>2014/08/26 13:30:05</td>
<td>PSFB</td>
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<td>98377</td>
<td>2014/08/26 13:30:05</td>
<td>PSFB</td>
<td>3.05047 6.00420</td>
</tr>
</tbody>
</table>

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- One last expansion shows it to be a specific file giving the issue
Conclusion

- CICS TS5 Applications provide challenges to monitoring
  - Data for resource monitoring may be harder to locate
    - This can cause issues in problem diagnosis
  - Old performance monitors may need updates
    - Batch programs need to look for different identifiers
    - Online monitors need similar changes
    - Performance indicators need to be examined across CICS regions to satisfy POLICY across the PLATFORM
Conclusion

- CICS TS5 Applications provide opportunities to monitoring
  - Application name provides access to performance data
    - Allows for a looser connection between the systems performance group and development
    - Decreases need for systems groups to intimately know every resource (transaction, program, etc.) that make the application work