

# Problem Analysis and Performance Tuning for CICS

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Rocket Software



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# Agenda

1. Challenges facing CICS Customers across the Organization
  - Complex Code
  - Skills Shortage
  - Where do we start and what is the focus
2. Detect, Verify (analyze) and Solve Method (DVS)
3. IBM OMEGAMON for CICS (OM CICS)
4. CICS Performance Analyzer (CICS PA)
5. Rocket C\Prof
6. Summary

# Challenges across the Organization



Application Developer

*"I have to keep up with application changes as we expand our markets worldwide and adopt more users."*

*"It is challenging to address performance issues with application workloads that always seem to be changing."*



CICS Sysprog

*"I'm getting too many performance alerts. Need to be able to pinpoint the ones that are most important."*



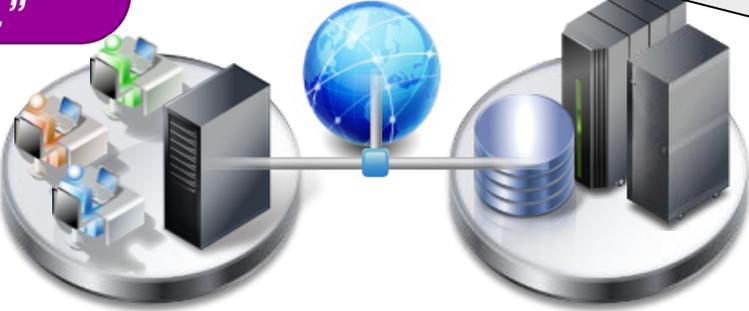
LOB Manager

*"I need to get my business results fast and accurate. What's going on?"*



IT Manager

*"Performance problems seem to appear without warning and deep technical skills are hard to find."*



QA Manager

*"We can't test for changing workloads in today's digital economy since we don't have enough resources."*

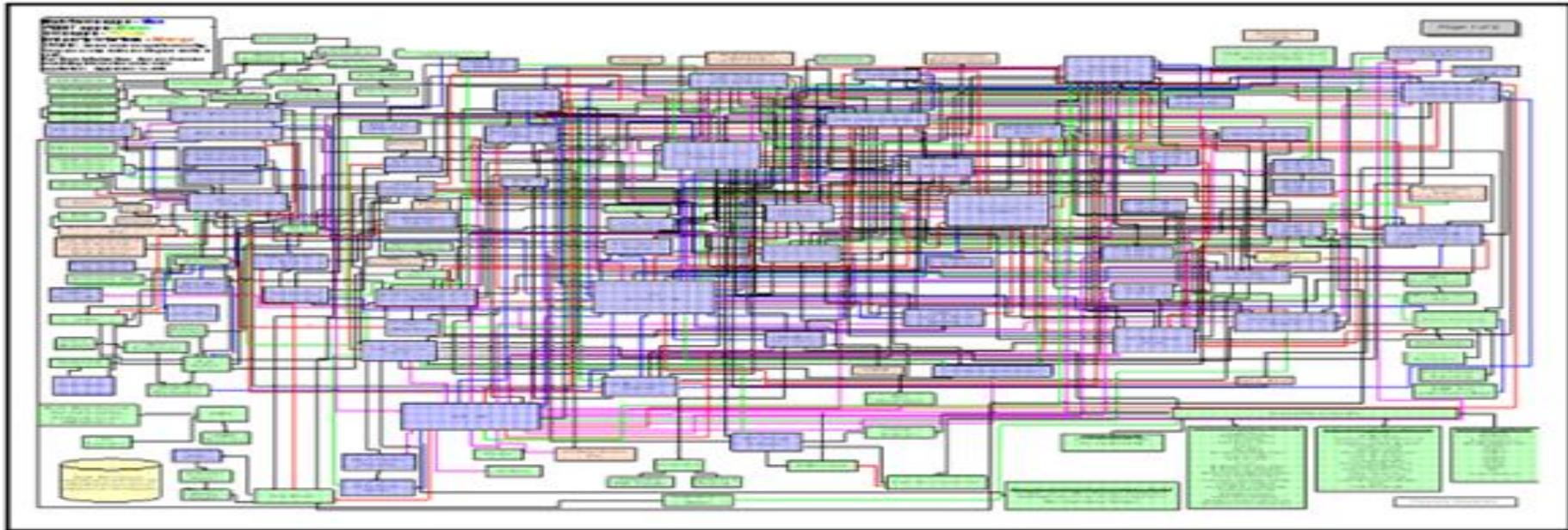
# CICS applications can be complex systems built on decades of continuous & incremental development

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**Change?**

**Fix problems?**

**Optimize?**



**Modernize?**

**API Enable?**

**Re-use?**

# CICS Problem Analysis / Performance and Tuning

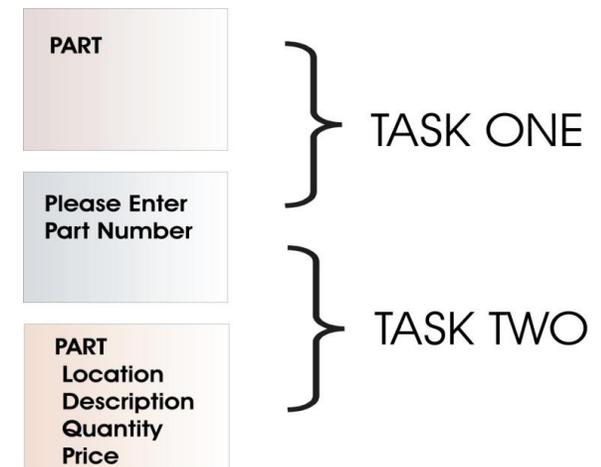
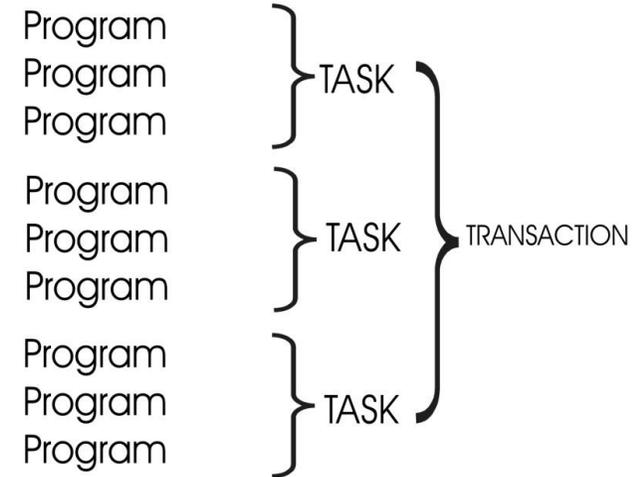
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- Where do I start?
  - The Problem determination manual was renamed to “Troubleshooting CICS” as of CICS v5.4
  - On-line version: <https://www.ibm.com/docs/en/cics-ts/5.6?topic=troubleshooting>
  - PDF Download: [https://www.ibm.com/docs/en/SSGMCP\\_5.6.0/pdf/troubleshooting-guide\\_pdf.pdf](https://www.ibm.com/docs/en/SSGMCP_5.6.0/pdf/troubleshooting-guide_pdf.pdf)
- System Problems – Affecting individual users or entire system?
  - System Outage
  - Waits, Loops and Hangs
  - Poor Performance possibly due to poor application design
- Application issues – Causing overall system problems or isolated to application?
  - Transaction Abends
  - Deadly Embrace
  - Applications suspended for excessive amounts of time
  - Response times erratic or degrading over time or after change implementation

# CICS tasks and programs

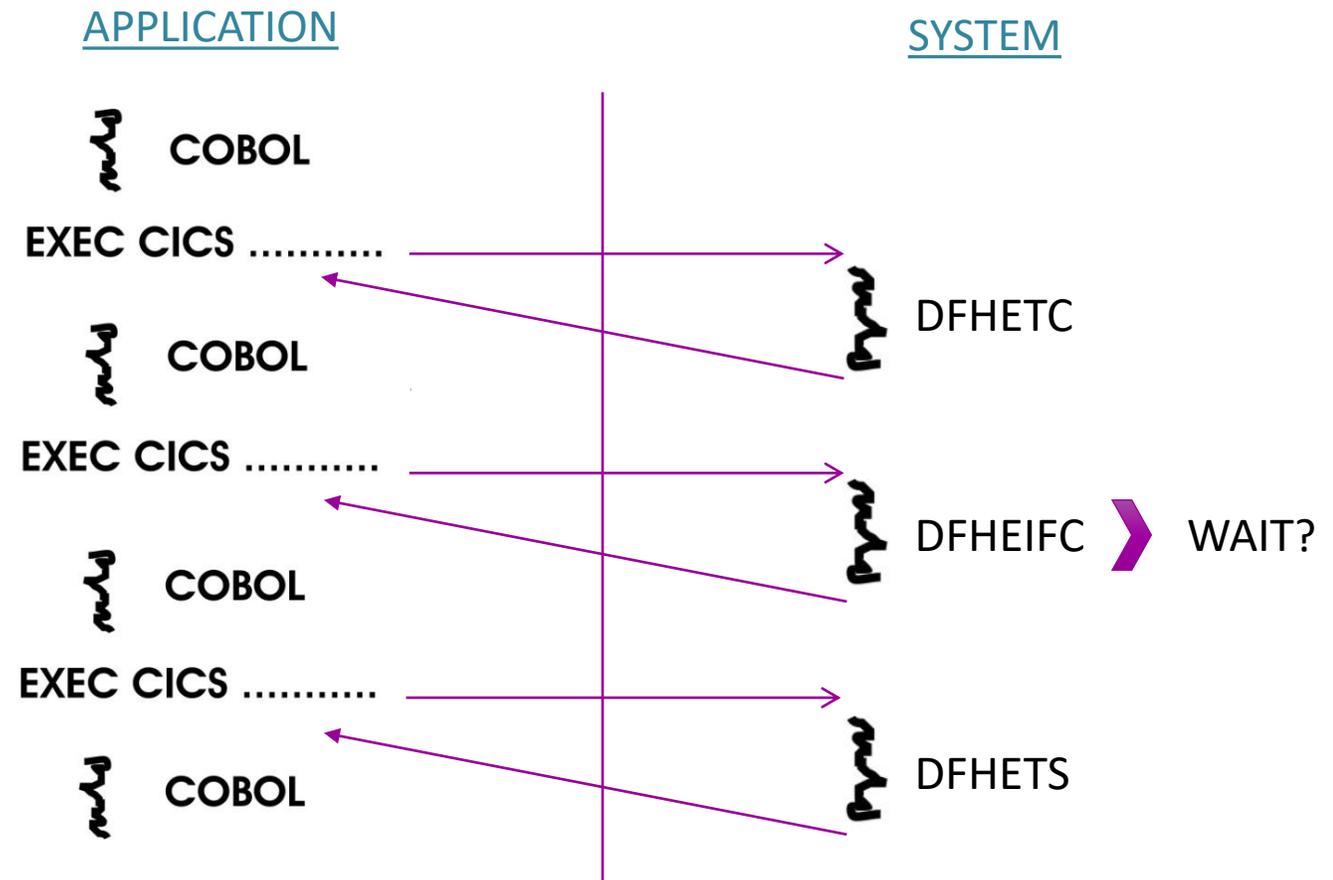
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- A task is an instance of a transaction started by a user.
- When a user types in data and presses Enter or a Function key, CICS begins a Task and loads the necessary programs.
- Tasks run concurrently. Therefore, a user can run multiple instances of the same transaction simultaneously.
- CICS multitasks giving fast response times.
- CICS runs each task, briefly giving CPU to each one.



# EXEC interface

- CICS programs look like batch with the insertion of Execute CICS commands.
- The CICS commands are used to request Services.
- CICS commands must be translated into COBOL prior or during program compilation.

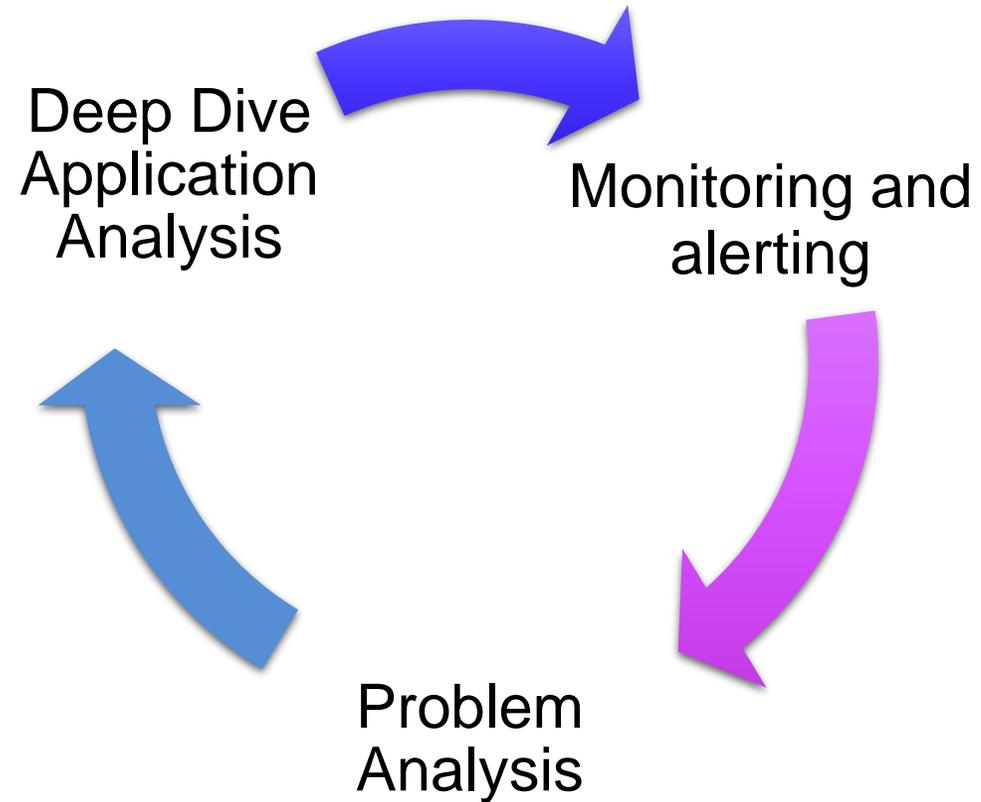


# Methodology for Solving Problems

DETECT → VERIFY → SOLVE

# CICS Performance / Problem Analysis Tasks

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# Detect, Verify (Analyze) and Solve

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**Detect** – Requires some form of system monitoring.

**IBM OMEGAMON for CICS on z/OS** allows users to:

- Avoid/delay costly slow downs and outages by monitoring key CICS resources and workloads and be alerted of any issues.
- Reduce time-to-resolution of problems by quickly pinpointing and isolating problems.
- Maximize overall efficiency by leveraging integration of z/OS platform information with other OMEGAMONs for a total picture of your multi-functional core business workloads.

**Access to historical data limited**

# Detect, **Verify (Analyze)** and Solve

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**Verify** – Requires a tool that can review long term data.

## **IBM CICS Performance Analyzer (PA) for z/OS**

- powerful offline reporting tool to help you develop, tune, and manage your CICS systems.
- CICS PA addresses the needs of everyone involved in CICS performance analysis, system tuning, and planning capacity.
- Includes those who architect, develop, deploy, and manage complex mainframe CICS applications.

**Access to Forensic Application Data Limited**

# Detect, Verify (Analyze) and **Solve**

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**Solve** – Requires a tool that can forensically analyze application flow.

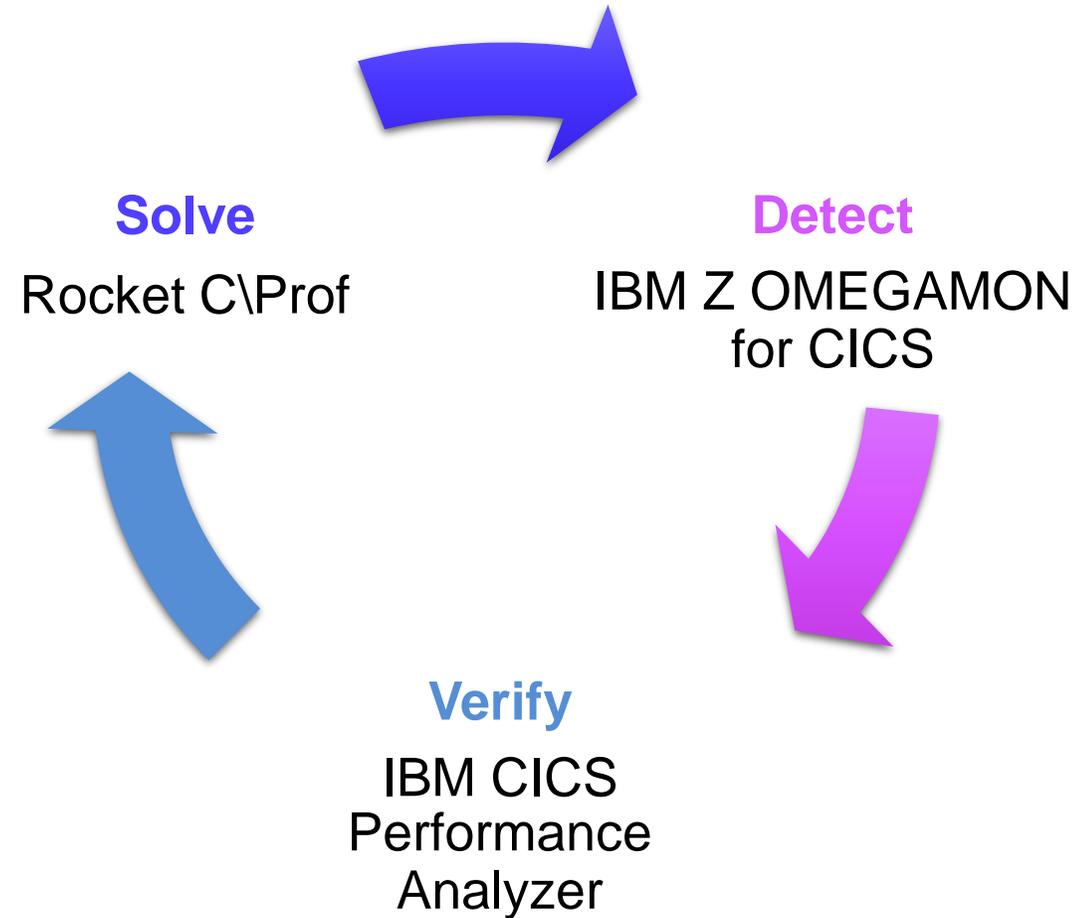
## **Rocket C\Prof**

- Reproducing a problem and identifying solutions with existing tools can be tedious, time consuming, and expensive.
- Rocket C\Prof helps organizations get more business and operational value from IBM CICS internal trace data while it protects your IBM z/OS mainframe environment.
- Rocket C\Prof provides the added details you need to diagnose problems in your CICS applications faster—with minimal impact on your business-critical applications.

**Access to data for deep dive application analysis**

# CICS Performance Management Tools

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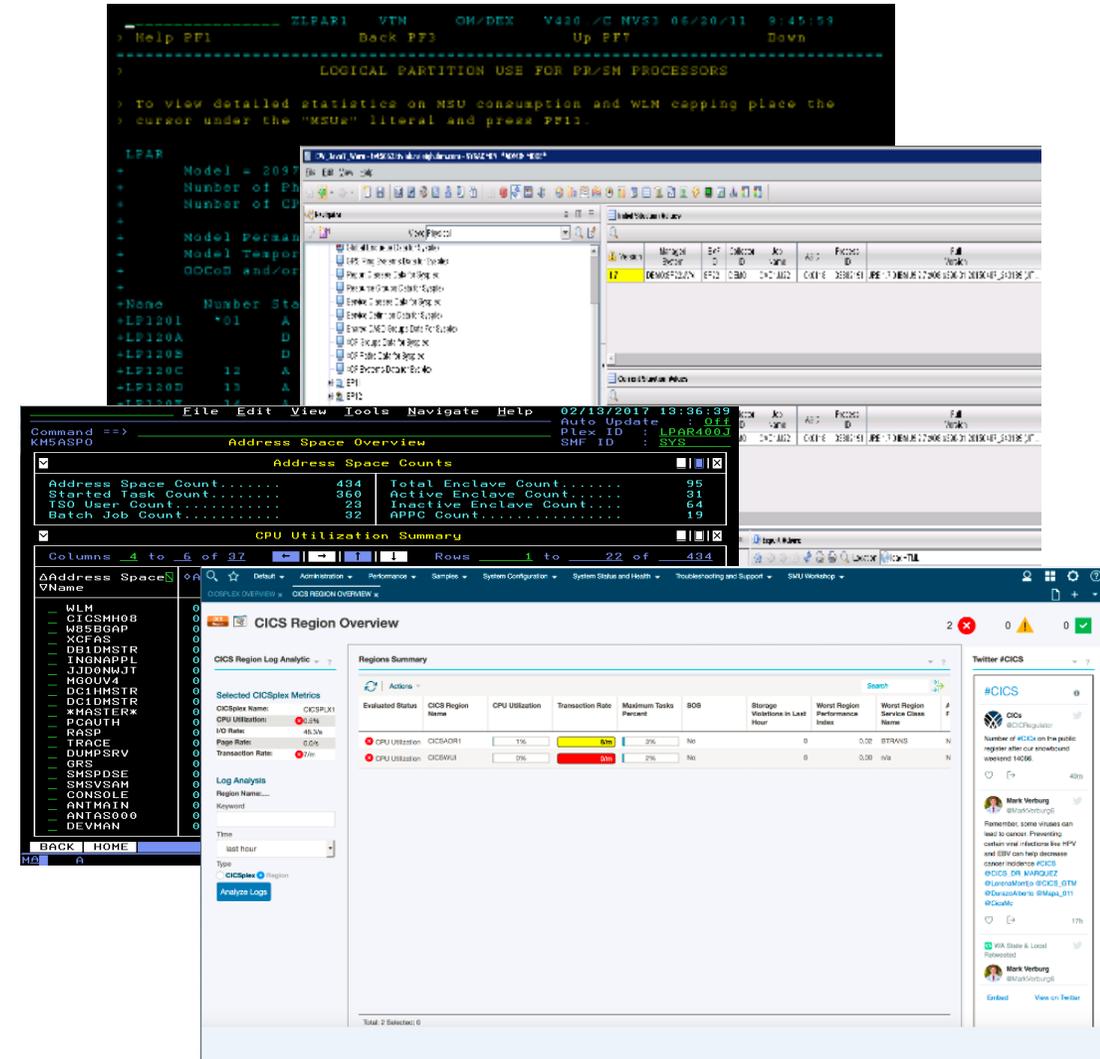


# IBM OMEGAMON for CICS

CICS Performance and Problem Management Tools (Detect)

# IBM Z OMEGAMON for CICS Overview

- OMEGAMON for CICS has been around since early 1980s:
  - We still call it the “Classic” UI, but it has evolved continuously since then.
- Some of the updates added over the years:
  - CICSplex wide data viewing and summarization
  - Real-time and Historical Data Collection and Reporting
  - Application Trace Facility
  - Bottleneck Analysis
  - Resource Limiting
  - Proactive Alerting
  - Task History collection
  - New CICS metrics and statistics
  - CICS TG support
  - Updated User Interfaces
  - Integration with other OMEGAMONS and other tooling
- Commitment has been to deliver Day One support for latest levels of CICS (including supporting open beta clients)
- **Latest level (V5.6) released in June 2022**



# New Features to date in V5.6.0

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- **FixPack 2, February 2023**
  - **Background Tasks:** The ability to designate the background and do not need to appear in the workspaces used for routine monitoring.
  - **CP/SM CICS System Groups:** OMEGAMON will now import any CP/SM CICS system groups which are configured.
  - **TRUE Monitoring:** You can now monitor activity generated by Task Related User Exits.
  - **FINDing the TCP/IP Service Port:** You can now search across a CICSplex or group of regions for Port used by a region's TCP/IP service.
- **October 2022**
  - **Correlating CICS tasks and Db2 threads:** The CICS Task History Detail panel now lets you correlate CICS task history with Db2 thread history. You can navigate directly between the CICS Task History Detail panel and the Db2 Thread History Detail panel in IBM OMEGAMON for Db2 Performance Expert.
  - **The FIND command:** Updated to support Logo ID, BUNDLES TS / TD Queues and Ports, also added wildcard support.

# New Features to date in V5.6.0

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- June 2022
  - **Program Tracking Support:** Ability to track program usage by transaction and region.
- Base IBM Z OMEGAMON for CICS 5.6.0
  - **Resource limiting** resolution for CPU has been increased, to allow transaction limits to be set in millisecond increments. This lets you take action much sooner, to prevent tasks from impacting the region.
  - **Finding resources within a group of regions** is now much more intuitive. The new FIND command menu provides a drop-down list of resources to search for, together with related help for each resource type. FIND is now extended to CICS temporary storage and transient data queues.
  - **New CICS policy statistics** are available. For customers using policies within CICS to take actions on applications, IBM Z OMEGAMON for CICS will now show statistics relating to the use of those policies.
  - **CICS Transaction Gateway Memory statistics** are now available. This allows users to monitor their CICS Transaction Gateway Daemon for problems related to memory usage.

# Checking Overall System Health

Drill down to see the system is operating as expected

# CICSplex Summary Screen

File Edit View Tools Navigate Help 12/21/2022 15:46:54

Command ==> KCPSTART Enterprise CICSplex Summary Auto Update : Off  
CICSplex :  
Region :

All Active CICSplexes

Columns 2 to 12 of 19 Rows 1 to 5 of 5

| ΔCICSplex<br>▽Name | ΔNumber of<br>▽Regions | ΔTransaction<br>▽Rate | ΔCPU<br>▽Utilization | Any SOS<br>Regions | SOS<br>Region | ΔWorst<br>▽Performance Index | Worst Service<br>Class Name | ΔEnqueue<br>▽Waits | ΔCurrent<br>▽Buffer Waits | ΔCurrent<br>▽String Waits | ΔI/O<br>▽Rate |
|--------------------|------------------------|-----------------------|----------------------|--------------------|---------------|------------------------------|-----------------------------|--------------------|---------------------------|---------------------------|---------------|
| - CCVPLEXH         | 4                      | 1/m                   | 0.0%                 | No                 | n/a           | 0.00%                        | n/a                         | 0                  | 0                         | 0                         | 0/s           |
| - FUWPLEX          | 8                      | 0/m                   | 0.1%                 | No                 | n/a           | 0.00%                        | n/a                         | 0                  | 0                         | 0                         | */s           |
| - RS01             | 2                      | 0/m                   | 0.0%                 | No                 | n/a           | 0.00%                        | n/a                         | 0                  | 0                         | 0                         | 0/s           |
| - RS02             | 2                      | 11/m                  | 0.0%                 | No                 | n/a           | 0.00%                        | n/a                         | 0                  | 0                         | 0                         | 0/s           |
| - WUIPLEX          | 1                      | 0/m                   | 0.1%                 | No                 | n/a           | 0.00%                        | n/a                         | 0                  | 0                         | 0                         | */s           |

File Edit View Tools Navigate Help 12/21/2022 15:48:17

Command ==> KCPSTART Enterprise CICSplex Summary Auto Update : Off  
CICSplex :  
Region :

All Active CICSplexes

Columns 10 to 19 of 19 Rows 1 to 5 of 5

| ΔCICSplex<br>▽Name | ΔCurrent<br>▽Buffer Waits | ΔCurrent<br>▽String Waits | ΔI/O<br>▽Rate | ΔPage<br>▽Rate | ΔStorage Violations<br>▽in Last Hour | Total<br>AIDs | Total<br>ICEs | ΔHighest<br>▽Percent MAXT | Highest<br>Region MAXT | All VTAM<br>ACBs Open |
|--------------------|---------------------------|---------------------------|---------------|----------------|--------------------------------------|---------------|---------------|---------------------------|------------------------|-----------------------|
| - CCVPLEXH         | 0                         | 0                         | 0.0/s         | 0.0/s          | 0                                    | 0             | 23            | 10%                       | CCVDEMO                | Yes                   |
| - FUWPLEX          | 0                         | 0                         | 37.2/s        | 0.0/s          | 0                                    | 0             | 43            | 2%                        | FUWFWR                 | Yes                   |
| - RS01             | 0                         | 0                         | 0.0/s         | 0.0/s          | 0                                    | 0             | 9             | 1%                        | CICS00                 | Yes                   |
| - RS02             | 0                         | 0                         | 0.0/s         | 0.0/s          | 0                                    | 0             | 10            | 19%                       | CCVCMAS                | Yes                   |
| - WUIPLEX          | 0                         | 0                         | 35.3/s        | 0.0/s          | 0                                    | 0             | 6             | 1%                        | FUWWUI                 | Yes                   |

# CICSplex Regions Summary Screen

S3 - Omegamon RS02 - Rocket BlueZone Mainframe Display

File Edit Session Options Transfer View Script Help

Command ==> KCPRGNS

Regions Summary for FUWPLEX

Columns 2 to 11 of 36

Rows 1 to 8 of 8

| ΔCICS Region<br>vName | ΔCPU<br>vUtilization | ΔTransaction<br>vRate | ΔMaximum Tasks<br>vPercent | Highest Pct<br>Class MaxT | Total Queued<br>Transactions | SOS | ΔStg. Violations<br>vlast hour | ΔWorst<br>vPerf. Index | Worst Region<br>Class Name | Service | +Any Cur<br>WS Faul |
|-----------------------|----------------------|-----------------------|----------------------------|---------------------------|------------------------------|-----|--------------------------------|------------------------|----------------------------|---------|---------------------|
| - FUWFWAR             | 0.8%                 | 1475/m                | 1%                         | 0%                        | 0                            | No  | 0                              | 0.01%                  | LTRANS                     |         | No                  |
| - FUWFWA1             | 1.4%                 | 1466/m                | 1%                         | 0%                        | 0                            | No  | 0                              | 0.01%                  | LTRANS                     |         | No                  |
| - FUWFWDR             | 1.5%                 | 784/m                 | 2%                         | 0%                        | 0                            | No  | 0                              | 0.00%                  | n/a                        |         | No                  |
| - FUWFWFR             | 0.8%                 | 1583/m                | 0%                         | 0%                        | 0                            | No  | 0                              | 0.00%                  | n/a                        |         | No                  |
| - FUWFWF2             | 0.0%                 | 0/m                   | 0%                         | 0%                        | 0                            | No  | 0                              | 0.00%                  | n/a                        |         | No                  |
| - FUWFWIR             | 0.4%                 | 890/m                 | 0%                         | 0%                        | 0                            | No  | 0                              | 0.00%                  | n/a                        |         | No                  |
| - FUWFWTR             | 1.3%                 | 2944/m                | 0%                         | 0%                        | 0                            | No  | 0                              | 0.27%                  | CTTRANS                    |         | No                  |
| - FUWTCIC             | 0.0%                 | 0/m                   | 0%                         | 0%                        | 0                            | No  | 0                              | 0.00%                  | n/a                        |         | No                  |

BACK

Hub RS01DEMO:TEMS on platform RS01(z/OS)

MO asc S02TCP07 03/014

S3/C 137.134.455 S02TCP07 NUM 00:00:203 03.014

# Region Overview Screen

File Edit View Tools Navigate Help 12/14/2022 15:05:32

Command ==> KCPRGNO CICS Region Overview Auto Update : Off  
CICSplex : CIREGS  
Region : CIC156GA

CICS Region: z/OS Address Space Data Sources

### CIC156GA Overview

|                                      |         |                                 |          |
|--------------------------------------|---------|---------------------------------|----------|
| System ID.....                       | RSC1    | CICS Region Name.....           | CIC156GA |
| Worst Region Service Class Name..... | CTRANS  | Region's Worst Perf. Index..... | 0.50%    |
| CPU Utilization.....                 | 7.1%    | CICS TOD Updated.....           | Yes      |
| Transaction Rate.....                | 17330/m | Maximum Tasks Percent.....      | 2%       |
| Queued Remote Requests.....          | 0       | SOS.....                        | No       |
| Stg. Violations last hour.....       | 0       | AIDs.....                       | 0        |
| ICEs.....                            | 3       | CICS TOD Clock.....             | 15:05:32 |
| Any Current WS Faults.....           | No      | Any Current WS Timeouts.....    | No       |
| CICS Version.....                    | 7.3.0   |                                 |          |

### Highest CPU Tasks

Columns 2 to 14 of 19 Rows 1 to 4 of 4

| Transaction ID | ΔCPU Time | ΔElapsed Time | Task State | Wait Type | Resource Type | Resource Name | Exceeds MAXR Threshold | ΔTask Number | First Program ID | Terminal ID | User ID  | Status | +PSB Name |
|----------------|-----------|---------------|------------|-----------|---------------|---------------|------------------------|--------------|------------------|-------------|----------|--------|-----------|
| OSRV           | .002702s  | 52m 03s       | Suspend    | TaskCnt1  | USERWAIT      | SRVWORK       | No                     | 00044        | KOCOME00         | n/a         | CICSUSER | Active | n/a       |
| OSEC           | .001700s  | 52m 03s       | Suspend    | TaskCnt1  | USERWAIT      | SR2WORK       | No                     | 00045        | KOCOME00         | n/a         | CICSUSER | Active | n/a       |
| SSP3           | .000372s  | .002209s      | Running    | CPU       | IN_DB2        | L800M         | No                     | 83506        | LGTESTP3         | S209        | CICSUSER | Active | n/a       |
| SSC1           | .000161s  | .022309s      | Running    | CPU       | IN_DB2        | L800E         | No                     | 83500        | LGTESTC1         | S204        | CICSUSER | Active | n/a       |

### Storage Areas

Columns 2 to 10 of 10 Rows 1 to 3 of 3

| Area | SOS | Percent Used | Storage Limit | Storage in Use | Storage Available | Storage Allocated | Region Size | zOS Storage Free | Largest Contiguous Available |
|------|-----|--------------|---------------|----------------|-------------------|-------------------|-------------|------------------|------------------------------|
| DSA  | No  | 20%          | 5.0M          | 1.0M           | 4.0M              | 1.5M              | 8.9M        | 3.1M             | 3.1M                         |
| EDSA | No  | 26%          | 200.0M        | 51.0M          | 149.0M            | 59.0M             | 1.5G        | 1.2G             | 1.2G                         |
| GDSA | No  | 0%           | 10.0G         | 18.0M          | 9.9G              | 1023.0M           | 10.0G       | n/a              | n/a                          |

### Connections

Columns 2 to 10 of 11 Rows 1 to 3 of 3

| Connection Type | Allocation Rate | Allocate Percentage | Allocation Count | Total Number of Connections | Total Send Sessions in Use | Maximum Send Sessions in Use | Percent of Maximum Send Sessions in Use | Total Receive Sessions in Use | +Maximum R Sessions |
|-----------------|-----------------|---------------------|------------------|-----------------------------|----------------------------|------------------------------|---|-------------------------------|---------------------|
| MRO             | 0               | 0                   | 0                | 0                           | 0                          | n/a                          | n/a                                     | 0                             | n/a                 |
| ISC             | 0               | 0                   | 0                | 0                           | 0                          | n/a                          | n/a                                     | 0                             | n/a                 |
| IPCONN          | 0               | 0                   | 0                | 0                           | 0                          | 0                            | 0                                       | 0                             | 0                   |

# Analyzing Individual Transactions

Use Task History as Transactions run to quickly catch normally

# Task History Detail Screen - tabs

File Edit View Tools Navigate Help 12/21/2022 15:52:05

Command ==> KCPTASHE

Display : HISTORY  
CICSplex : FUWPLEX  
Region : FUFWAR

Task History Detail

Details Statistics Storage Timings I/O Programs Related

Task History Detail for Task Number 00781

|                          |          |                          |          |
|--------------------------|----------|--------------------------|----------|
| Transaction ID.....      | DATA     | CPU Time.....            | .000359s |
| Response Time.....       | .000396s | Task Number.....         | 00781    |
| End Time.....            | 13:17:23 | Start Time.....          | 13:17:23 |
| User ID.....             | CICDFLT  | Program ID.....          | DATAPGM  |
| Storage HWM.....         | 53616    | File Requests.....       | 0        |
| Terminal ID.....         | TR1      | Terminal I/O.....        | 0        |
| ABEND Code.....          |          | Trace active.....        | No       |
| End Date.....            | 12/21/22 | Start Date.....          | 12/21/22 |
| Asynchronous Status..... | No       | Original Start time..... | 13:17:23 |

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File Edit View Tools Navigate Help 12/21/2022 15:53:47

Command ==> KCPTASHL

Display : HISTORY  
CICSplex : FUWPLEX  
Region : FUFWAR

Task History Detail

Details Statistics Storage Timings I/O Programs Related

Tasks with same unit of work

| CICS Region Name | Transaction ID | CPU Time | Overall Elapsed Time MS | Total Wait Time | Dispatch Time | Task Number | Task Status |
|------------------|----------------|----------|-------------------------|-----------------|---------------|-------------|-------------|
| - FUWFWTR        | DATA           | .000448s | .002562s                | 0.001s          | 0.000s        | 01678       | Done        |
| - FUWFWIR        | CSMI           | .000358s | .000797s                | 0.000s          | 0.000s        | 00751       | Done        |
| - FUWFWFR        | CSMI           | .000199s | .000716s                | 0.000s          | 0.000s        | 00743       | Done        |
| - FUWFWAR        | CSMI           | .000097s | .000685s                | 0.000s          | 0.000s        | 00778       | Done        |

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File Edit View Tools Navigate Help 12/21/2022 15:55:29

Command ==> KCPTASHP

Display : HISTORY  
CICSplex : FUWPLEX  
Region : FUFWAR

Task History Detail

Details Statistics Storage Timings I/O Programs Related

Transaction Program Details

| Program Name | Invoked Count | ΔCPU Time | ΔElapsed Time | ΔDispatch Time | ΔCPU Time on QR TCB | ΔNumber of EXEC calls | ΔNumber of Abends | ΔNumber of Mode Switches |
|--------------|---------------|-----------|---------------|----------------|---------------------|-----------------------|-------------------|--------------------------|
| - DATAPGM    | 1             | .000169s  | .000959s      | .000209s       | .000065s            | 10                    | 0                 | 7                        |

# Program Tracking Feature - New

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- Program Tracking is a new feature which allows users to see all the programs that have run for a task.
- For a program to be tracked it must be either invoked by CICS as a result of an EXEC CICS command or application TRUE request or be called directly and issue an EXEC CICS call.
- Only determined if it is a new program via the call if the EXEC CICS request is issued from a different load module.
- This feature is enabled by default. It can be controlled dynamically via the TOM.
- Worst case less than 0.25% based upon the 1ms per transaction.

# Task Program Details

- OMEGAMON CICS provides details on each CICS defined program that has been used by a task.
- This is available via the OMEGAMON CICS Active Task and Task History displays.

File Edit View Tools Navigate Help 02/04/2022 13:27:24

Command ==> KCPTASHP

Display : HISTORY  
CICSplex : SB3  
Region : CICD5501

Task History Detail

Details Statistics Storage Timings Programs Related

Transaction Program Details

Columns 2 to 9 of 9 Rows 1 to 6 of 6

| ΔProgram<br>▽Name | ΔInvoked<br>▽Count | ΔCPU<br>▽Time | ΔElapsed<br>▽Time | ΔDispatch<br>▽Time | ΔCPU Time<br>▽on QR TCB | ΔNumber of<br>▽EXEC calls | ΔNumber<br>▽of Abends | ΔNumber of<br>▽Mode Switches |
|-------------------|--------------------|---------------|-------------------|--------------------|-------------------------|---------------------------|-----------------------|------------------------------|
| - DPLLSTRT        | 1                  | .000033s      | .000066s          | .000063s           | .000033s                | 3                         | 0                     | 0                            |
| - DPLLINKA        | 3                  | .000221s      | .000381s          | .000372s           | .000221s                | 12                        | 0                     | 0                            |
| - DPLLINKB        | 1                  | .000054s      | 2.19312s          | .000054s           | .000054s                | 6                         | 0                     | 0                            |
| - DPLLINKC        | 2                  | .000274s      | 4.19449s          | .000299s           | .000274s                | 18                        | 0                     | 0                            |
| - DPLLINKD        | 1                  | .000086s      | 2.09694s          | .000089s           | .000086s                | 7                         | 0                     | 0                            |
| - DPLXCTLA        | 1                  | .000175s      | 2.09709s          | .000221s           | .000175s                | 7                         | 0                     | 0                            |

# Task Program Details

- Locating tasks which used a specific program.
- Task History filters allow you to specify as program name. In which case only tasks which have used the program will be returned. The wildcard \* character is supported.

The screenshot shows a terminal window with a menu bar (File, Edit, View, Tools, Navigate, Help) and a timestamp (05/18/2023 12:32:09). The command prompt shows 'Command ==> KCPTAHFN'. The 'Task History Filters' dialog box is open, displaying various filter criteria. The 'Program' filter under 'Inclusion Criteria' is set to 'DATABUS\_'. The 'Display' options are set to 'HISTORY', 'Plex ID' is 'FUWPLEX', and 'Sys ID' is blank. The dialog box includes sections for 'Records to scan' (10000), 'Between' (12:31:06 on 05/18/2023 and 12:32:06 on 05/18/2023), 'Inclusion Criteria', and 'Exclusion Criteria'. At the bottom, there are buttons for 'Clear All Filters' and 'OK'.

```
File Edit View Tools Navigate Help 05/18/2023 12:32:09
Command ==> KCPTAHFN
Task History Filters
Display : HISTORY
Plex ID : FUWPLEX
Sys ID :

Records to scan 10000
Response time GE _____
Storage HWM . GE _____
DL/I . . . . GE _____
ADABAS . . . . GE _____
IDMS . . . . GE _____
MQ . . . . GE _____
CPU time . . .GE _____
File . . . .GE _____
DB2 . . . .GE _____
DATACOM . . .GE _____
SUPRA . . . .GE _____
USREVNT1 . .GE _____

Between 12:31:06 on 05/18/2023 and 12:32:06 on 05/18/2023

Inclusion Criteria
Tran ID . . EQ _____
Terminal ID EQ _____
User ID . . EQ _____
Abend code EQ _____
Program . . EQ DATABUS_

Exclusion Criteria
Tran ID . . EQ _____
Terminal ID EQ _____
User ID . . EQ _____

Only Transaction and Terminal filters are case sensitive
Clear All Filters OK
```

# Program Aggregation – Region Level

File Edit View Tools Navigate Help 02/04/2022 14:01:47

Command ==> KCPPRGS Program Summary

Auto Update : Off  
CICSplex : SB3  
Region : CICD5501

Installed Used

Programs which have been used on CICD5501

Columns 2 to 10 of 15 Rows 13 to 18 of 18

| ΔProgram<br>▽Name | ΔInvoked<br>▽Count | ΔTransaction<br>▽Count | ΔCPU<br>▽Time | ΔAverage<br>▽CPU Time | ΔElapsed<br>▽Time | ΔAverage<br>▽Elapsed Time | ΔDispatch<br>▽Time | ΔAverage<br>▽Dispatch Time | ΔCPU Time<br>▽on QR TCB |
|-------------------|--------------------|------------------------|---------------|-----------------------|-------------------|---------------------------|--------------------|----------------------------|-------------------------|
| - DPLLINKB        | 2                  | 2                      | .000112s      | .000056s              | 4.30868s          | 2.15434s                  | .000112s           | .000056s                   | .000112s                |
| - DPLLINKC        | 4                  | 2                      | .000540s      | .000135s              | 8.38270s          | 2.09567s                  | .000749s           | .000187s                   | .000540s                |
| - DPLLINKD        | 2                  | 2                      | .000175s      | .000088s              | 4.18710s          | 2.09355s                  | .000177s           | .000089s                   | .000175s                |
| - DPLLSTRT        | 2                  | 2                      | .000339s      | .000170s              | .005112s          | .002556s                  | .005102s           | .002551s                   | .000074s                |
| - DPLXCTLA        | 2                  | 2                      | .000329s      | .000165s              | 4.18599s          | 2.09299s                  | .000525s           | .000263s                   | .000329s                |
| - MICKSTRS        | 12003              | 12003                  | .251720s      | .000021s              | 20m 34s           | .102881s                  | .703362s           | .000059s                   | .251720s                |

File Edit View Tools Navigate Help 02/04/2022 14:01:11

Command ==> KCPPRGS Program Summary

Auto Update : Off  
CICSplex : SB3  
Region : CICD5501

Installed Used

Programs which have been used on CICD5501

Columns 9 to 15 of 15 Rows 13 to 18 of 18

| ΔProgram<br>▽Name | ΔAverage<br>▽Dispatch Time | ΔCPU Time<br>▽on QR TCB | ΔAverage CPU Time<br>▽on QR TCB | ΔNumber of<br>▽EXEC Calls | ΔAverage<br>▽EXEC Calls | ΔNumber<br>▽of Abends | ΔNumber of<br>▽Mode Switches |
|-------------------|----------------------------|-------------------------|---------------------------------|---------------------------|-------------------------|-----------------------|------------------------------|
| - DPLLINKB        | .000056s                   | .000112s                | .000056s                        | 12                        | 6                       | 0                     | 0                            |
| - DPLLINKC        | .000187s                   | .000540s                | .000135s                        | 36                        | 9                       | 0                     | 0                            |
| - DPLLINKD        | .000089s                   | .000175s                | .000088s                        | 14                        | 7                       | 0                     | 0                            |
| - DPLLSTRT        | .002551s                   | .000074s                | .000037s                        | 6                         | 3                       | 0                     | 2                            |
| - DPLXCTLA        | .000263s                   | .000329s                | .000165s                        | 14                        | 7                       | 0                     | 0                            |
| - MICKSTRS        | .000059s                   | .251720s                | .000021s                        | 84264                     | 7                       | 52                    | 0                            |

# Program Aggregation – Region Level

The program aggregation data displayed with program details.

```
File Edit View Tools Navigate Help 02/04/2022 14:06:13
Auto Update : Off
Command ==> KCPPRGD
CICSplex : SB3
Region : CICD5501

Program Details
Program statistics for MICKSTRS in CICD5501
Program Status..... Enabled
Current Use Count..... 1
Total Use Count..... 12205
Statistics Use Count..... 12205
Statistics Refreshes..... 0
Load Status..... Loaded
Load Point..... 39B0F000
Loaded From..... Library
Length..... 4104
Current Copies..... 1
Total Load Count..... 1
Deletes by Compression..... 0
Statistics Last Reset..... 00:00:00
Program Location..... ESDSA
Entry Point..... B9B0F000
Library Name..... CMDEVTST

RPL Dataset Name
TDCICST.CMDEVTST.LOAD

Program Usage Data for CICD5501
Invoked Count..... 12204
CPU Time..... .253797s
Elapsed Time..... 20m 34s
Dispatch Time..... .705536s
CPU Time on QR TCB..... .253797s
Number of Mode Switches..... 0
Number of EXEC Calls..... 85471
Transaction Count..... 12204
Average CPU Time..... .000021s
Average Elapsed Time..... .101187s
Average Dispatch Time..... .000058s
Average CPU Time on QR TCB..... .000021s
Number of Abends..... 53
Average EXEC Calls..... 7

Program Definition for MICKSTRS in CICD5501
Defined Language..... Not Defi
Data Location..... Any
Execution Key..... User
Definition Type..... Grplist
Amode..... 31
API status..... CICS API
Remote Program ID..... n/a
Remote Transaction ID..... n/a
Deduced Language..... Assemble
Concurrency..... Quasiree
Program Attribute..... Reusable
CEDF Allowed..... Yes
Rmode..... Any
EXECUTIONSET..... FullAPI
Remote System ID..... n/a

Resource Signature Data for MICKSTRS in CICD5501
BACK | HOME Hub C5D3:CMS on platform SB3(z/OS) MORE
```

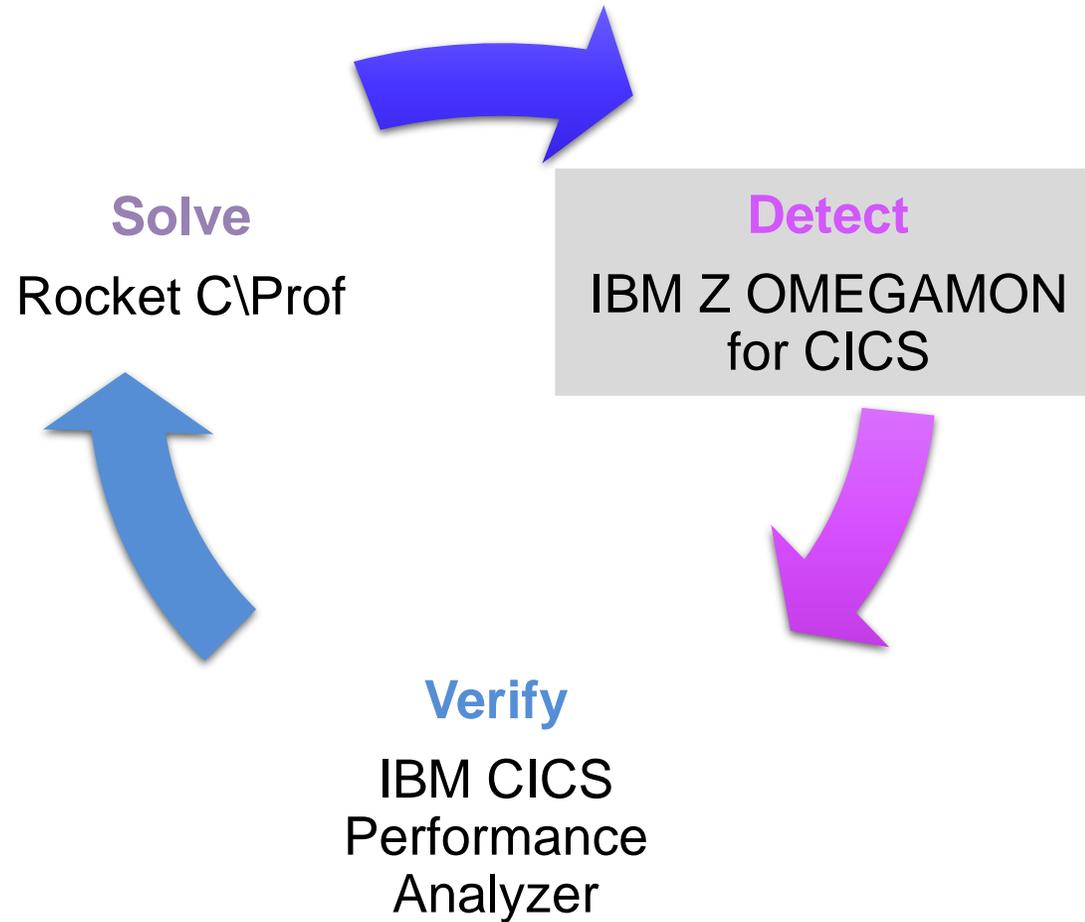
# Task History Collection - timespan

```
File Edit View Tools Navigate Help 12/21/2022 16:01:39
Command ==>
KCPONDV
CICS Task History Status
Task History Status Active
Task History DataSpace Status
Data Store Type..... DataSpac
Data Store Size..... 956K
Data Store Records..... 240
Transaction Recs Received..... 478
Cross Memory Posts..... 2
Date of Oldest Transaction..... 12/19/22
Time of Oldest Transaction..... 06:43:28
TimeSpan..... 2d 09h
Start Date..... 12/16/22
Start Time..... 17:55:35
Display Requests..... 33
Data Store Wraparound..... 1
Reserved Size..... 25%
Date of Most Recent Trans..... 12/21/22
Time of Most Recent Trans..... 15:54:36
Auto Update : Off
CICSplex : FUWPLEX
Region : FUWFWAR
```

- OMEGAMON can detect, and in some cases remediate problems
- However, permanently solving problems require further analysis
- Task History data in OMEGAMON is only kept for a short period of time
- Some problems require analyzing data collected over several months...

# CICS Performance Management Tools

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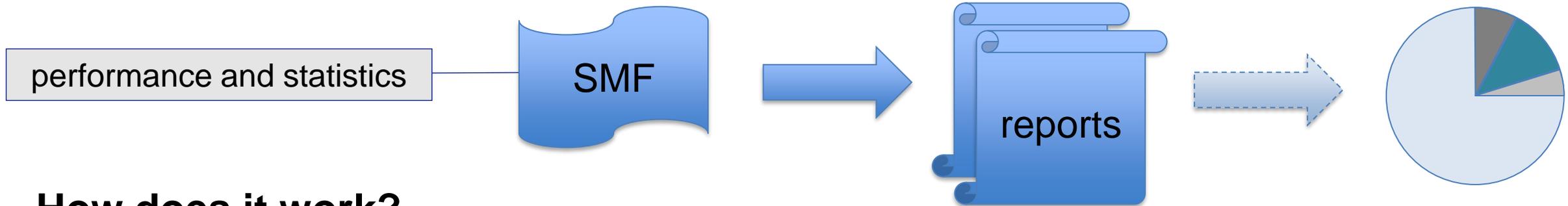
# IBM CICS Performance Analyzer – CICS PA

CICS Performance and Problem Management Tools (Verify)

# What is IBM CICS Performance Analyzer?

---

- A comprehensive performance reporting and analysis tool for CICS
- Provides ongoing system management and measurement reports on all aspects of CICS application performance

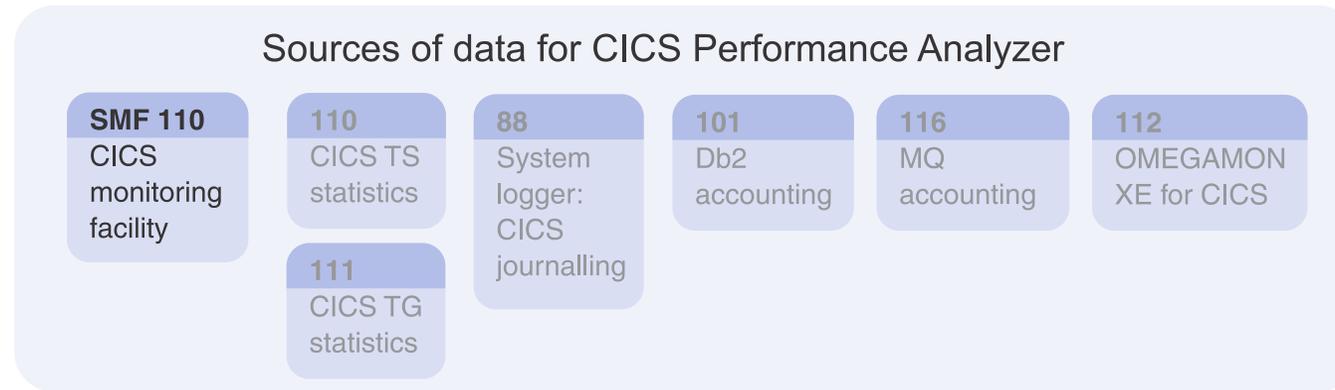


## How does it work?

- Uses SMF data as input
- Easy to use interface for report generation (over 250 supplied report forms)
- Performance and statistical analysis

# CICS monitoring facility (CMF)

---



- CMF collects data about all transactions in CICS
- Records are written to SMF for later offline processing
- CMF collects 4 classes of data: **exception**, identity, **performance**, and transaction resource
- CMF can produce a large volume of data, so CICS compresses the data by default
- To exclude monitoring data fields, use a monitoring control table (MCT)
- To process output, use CICS PA or CICS-supplied sample program DFH\$MOLS

# CMF data types – Performance and Exception

---

## **Performance class**

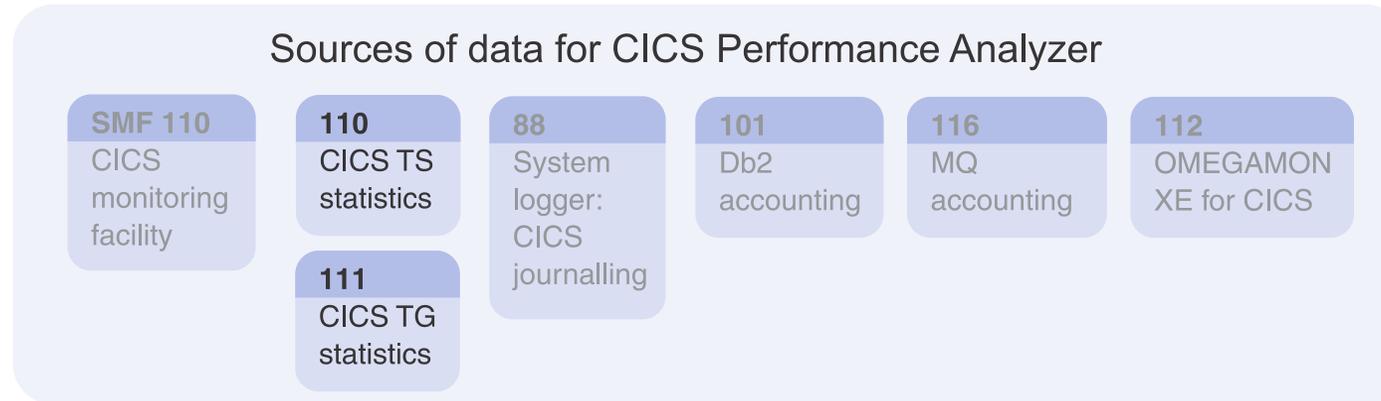
- Provides detailed transaction information
- Processor and elapsed time
- Time spent waiting for I/O
- One record per transaction

## **Exception class**

- Information about resource shortages encountered
  - Queuing for file strings
  - Wait for temporary storage buffers
- Highlights problems in CICS system operation
- Identifies system constraints that affect performance
- One exception record written for each condition that occurs

# CICS Statistics

---



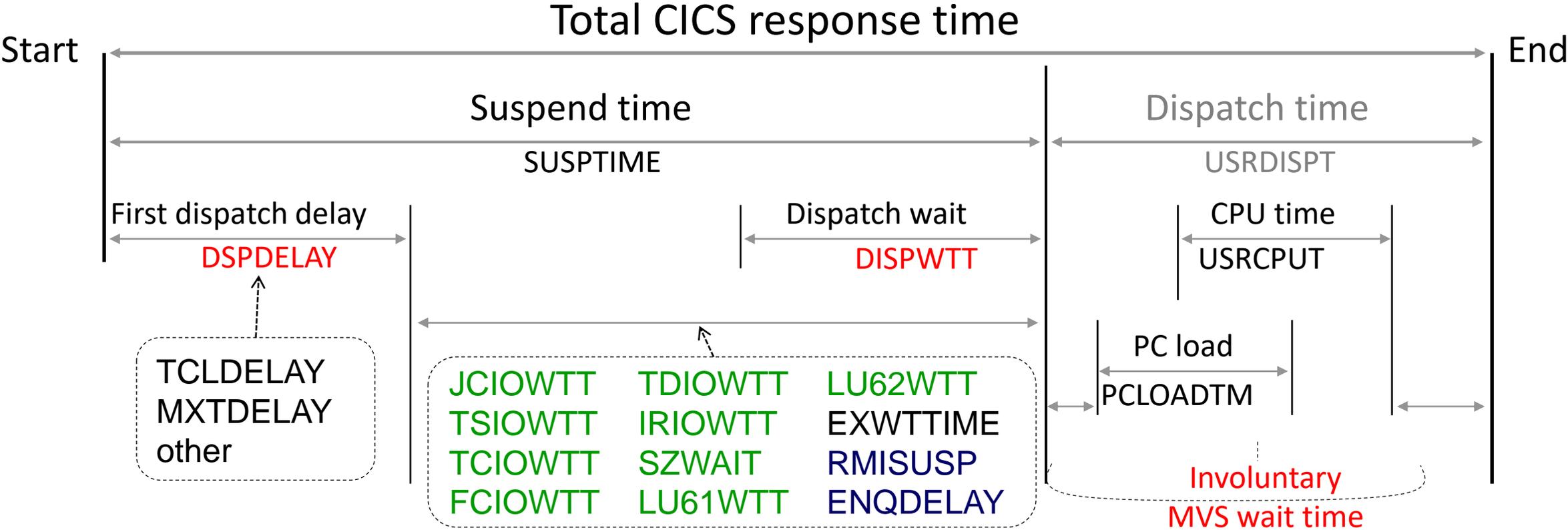
- Statistics domain collects a variety of data and writes it to the SMF data set
- Provides information about resources and domains
  - Counts and wait times for resource requests
  - Processor and storage use
- Some statistics counters can be reset when records are cut
- Interval recording can be set on/off using STATRCD (SIT)
- Records can be processed by DFHSTUP, DFH0STAT or CICS PA

# When does CICS collect statistics?

---

- **Interval statistics**
  - At intervals set, default every hour
  - Requires STATRCD=ON in SIT
  - Can be turned on using SET command (CEMT SET STATISTICS)
- **End-of-day statistics**
  - When CICS shuts down either normal or immediate
  - At midnight (by default) in 24/7 operations
- **Requested statistics**
  - EXEC CICS Perform statistics record
  - EXEC CICS Set statistics RECORDNOW
  - CEMT Perform statistics
  - Can be issued with any combination of resources

# Response time structure of CICS transaction



# Response time

---

Response time consists of two elements:

1. **Suspend time:** the time a task is not executing (waiting)
2. **Dispatch time:** the time that CICS thinks the task is executing.  
This time is further divided into:
  - A. **CPU time:** the time the task is executing on CPU
  - B. **Wait time:** the time the CPU has been taken away from the task without the knowledge of CICS

CPU to dispatch ratio:

- Ratio = (CPU time/dispatch time) \* 100
- Objective is 80% or higher

# Suspend time breakdown

$$\text{Suspend time} = \text{First dispatch time} + \text{I/O wait time} + \text{Other wait time} + \text{Unaccounted wait time}$$

First dispatch delay includes  
TRANCLASS delay and MXT delay

Total I/O wait time =  
(terminal I/O wait time +  
temporary storage I/O wait time +  
shared temporary storage I/O wait time +  
transient data I/O wait time +  
journal (MVS Logger) I/O wait time +  
file I/O wait time +  
RLS file I/O wait time +  
Coupling Facility Data Table (CFDT) I/O wait time +  
inbound socket I/O wait time +  
outbound socket I/O wait time +  
inter-region (MRO) I/O wait time +  
LU 6.1 I/O wait time +  
LU 6.2 I/O wait time +  
FEPI I/O wait time)

Total Other wait time =  
( CICS OTE TCBS delay time +  
CICS change-TCB mode delay time +  
TCB mismatch wait time +  
ENQ delay time +  
IC/WAIT interval control delay time +  
Lock Manager (LM) delay time +  
RMI suspend time +  
BTS delay +  
JVM suspend +  
request receiver wait time +  
request processor wait time +  
RRMS/MVS in-doubt wait time +  
3270 bridge partner wait time +  
CFDT server sync point wait time +  
MVS storage constraint wait time +  
dispatchable waits wait time)

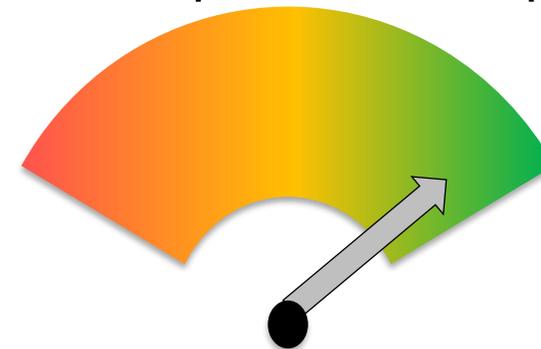
# Why analyze SMF data?

---

- Analyze CICS application performance
- Improve CICS resource usage
- Evaluate the effects of CICS tuning efforts
- Improve transaction response time
- Provide ongoing system management and measurement reports
- Increase availability of resources
- Increase the productivity of system and application programmers
- Provide awareness of usage trends

## Why is it important?

- Reduce time and resource required to analyze offline performance data
- Enables deep-dive CICS performance analysis and understanding of usage trends
- Aids capacity planning and tuning
- Help quickly identify trends, anticipate and prevent online performance problems



# Benefits of using CICS PA

---

- Ease of use
  - No additional setup or customization required
  - Familiar CICS terms and concepts
- ISPF dialog to build, maintain, and submit reports
  - Tailor your reports easily using report forms
  - Extensive online help available, and field descriptions
- Trend and capacity planning
- Statistics reporting capability
  - Comprehensive reporting and analysis of CICS statistics data
  - Alert processing to highlight potential tuning opportunities
- Transaction profiling
  - Compares transaction performance between two time periods

# Performance Summary Screen

V5R4M0

## CICS Performance Analyzer Performance Summary

0SUM0001 Printed at 15:29:36 12/06/2018

Data from 00:17:50 11/23/2017 to 23:59:49 11/23/2017

Page 1

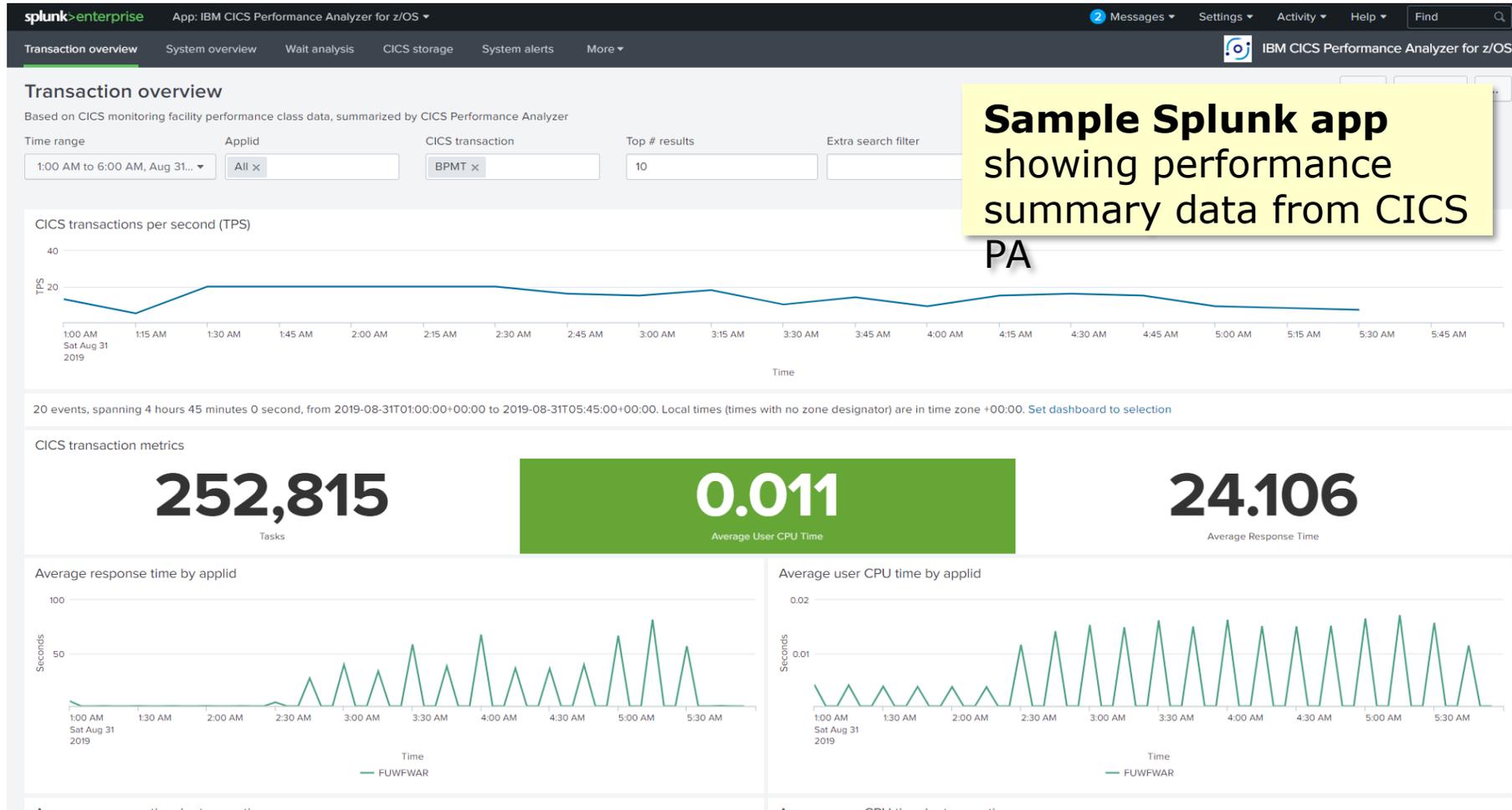
| Tran | WEBDESC                 | #Tasks | Avg Response Time | Max Response Time | Avg Dispatch Time | Avg User CPU Time | Avg Suspend Time | Max Suspend Time | Avg DispWait Time | Avg FC Wait Time | Avg FCAMRq Count | Avg IR Wait Time | Avg SC24UHW Count | Avg SC31UHW Count |
|------|-------------------------|--------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------|------------------|------------------|------------------|-------------------|-------------------|
| DSA2 | wachinformation         | 876    | .0261             | 1.2575            | .0094             | .0067             | .0167            | 1.2470           | .0040             | .0000            | 43               | .0000            | 0                 | 8873477           |
| DSA2 | wactualdisbursements    | 130    | .0339             | .2196             | .0196             | .0137             | .0142            | .1928            | .0047             | .0000            | 200              | .0000            | 0                 | 9228932           |
| DSA2 | waddhistory             | 44309  | .0272             | 6.2085            | .0080             | .0061             | .0192            | 6.2001           | .0032             | .0000            | 29               | .0000            | 0                 | 8526714           |
| DSA2 | wadverseactionhierarchy | 5      | .0392             | .0435             | .0303             | .0096             | .0090            | .0164            | .0036             | .0000            | 63               | .0000            | 0                 | 8919520           |
| DSA2 | wbankersnote            | 9200   | .0326             | 3.0703            | .0147             | .0118             | .0179            | 3.0548           | .0039             | .0000            | 57               | .0000            | 0                 | 8547006           |
| DSA2 | wcchupdate              | 37083  | .0334             | 5.2381            | .0103             | .0074             | .0231            | 5.2260           | .0040             | .0000            | 58               | .0000            | 0                 | 8918366           |
| DSA2 | wchecklist              | 4823   | .3627             | 4.6495            | .1993             | .1375             | .1635            | 4.4762           | .0351             | .0000            | 2494             | .0000            | 0                 | 9230632           |
| DSA2 | wclosingmethodrecommend | 37     | .1910             | .3687             | .1514             | .0965             | .0396            | .1822            | .0196             | .0000            | 1846             | .0000            | 0                 | 9131641           |
| DSA2 | wclosingsupport         | 3632   | .0916             | 2.3611            | .0337             | .0236             | .0580            | 2.3270           | .0077             | .0000            | 370              | .0000            | 0                 | 9130782           |
| DSA2 | wcommunication          | 27439  | .3698             | 4.5413            | .2227             | .1542             | .1472            | 4.3050           | .0388             | .0000            | 2753             | .0000            | 0                 | 9249514           |
| DSA2 | wcontactupdate          | 5477   | .0346             | 3.1524            | .0129             | .0093             | .0218            | 3.1350           | .0043             | .0000            | 85               | .0000            | 0                 | 8951858           |
| DSA2 | wcontractfinancial      | 8179   | .3128             | 3.7768            | .1864             | .1274             | .1265            | 3.5585           | .0316             | .0000            | 2391             | .0000            | 0                 | 9306619           |
| DSA2 | wcontractissuenotificat | 1959   | .0325             | 1.0548            | .0143             | .0104             | .0182            | 1.0395           | .0034             | .0000            | 98               | .0000            | 0                 | 9078754           |
| DSA2 | wcosignaturestatement   | 62     | .0244             | .0969             | .0119             | .0078             | .0125            | .0862            | .0045             | .0000            | 52               | .0000            | 0                 | 9078769           |
| DSA2 | wcreditbureaureports    | 13790  | .1867             | 6.1528            | .1401             | .0946             | .0466            | 6.1404           | .0207             | .0000            | 1707             | .0000            | 0                 | 9082305           |
| DSA2 | wcreditreversal         | 2      | .0367             | .0433             | .0283             | .0092             | .0084            | .0106            | .0011             | .0000            | 35               | .0000            | 0                 | 8591656           |
| DSA2 | wdecision               | 31634  | .3303             | 6.9502            | .1807             | .1226             | .1495            | 6.6450           | .0312             | .0000            | 2217             | .0000            | 0                 | 9142872           |
| DSA2 | wdisbursementdetails    | 2943   | .0356             | 6.0530            | .0174             | .0134             | .0182            | 6.0456           | .0049             | .0000            | 210              | .0000            | 0                 | 9216289           |
| DSA2 | wdisclosures            | 853    | .1028             | 3.1773            | .0193             | .0132             | .0835            | 3.1549           | .0062             | .0000            | 172              | .0000            | 0                 | 8951865           |
| DSA2 | wdiscountmaintutility   | 650    | .0573             | 2.1343            | .0215             | .0151             | .0357            | 2.1096           | .0049             | .0000            | 183              | .0000            | 0                 | 9092450           |
| DSA2 | wemploymentandincome    | 2015   | .3116             | 4.4824            | .2051             | .1430             | .1064            | 4.2515           | .0314             | .0000            | 2398             | .0000            | 0                 | 9244769           |
| DSA2 | wexceptions             | 22007  | .2874             | 6.6658            | .1744             | .1177             | .1130            | 6.4709           | .0292             | .0000            | 2152             | .0000            | 0                 | 9139205           |
| DSA2 | wextcontact             | 1      | .0299             | .0299             | .0297             | .0133             | .0002            | .0002            | .0001             | .0000            | 62               | .0000            | 0                 | 8658976           |
| DSA2 | wfinancial              | 1763   | .3131             | 2.3143            | .1818             | .1252             | .1313            | 2.1094           | .0327             | .0000            | 2510             | .0000            | 0                 | 9227588           |

# Visualize the Data using an Analytics Engine

SupportPac CA10 provides sample JSON Lines data output

<https://www.ibm.com/support/pages/ca10-cics-performance-analyzer-zos-output-json-lines>

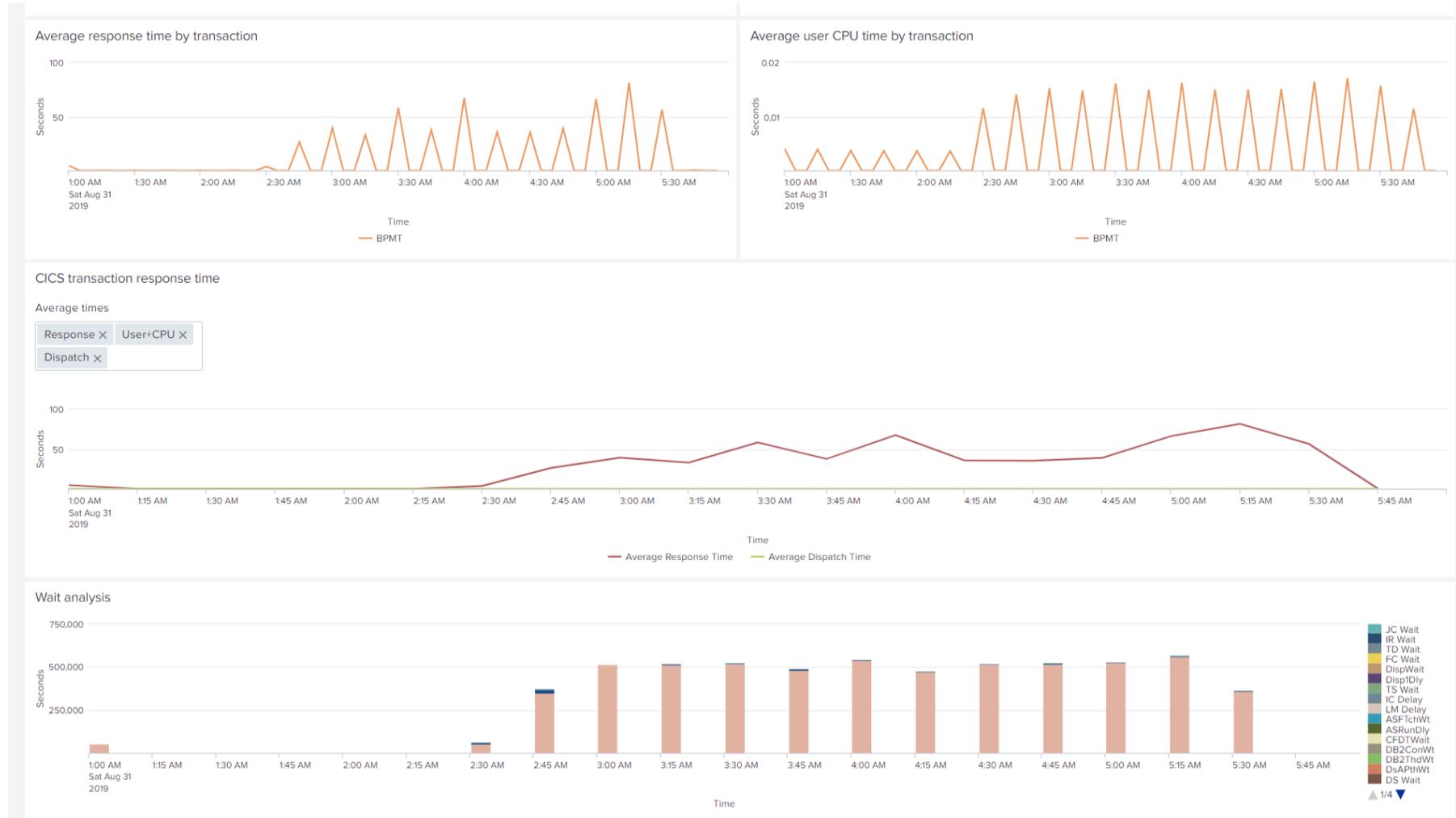
# Visualization with Splunk or Elastic Dashboards



**Sample Splunk app**  
showing performance  
summary data from CICS  
PA

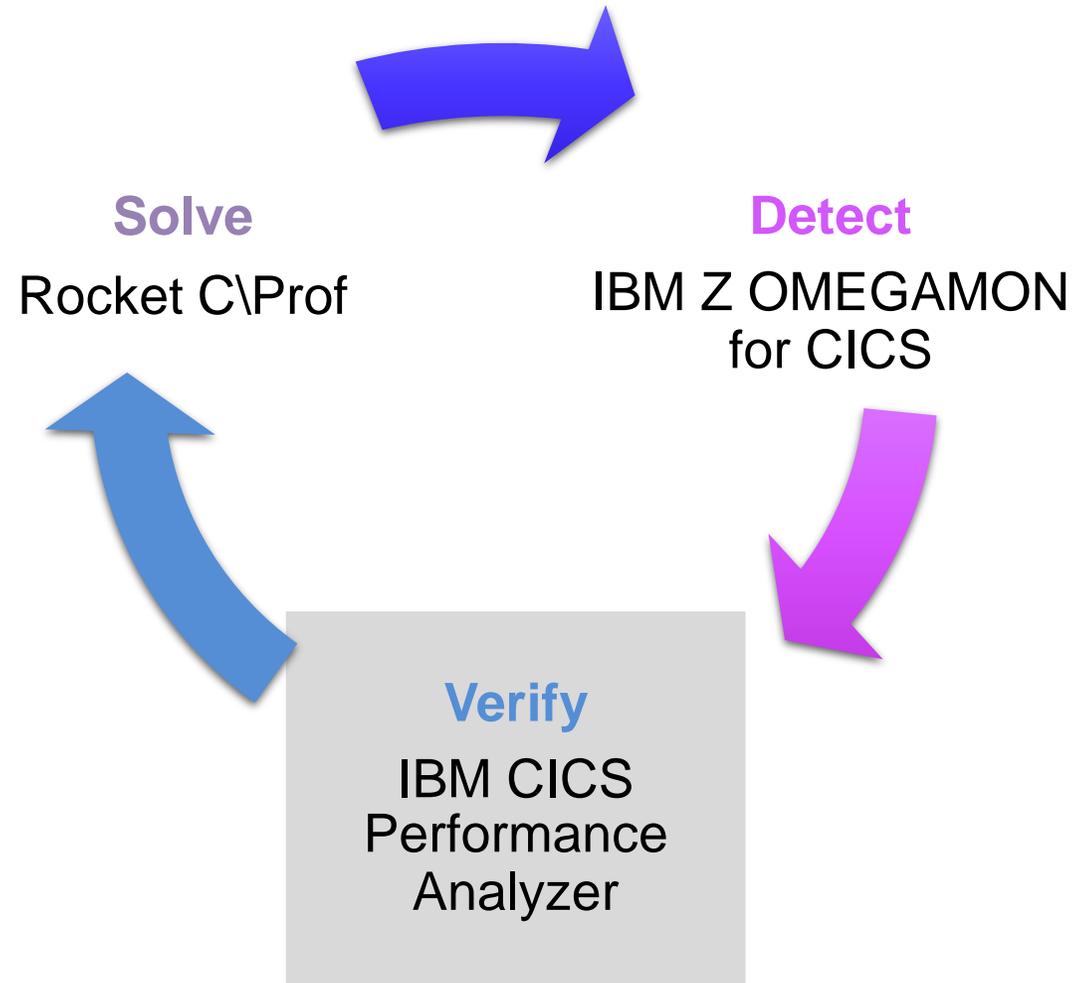
Sample Splunk app

# Visualization with Splunk or Elastic Dashboards



# CICS Performance Management Tools

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# Rocket C\Prof

CICS Performance and Problem Management Tools (Solve)

# What is C\PROF?

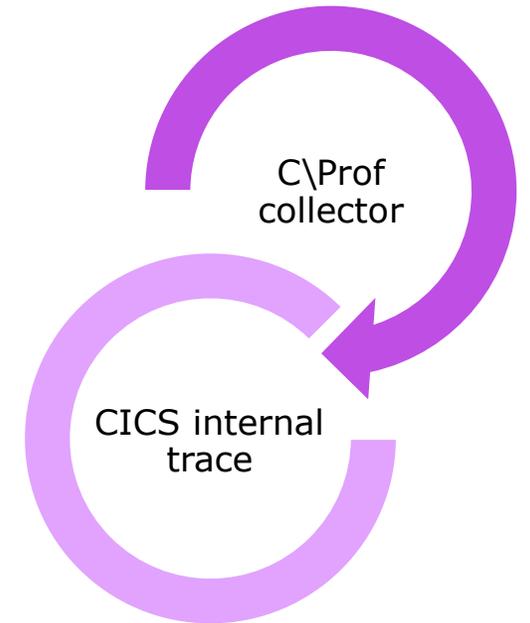
---

- A completely new approach to trace capture
- Uses significantly less CPU than traditional tools
- Does not require changes to CICS
- With C\Prof, the CICS trace becomes:
  - Inexpensive to capture
  - Simple to interpret
- C\Prof ***unlocks*** the hidden value of the trace
  - Low CPU usage means you can run it in production
  - Ideal for permanent use in development environments

# How does it work?

---

- **Collector runs in separate MVS address space**
  - Peeks inside CICS to look at CICS internal trace
  - **CICS is unaware that this is happening**
- **The CICS internal trace is collecting all the time**
  - C\Prof writes the trace to special profiling or auxiliary trace data sets
  - Level of detail is only limited to what is stored in the trace
  - Collect all the time, in a short burst, or take a quick snapshot
- **Collect one region or multiple with same collector**
  - Use C\Prof to filter and sort transactions, view application events, dive into the trace events themselves
  - **Supports regions using MRO**
  - Collect using the C\Prof server, or generate JCL to submit ad hoc batch collection requests



# Highlights: C\Prof

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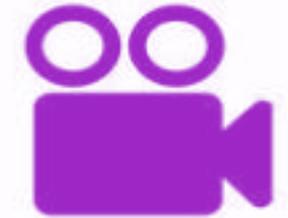
- Simple to get started (< 30 minutes)
- Transaction data supplied in near-real time
- Single Point of Control (SPOC) via the C\Prof **Region List**
- An “application” view of your trace events:
  - Collect event data from the CICS internal trace
  - Find your transaction
  - **Drill down to application events, performance information, transaction breakdown by program, trace event “deep dive”**
- Adjustable trace levels
  - Add additional trace points for more detail
- All the features of the CICS auxiliary trace but much more

# Multiple trace capture modes

---

- **Record**

- Record the contents of the CICS internal trace
- *Two modes:*
  - **Record for Profiling – our premiere feature**
    - Application perspective of the trace
    - Stored in C\Prof archive data sets
    - View transaction list, application events, program calls, trace events...
  - **Record to Auxiliary Trace Data Sets**
    - Output similar to the CICS auxiliary trace facility but with a lot less overhead and more recording options



- **Snap (snapshot)**

- Take a point-in-time snapshot of the CICS internal trace
  - Captures a **copy** of what is currently there
- *Effect?*
  - Snap looks **backward** to see what recently occurred in CICS
- Works even if the collector was not running at the time
- Combine with automation products for automated problem capture



# C\Prof translates this ...

```
• AP 1790 TFXM ENTRY - FUNCTION(INIT_XM_CLIENT) CLIENT_REQUEST_BLOCK(2708F570 , 02A00000)
•
• TASK-01629 KE_NUM-0286 TCB-C/QR /008F63C8 RET-A47683E0 TIME-00:25:52.3404031650 INTERVAL-00.0000020239 =0000058
• 1-0000 00480000 000000B3 00000000 00000000 BFC00000 00000000 01000100 2708F570 *.....{.....5.*
• 0020 02A00000 00000000 00000000 00020000 00000000 00000000 DBC862DE C5240D60 *.....H..E..-*
• 0040 00000000 00000000 *..... *
• 2-0000 C3D7F3F6 91F20006 2732D040 2732D040 00000000 0001629C *CP36j2....} ..} ..... *
```

```
• XM 1001 XMIQ ENTRY - FUNCTION(SET_TRANSACTION) FACILITY_TYPE(TERMINAL) FACILITY_TOKEN(2708F570)
•
• TASK-01629 KE_NUM-0286 TCB-C/QR /008F63C8 RET-A5A68922 TIME-00:25:52.3404045825 INTERVAL-00.0000014174 =0000059
• 1-0000 01380000 000000A1 00000000 00000000 B1000000 00080000 03A85530 26EEF160 *.....y....1-*
• 0020 2702E0E8 1790E0D8 26EEDFE0 00000048 2708F570 00000018 00000000 15672700 *..Y..Q...5.....*
• 0040 15000000 00000000 273C96CD 00000000 00000000 2474E310 00000000 2474E460 *.....o.....T.....U-*
• 0060 00000000 2474E572 00000000 2474E310 00000000 2474E89C 00000000 2474EC10 *.....V.....T.....Y.....*
• 0080 C9E401D9 24A0B250 F0F3F8C8 24AFED40 000002D0 C6F4E2C1 00000000 2474EFC2 *IU.R...&038H...}F4SA.....B*
• 00A0 00000000 2474EB84 00000000 2474EF40 0000001E 2708F570 0000001E 8C97459B *.....d.....5.....p..*
• 00C0 00000000 00000000 00000000 00000000 00000000 26EEF430 00000000 00000000 *.....4.....*
• 00E0 00000000 00000000 00000000 E3E2F8F0 F0F74040 00000000 00000000 00009508 *.....TS8007 .....n.*
• 0100 00000000 00009508 00000000 00009508 00000000 00000000 00000000 024D47D6 *.....n.....n.....(o*
• 0120 00000000 024D47D6 00000000 00000000 00000000 00000000 *.....(o..... *
```

```
• XM 1002 XMIQ EXIT - FUNCTION(SET_TRANSACTION) RESPONSE(OK)
•
• TASK-01629 KE_NUM-0286 TCB-C/QR /008F63C8 RET-A5A68922 TIME-00:25:52.3404064179 INTERVAL-00.0000018354 =0000060
• 1-0000 01380000 000000A1 00000000 00000000 B1000000 00080000 03A80130 26EEF160 *.....y....1-*
• 0020 2702E0E8 1790E0D8 26EEDFE0 00000048 2708F570 00000018 00000000 15672700 *..Y..Q...5.....*
• 0040 15000000 00000000 273C96CD 00000000 00000000 2474E310 00000000 2474E460 *.....o.....T.....U-*
• 0060 00000000 2474E572 00000000 2474E310 00000000 2474E89C 00000000 2474EC10 *.....V.....T.....Y.....*
• 0080 C9E401D9 24A0B250 F0F3F8C8 24AFED40 000002D0 C6F4E2C1 00000000 2474EFC2 *IU.R...&038H...}F4SA.....B*
• 00A0 00000000 2474EB84 00000000 2474EF40 0000001E 2708F570 0000001E 8C97459B *.....d.....5.....p..*
• 00C0 00000000 00000000 00000000 00000000 00000000 26EEF430 00000000 00000000 *.....4.....*
• 00E0 00000000 00000000 00000000 E3E2F8F0 F0F74040 00000000 00000000 00009508 *.....TS8007 .....n.*
• 0100 00000000 00009508 00000000 00009508 00000000 00000000 00000000 024D47D6 *.....n.....n.....(o*
• 0120 00000000 024D47D6 00000000 00000000 00000000 00000000 *.....(o..... *
```

# Into a consolidated form like this

```

File  Menu  Edit  Form  Help
C:\Prof Application Events
Command ==>
Row 1 of 84 More: >
Scroll ==> PAGE

Tran: BPMT Start: 2023-05-11 13:43:29.397222 Response: 0.400859 Task: 819

/  Relative APPLID  Task Program  Elapsed Call  Resource  EIBRESP  TCB  STMT #  Offset  Command
---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
+0.000000 FUWFWTR 819 0.000114 ATTACH TASK  MBKPSTD1  QR  ATTACH/OK TRANSACTION_TOK
+0.000114 FUWFWTR 819 0.000221 GETMAIN OK QR SYSEIB GETMAIN SET(X'28E0E008')
+0.000280 FUWFWAR 12871 0.000220 ATTACH TASK  MBKPSTD1  QR  ATTACH/OK TRANSACTION_TOK
+0.000501 FUWFWAR 12871 MBKPSTD1 0.000014 GETMAIN OK QR SYSEIB GETMAIN SET(X'26A5C008')
+0.000529 FUWFWAR 12871 MBKPSTD1 0.000002 START PROGRAM MBKPSTD1  QR  START_PROGRAM PROGRAM(MBK
+0.000600 FUWFWAR 12871 MBKPSTD1 0.000002 GETMAIN OK QR 00000481 SYSEIB GETMAIN SET(X'2850C8D8')
+0.000609 FUWFWAR 12871 MBKPSTD1 0.000010 LINK MBKPSTD1  OK QR 00066 +0014E2 LINK PROGRAM('MBKPCOM1')
+0.000628 FUWFWAR 12871 MBKPSTD1 0.000001 GETMAIN OK QR 00000481 SYSEIB GETMAIN SET(X'285166B8')
+0.000632 FUWFWAR 12871 MBKPSTD1 0.000001 GETMAIN OK QR 00128 +001604 GETMAIN SET(X'28517BF8')
+0.000635 FUWFWAR 12871 MBKPSTD1 0.000001 GETMAIN OK QR 00134 +001696 GETMAIN SET(X'28517C78')
+0.000637 FUWFWAR 12871 MBKPSTD1 0.000000 GETMAIN OK QR 00137 +001718 GETMAIN SET(X'28517C98')
+0.000639 FUWFWAR 12871 MBKPSTD1 0.000001 GETMAIN OK QR 00215 +001B3C GETMAIN SET(X'28517CC8')
+0.000641 FUWFWAR 12871 MBKPSTD1 0.000003 MONITOR OK QR 00221 +001C04 MONITOR POINT(2) DATA1('
+0.000645 FUWFWAR 12871 MBKPSTD1 0.000000 MONITOR OK QR 00227 +001CC2 MONITOR POINT(1) DATA1('
+0.000647 FUWFWAR 12871 MBKPSTD1 0.000001 FREEMAIN OK QR 00233 +001D38 FREEMAIN DATAPOINTER(X'28
+0.000653 FUWFWAR 12871 MBKPSTD1 0.000852 LINK MBKPSEQ1 OK QR 00191 +001954 LINK PROGRAM('MBKPSEQ1')
+0.001055 FUWFWFR 379 0.000148 ATTACH TASK  DFHMIRS  QR  ATTACH/OK TRANSACTION_TOK
+0.001204 FUWFWFR 379 DFHMIRS 0.000018 GETMAIN OK QR SYSEIB GETMAIN SET(X'2A90E008')
+0.001237 FUWFWFR 379 DFHMIRS 0.000002 START PROGRAM DFHMIRS  QR  START_PROGRAM PROGRAM(DFH
+0.001248 FUWFWFR 379 DFHMIRS 0.000015 LINK MBKPSEQ1  OK QR +0020B0 LINK PROGRAM('MBKPSEQ1')
+0.001303 FUWFWFR 379 MBKPSEQ1 0.000012 READQ TD MBK1 OK QR 00054 +001356 READQ TD QUEUE('MBK1') IN
+0.001317 FUWFWFR 379 MBKPSEQ1 0.000003 WRITEQ TD MBK1 OK QR 00070 +00142E WRITEQ TD QUEUE('MBK1') F
+0.001322 FUWFWFR 379 MBKPSEQ1 0.000020 WRITEQ TS MINIBANK OK QR 00082 +0014D4 WRITEQ TS QUEUE('MINIBANK
+0.001343 FUWFWFR 379 MBKPSEQ1 0.000002 READQ TS MINIBANK OK QR 00090 +001588 READQ TS QUEUE('MINIBANK'
+0.001347 FUWFWFR 379 MBKPSEQ1 0.000002 DELETEQ TS MINIBANK OK QR 00099 +001602 DELETEQ TS QUEUE('MINIBAN
+0.001350 FUWFWFR 379 MBKPSEQ1 0.000018 RETURN OK QR 00107 +001674 LINK PROGRAM('MBKPSEQ1')
+0.001506 FUWFWAR 12871 MBKPSTD1 0.000002 LINK MBKPDEB1 OK QR 00300 +002280 LINK PROGRAM('MBKPDEB1')
+0.001519 FUWFWAR 12871 MBKPDEB1 0.000001 GETMAIN OK QR 00000481 SYSEIB GETMAIN SET(X'28520898')
+0.001525 FUWFWAR 12871 MBKPDEB1 0.000190 READ MBKACCT1 OK QR-> 00078 +0014D6 READ FILE('MBKACCT1') INT
+0.001717 FUWFWAR 12871 MBKPDEB1 0.000761 REWRITE MBKACCT1 OK QR 00106 +0016C6 REWRITE FILE('MBKACCT1')
+0.002481 FUWFWAR 12871 MBKPDEB1 0.000029 RETURN OK QR 00135 +0017B2 RETURN COBOL II STMT # (013
+0.002496 FUWFWAR 12871 MBKPDEB1 0.000002 FREEMAIN OK QR 00000404 SYSEIB LINK PROGRAM('MBKPDEB1')
+0.002512 FUWFWAR 12871 MBKPSTD1 0.000024 LINK DFHDYP OK QR +0023D6 LINK PROGRAM('MBKPPMT1')
+0.002541 FUWFWAR 12871 DFHDYP 0.001026 RETURN OK QR +00022E RETURN ASM
+0.002659 FUWTCIC 12906 0.000130 ATTACH TASK  MBKPPMT1  QR  ATTACH/OK TRANSACTION_TOK
+0.002789 FUWTCIC 12906 0.000026 GETMAIN OK QR SYSEIB GETMAIN SET(X'28FAE008')
+0.002840 FUWTCIC 12906 0.000018 LINK MBKPPMT1  OK QR  LINK PROGRAM('MBKPPMT1')
+0.002946 FUWTCIC 12906 MBKPPMT1 0.000002 GETMAIN OK QR 00000481 SYSEIB GETMAIN SET(X'2A60E248')
+0.002971 FUWTCIC 12906 MBKPPMT1 0.000002 ADDRESS OK QR 00000247 SYSEIB ADDRESS SYSEIB ASM STMT_#
+0.002975 FUWTCIC 12906 MBKPPMT1 0.000012 LOAD CSQCOPEN OK QR 00000285 SYSEIB LOAD PROGRAM('CSQCOPEN')
+0.003020 FUWTCIC 12906 CSQCOPEN 0.000204 MQOPEN 0 L8+QR +0002BC APPLICATION-REQUEST MQOPE
+0.003246 FUWTCIC 12906 MBKPPMT1 0.000004 ADDRESS OK QR 00000247 SYSEIB ADDRESS SYSEIB ASM STMT_#
+0.003252 FUWTCIC 12906 MBKPPMT1 0.000009 LOAD CSQCPUT OK QR 00000285 SYSEIB LOAD PROGRAM('CSQCPUT') S
+0.003272 FUWTCIC 12906 CSQCPUT 0.000094 MQPUT 0 L8+QR +000460 APPLICATION-REQUEST MQPUT
+0.003372 FUWTCIC 12906 MBKPPMT1 0.000000 ADDRESS OK QR 00000247 SYSEIB ADDRESS SYSEIB ASM STMT_#
ME 01A SD6TCP25 04/015

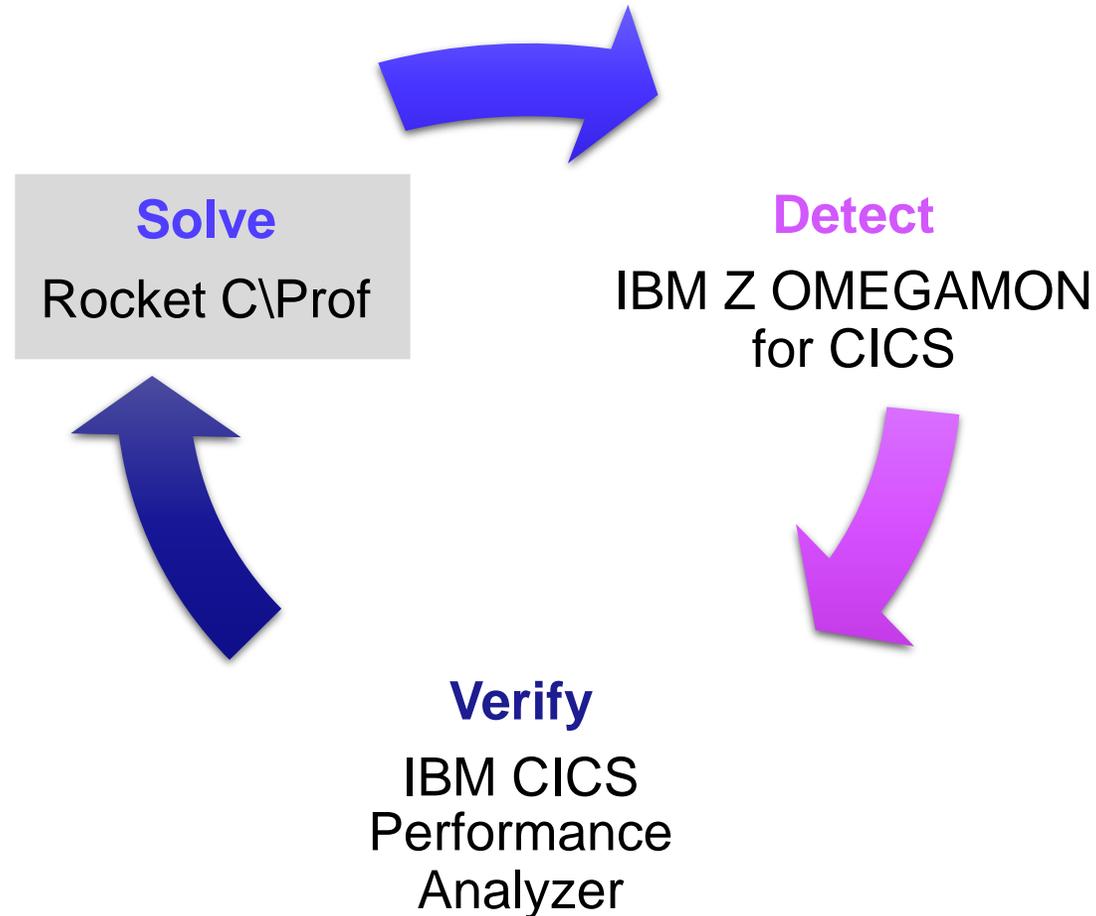
```

# Or this...

| Rocket C:\Prof - Transactions in region FUWFTR in group DEMO - Events in BPMT |        |          |              |          |               |          |       |       |          |  |
|---|--------|----------|--------------|----------|---------------|----------|-------|-------|----------|--|
| Tran: BPMT Start: 2023-05-11 13:43:29.397221 Response: 0.400859 Task: 819     |        |          |              |          |               |          |       |       |          |  |
| Relative Time   | APPLID | Program  | Elapsed Time | Call     | Resource      | EIBRESP  | TCB   | STMT# | OFFSET   | Command  |
| 0.000114  | FUWFTR |          | 0.03%        | 0.000114 | ATTACH TASK   |          |       |       |          | ATTACH/OK TRANSACTION_TOKEN(27452700 , 0000819C) TRANNUM(0000819C)   |
| 0.000280  | FUWFTR |          | 0.01%        | 0.000220 | GETMAIN       | OK       | QR    |       | SYSEIB   | GETMAIN SET(X'28E0E008') FLENGTH(8176) INITIMG(X'00') NOSUSPEND CICSDDATAKEY EXECUTABLE SYSEIB ASH   |
| 0.000501  | FUWFTR | MBKPSTDI | 0.05%        | 0.000220 | ATTACH TASK   |          |       |       |          | ATTACH/OK TRANSACTION_TOKEN(264CA700 , 0012871C) TRANNUM(0012871C)   |
| 0.000529  | FUWFTR | MBKPSTDI | 0.00%        | 0.000014 | GETMAIN       | OK       | QR    |       | SYSEIB   | GETMAIN SET(X'26A5C008') FLENGTH(8176) INITIMG(X'00') NOSUSPEND CICSDDATAKEY SYSEIB ASH  |
| 0.000600  | FUWFTR | MBKPSTDI | 0.00%        | 0.000002 | START PROGRAM | MBKPSTDI | QR    |       |          | START_PROGRAM PROGRAM(MBKPSTDI) CDFP_STATUS(CDFP) EXECUTION_SET(FULLAPI) ENVIRONMENT_TYPE(EXEC) SYNCONRETURN(NO) LANGUAGE_BLOCK(267FCF54) COWAREA(00000000 , 00000000) LINK_LEVEL(1) SYSEIB_REQ... |
| 0.000609  | FUWFTR | MBKPSTDI | 0.00%        | 0.000010 | LINK          | MBKPCOM1 | OK    | QR    | 00000481 | GETMAIN SET(X'2858C808') FLENGTH(4520) EXECUTABLE SYSEIB ASH STHT_#(00000481)  |
| 0.000628  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | LINK          | MBKPCOM1 | OK    | QR    | +0014E2  | LINK PROGRAM('MBKPCOM1') COWAREA('BPMT 1234567890 2234567890 0000000000000100(000000000000100(PA')) LENGTH(282) COBOLII STHT_#(00066)  |
| 0.000632  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | GETMAIN       |          | OK    | QR    | 00000481 | GETMAIN SET(X'28516608') FLENGTH(5424) EXECUTABLE SYSEIB ASH STHT_#(00000481)  |
| 0.000635  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | GETMAIN       |          | OK    | QR    | 00128    | GETMAIN SET(X'285178F8') FLENGTH(108) INITIMG(X'40') COBOLII STHT_#(00128)   |
| 0.000637  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | GETMAIN       |          | OK    | QR    | 00134    | GETMAIN SET(X'28517C78') FLENGTH(16) INITIMG(X'40') COBOLII STHT_#(00134)  |
| 0.000639  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | GETMAIN       |          | OK    | QR    | 00137    | GETMAIN SET(X'28517C08') FLENGTH(24) INITIMG(X'40') COBOLII STHT_#(00137)  |
| 0.000641  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | GETMAIN       |          | OK    | QR    | 00215    | GETMAIN SET(X'28517CC8') FLENGTH(8) INITIMG(X'40') COBOLII STHT_#(00215)   |
| 0.000645  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000003 | MONITOR       |          | OK    | QR    | +001C84  | MONITOR POINT(2) DATA1('.._BH') DATA2('...') ENTRYNAME('DFHAPPL') COBOLII STHT_#(00221)  |
| 0.000647  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | MONITOR       |          | OK    | QR    | 00227    | MONITOR POINT(1) DATA1('.._BH') DATA2('...') ENTRYNAME('DFHAPPL') COBOLII STHT_#(00227)  |
| 0.000653  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | FREEMAIN      |          | OK    | QR    | +001D38  | FREEMAIN DATAPOINTER(X'28517CC8') COBOLII STHT_#(00233)  |
| 0.000655  | FUWFTR | MBKPCOM1 | 0.21%        | 0.000852 | LINK          | MBKPSQ1  | OK    | QR    | 00191    | LINK PROGRAM('MBKPSQ1') COWAREA('00000000') LENGTH(7) COBOLII STHT_#(00191)  |
| 0.001204  | FUWFTR | DFHPIRS  | 0.04%        | 0.000148 | ATTACH TASK   |          |       |       |          | ATTACH/OK TRANSACTION_TOKEN(280E1700 , 0000379C) TRANNUM(0000379C)   |
| 0.001237  | FUWFTR | DFHPIRS  | 0.00%        | 0.000018 | GETMAIN       |          | OK    | QR    | SYSEIB   | GETMAIN SET(X'2A0E0008') FLENGTH(8176) INITIMG(X'00') NOSUSPEND CICSDDATAKEY EXECUTABLE SYSEIB ASH   |
| 0.001248  | FUWFTR | DFHPIRS  | 0.00%        | 0.000015 | START PROGRAM | DFHPIRS  | QR    |       |          | START_PROGRAM PROGRAM(DFHPIRS) CDFP_STATUS(CDFP) EXECUTION_SET(FULLAPI) ENVIRONMENT_TYPE(EXEC) SYNCONRETURN(NO) LANGUAGE_BLOCK(29187D40) COWAREA(00000000 , 00000000) LINK_LEVEL(1) SYSEIB_REQ...  |
| 0.001303  | FUWFTR | MBKPSQ1  | 0.00%        | 0.000015 | LINK          | MBKPSQ1  | OK    | QR    | +002080  | LINK PROGRAM('MBKPSQ1') COWAREA('00000000') LENGTH(7) ASH  |
| 0.001317  | FUWFTR | MBKPSQ1  | 0.00%        | 0.000002 | READQ TD      | MBK1     | OK    | QR    | 00054    | READQ TD QUEUE('MBK1') INTO('0000006') LENGTH(7) NOSUSPEND COBOLII STHT_#(00054)   |
| 0.001322  | FUWFTR | MBKPSQ1  | 0.00%        | 0.000002 | WRITEQ TD     | MBK1     | OK    | QR    | 00070    | WRITEQ TD QUEUE('MBK1') FROM('0000007') LENGTH(7) COBOLII STHT_#(00070)  |
| 0.001343  | FUWFTR | MBKPSQ1  | 0.00%        | 0.000002 | WRITEQ TS     | MINIBANK | OK    | QR    | 00082    | WRITEQ TS QUEUE('MINIBANK') FROM('0000007') LENGTH(7) AUXILIARY COBOLII STHT_#(00082)  |
| 0.001347  | FUWFTR | MBKPSQ1  | 0.00%        | 0.000002 | READQ TS      | MINIBANK | OK    | QR    | 00090    | READQ TS QUEUE('MINIBANK') INTO('0000007') LENGTH(7) ITH(1) COBOLII STHT_#(00090)  |
| 0.001350  | FUWFTR | MBKPSQ1  | 0.00%        | 0.000002 | DELETEQ TS    | MINIBANK | OK    | QR    | 00099    | DELETEQ TS QUEUE('MINIBANK') COBOLII STHT_#(00099)   |
| 0.001506  | FUWFTR | MBKPSQ1  | 0.00%        | 0.000018 | RETURN        |          | OK    | QR    | 00107    | LINK PROGRAM('MBKPSQ1') COWAREA('00000007') LENGTH(7) COBOLII STHT_#(00107)  |
| 0.001519  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000002 | LINK          | MBKPCOM1 | OK    | QR    | 00300    | LINK PROGRAM('MBKPCOM1') COWAREA('1234567890 0000000000000100(PAYMENT TEST ...)') LENGTH(241) COBOLII STHT_#(00300)  |
| 0.001525  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000001 | GETMAIN       |          | OK    | QR    | 00000481 | GETMAIN SET(X'28520098') FLENGTH(4304) EXECUTABLE SYSEIB ASH STHT_#(00000481)  |
| 0.001717  | FUWFTR | MBKPCOM1 | 0.05%        | 0.000190 | READ          | MBKACCT1 | OK    | QR    | 00078    | READ FILE('MBKACCT1') INTO('1234567890 0999999876210800(') LENGTH(207) RIDFLD('1234567890') KEYLENGTH(20) EQUAL UPDATE COBOLII STHT_#(00078)   |
| 0.002481  | FUWFTR | MBKPCOM1 | 0.19%        | 0.000761 | REWRITE       | MBKACCT1 | OK    | QR    | 00106    | REWRITE FILE('MBKACCT1') FROM('1234567890 0999999876210800(') LENGTH(207) COBOLII STHT_#(00106)  |
| 0.002496  | FUWFTR | MBKPCOM1 | 0.01%        | 0.000029 | RETURN        |          | OK    | QR    | 00135    | RETURN COBOLII STHT_#(00135)   |
| 0.002512  | FUWFTR | MBKPCOM1 | 0.00%        | 0.000002 | FREEMAIN      |          | OK    | QR    | 00000484 | LINK PROGRAM('MBKPCOM1') COWAREA('1234567890 0000000000000100(PAYMENT TEST ...)') LENGTH(241) COBOLII STHT_#(00300)  |
| 0.002541  | FUWFTR | DFHDYP   | 0.01%        | 0.000024 | LINK          | DFHDYP   | OK    | QR    | +0023D6  | LINK PROGRAM('MBKPPHT1') COWAREA('1234567890 0000000000000100(PAYMENT TEST ...)') LENGTH(241) SYSD('TCIC') COBOLII STHT_#(00312)   |
| 0.002659  | FUWFTR | DFHDYP   | 0.26%        | 0.001026 | RETURN        |          | OK    | QR    | +00022E  | RETURN ASH   |
| 0.002789  | FUWFTR | FUWTCIC  | 0.03%        | 0.000130 | ATTACH TASK   |          |       |       |          | ATTACH/OK TRANSACTION_TOKEN(28F59A00 , 0012906C) TRANNUM(0012906C)   |
| 0.002840  | FUWFTR | FUWTCIC  | 0.01%        | 0.000026 | GETMAIN       |          | OK    | QR    | SYSEIB   | GETMAIN SET(X'28FAE008') FLENGTH(8176) INITIMG(X'00') NOSUSPEND CICSDDATAKEY SYSEIB ASH  |
| 0.002946  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000018 | LINK          | MBKPPHT1 | OK    | QR    |          | LINK PROGRAM('MBKPPHT1') COWAREA('1234567890 0000000000000100(PAYMENT TEST ...)') LENGTH(241) ASH  |
| 0.002971  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000002 | GETMAIN       |          | OK    | QR    | 00000481 | GETMAIN SET(X'2A0E248') FLENGTH(80088) EXECUTABLE SYSEIB ASH STHT_#(00000481)  |
| 0.002975  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000002 | ADDRESS       |          | OK    | QR    | 00000247 | ADDRESS SYSEIB ASH STHT_#(00000247)  |
| 0.003020  | FUWFTR | CSQCOPEH | 0.00%        | 0.000012 | LOAD          | CSQCOPEH | OK    | QR    | 00000285 | LOAD PROGRAM('CSQCOPEH') SET(X'24EFC00') FLENGTH(3600) ENTRY(X'4AEFD108') SYSEIB ASH STHT_#(00000285)  |
| 0.003246  | FUWFTR | MBKPPHT1 | 0.05%        | 0.000204 | HQOPEN        |          | L8+QR |       | +00029C  | APPLICATION-REQUEST HQOPEN - HQCC(00000000) HQRC(00000000)   |
| 0.003252  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000004 | ADDRESS       |          | OK    | QR    | 00000247 | ADDRESS SYSEIB ASH STHT_#(00000247)  |
| 0.003272  | FUWFTR | CSQCPUT  | 0.00%        | 0.000009 | LOAD          | CSQCPUT  | OK    | QR    | 00000285 | LOAD PROGRAM('CSQCPUT') SET(X'29EFC00') FLENGTH(3600) ENTRY(X'4AEFC42C') SYSEIB ASH STHT_#(00000285)   |
| 0.003372  | FUWFTR | MBKPPHT1 | 0.02%        | 0.000094 | HQPUT         |          | L8+QR |       | +000460  | APPLICATION-REQUEST HQPUT - HQCC(00000000) HQRC(00000000)  |
| 0.003374  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000002 | ADDRESS       |          | OK    | QR    | 00000247 | ADDRESS SYSEIB ASH STHT_#(00000247)  |
| 0.003394  | FUWFTR | CSQCOPEH | 0.00%        | 0.000002 | LOAD          | CSQCOPEH | OK    | QR    | 00000285 | LOAD PROGRAM('CSQCOPEH') SET(X'24EFC00') FLENGTH(3600) ENTRY(X'4AEFF0A0') SYSEIB ASH STHT_#(00000285)  |
| 0.003440  | FUWFTR | MBKPPHT1 | 0.01%        | 0.000038 | HQGET         |          | L8+QR |       | +0003D4  | APPLICATION-REQUEST HQGET - HQCC(00000002) HQRC(000007F5)  |
| 0.003453  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000004 | GETMAIN       |          | OK    | QR    | 00000481 | GETMAIN SET(X'2A0E2138') FLENGTH(4080) EXECUTABLE SYSEIB ASH STHT_#(00000481)  |
| 0.003478  | FUWFTR | MBKPPHT1 | 0.01%        | 0.000023 | WRITEQ TD     | CESE     | OK    | QR    | 00000412 | WRITEQ TD QUEUE('CESE') FROM(' IRI BPMT 20230511134329 HQGET failed * CC : 00000000 * RC : 000002037 *') LENGTH(185) SYSEIB ASH STHT_#(00000412)   |
| 0.003480  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000004 | ADDRESS       |          | OK    | QR    | 00000247 | ADDRESS SYSEIB ASH STHT_#(00000247)  |
| 0.003489  | FUWFTR | CSQCLOS  | 0.00%        | 0.000001 | LOAD          | CSQCLOS  | OK    | QR    | 00000285 | LOAD PROGRAM('CSQCLOS') SET(X'24EFC00') FLENGTH(3600) ENTRY(X'4AEFF114') SYSEIB ASH STHT_#(00000285)   |
| 0.003504  | FUWFTR | MBKPPHT1 | 0.00%        | 0.000041 | HQCLOSE       |          | L8+QR |       | +000348  | APPLICATION-REQUEST HQCLOSE - HQCC(00000000) HQRC(00000000)  |
|   |        |          | 0.01%        | 0.000041 | RETURN        |          | OK    | QR    | +0001E0  | RETURN COBOLII STHT_#(00199)   |

# CICS Performance Management Tools

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# Summary

# Questions?