



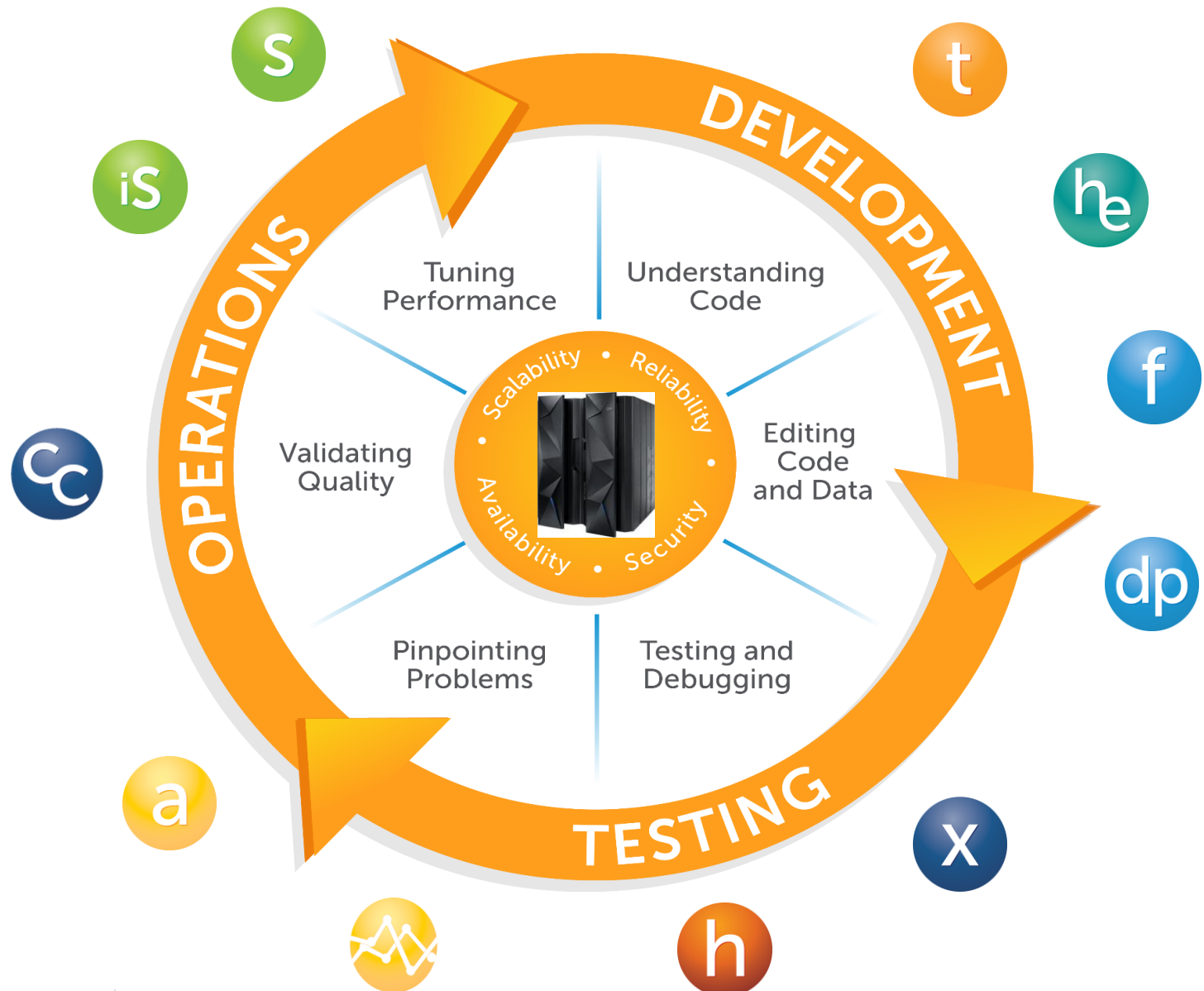
# A day in the life of an IMS application

A „holistic“ View on Application Development Tools

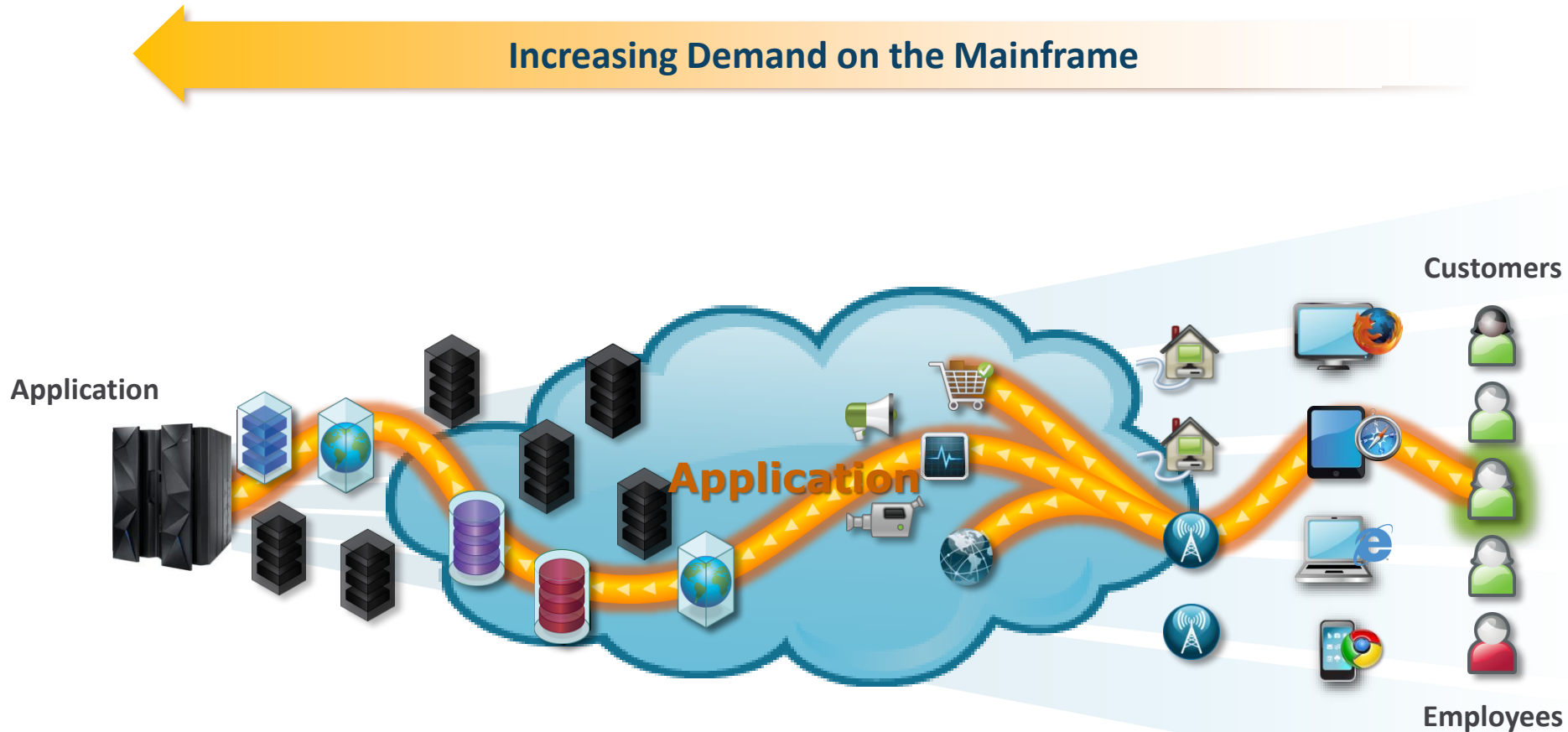
Ralph Nüsse  
EMEA Technical Specialist



# Tools around the SDLC



# New Normal of Mainframe



# IT Challenges

## Complexity Explosion



## Business Demands Increasing

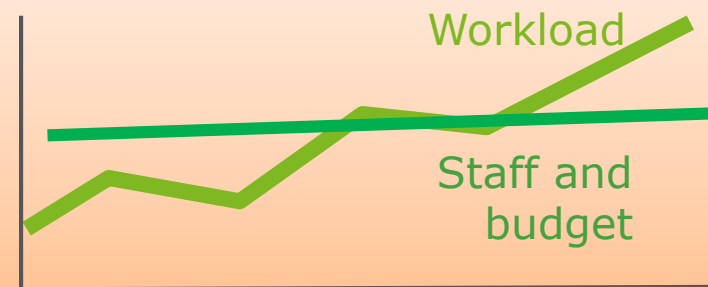
More **features!**  
**Faster** delivery!  
Better **performance!**



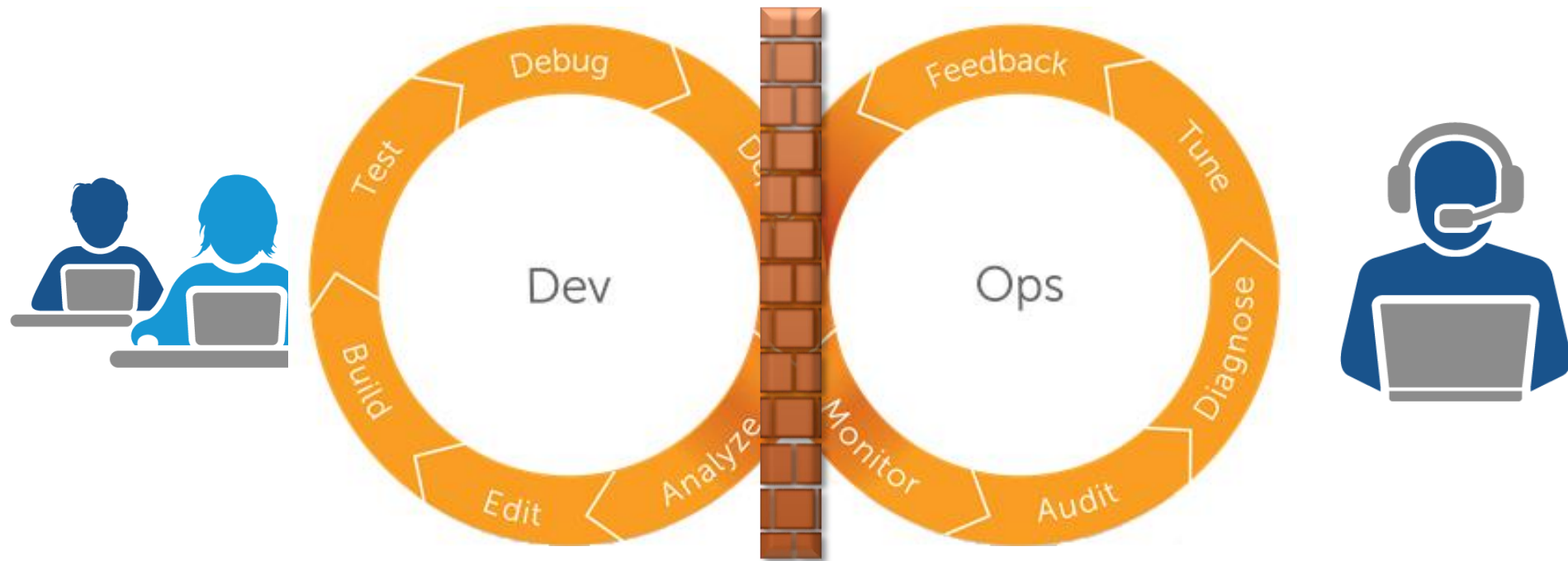
## Rising User Expectations



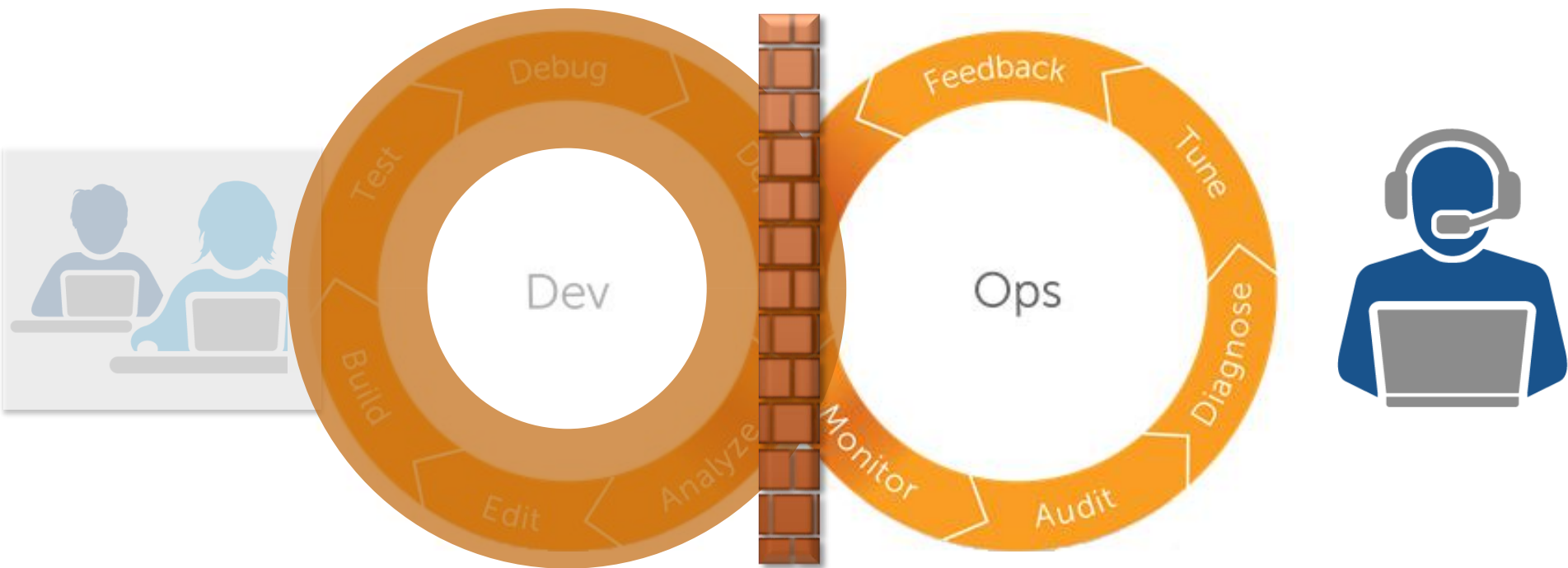
## Do More With Less



# Different Departments – Different Interests



# On the Operations Side



# Monitoring Alarm, e.g. Loop Detection

```
12JUN2015 18:29:47 ----- MAINVIEW WINDOW INTERFACE (V6.1.00) -----
COMMAND ==>                                     SCROLL ==> PAGE
CURR WIN ==> 1      ALT WIN ==>
+W1 =LPCKCAND=====ESAJXTSJ=*=====12JUN2015==18:29:47====MVMVS====D==651
C Jobname  Elapsed  Job Tot  Period 1 Period 1 Period 1  Period 2 Period 2 Peri
- - - - - Job Time CPU Time EXCPs    %Use+Dly EXCPs Del EXCPs    %Use+Dly EXCP
ACCT7380 00:02:16 00:01:56                100.0                100.0
RMFGAT 329:17:2 04:42:43                6.7                6.7
ASTMON8H 26:32:05 01:35:56            13        6.7            13        6.7
M71FCHIN 244:54:1 01:51:13                6.7                6.7
M71FMSTR 244:54:2 02:49:40                6.7                6.7
JKS      10:35:31 00:02:22                6.7
```

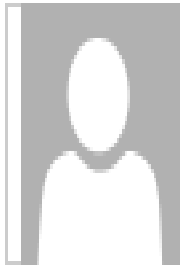
# Automated triggering of Measurement

```
AY STRBADD STC76345 DSID      2 LINE 0      COLUMNS 02- 161
> _                                     SCROLL ==> PAGE
***** TOP OF DATA *****
JES2 JOB LOG -- SYSTEM ESAJ -- NODE ESAJ

WEDNESDAY, 17 JUN 2015
IEF695I START STRBADD WITH JOBNAME STRBADD IS ASSIGNED TO USER MAINT , GROUP SYS1
$HASP373 STRBADD STARTED
IEF403I STRBADD - STARTED - TIME=11.35.16
+STR6300I Input = ADD ACCT7380,STEP=*,GOMIN=00001,LIMIT=(1,QUIT),RJCLFILE=( _YES_ )
+STR6261I 0137 ACCT7380 ACTIVE/INITIALIZING ESAJ STEP=*/LPCKTST2 CREATED=(11:35:17 06/17/2015) GOMIN=1 LIMIT=(1,
QUIT)
+STR6261I EXPIRATION=(06/24/2015) INITBY=UR
+STR6142I STROBE.USERID.ACCT7380.S024D001.SAMPLE DEV285 0/0 OPEN
+STR6200I Strobe measurement session initialized for job ACCT7380 at 11:35:17 06/17/2015
+STR6801I Strobe sample data set allocated volser=DEV285
+STR6800I DSN=STROBE.USERID.ACCT7380.S024D001.SAMPLE
+STR5301I Strobe running
+STR6130I ADD operation completed
+STRGM1005 RC=0000 RSN=0000 FDBK=0000
IEF404I STRBADD - ENDED - TIME=11.35.25
$HASP395 STRBADD ENDED
```



# Automated Email Alert



Wed 6/17/2015 9:28 AM

iStrobe@esaj.bmc.com

Compuware iStrobe Profile Download Notification

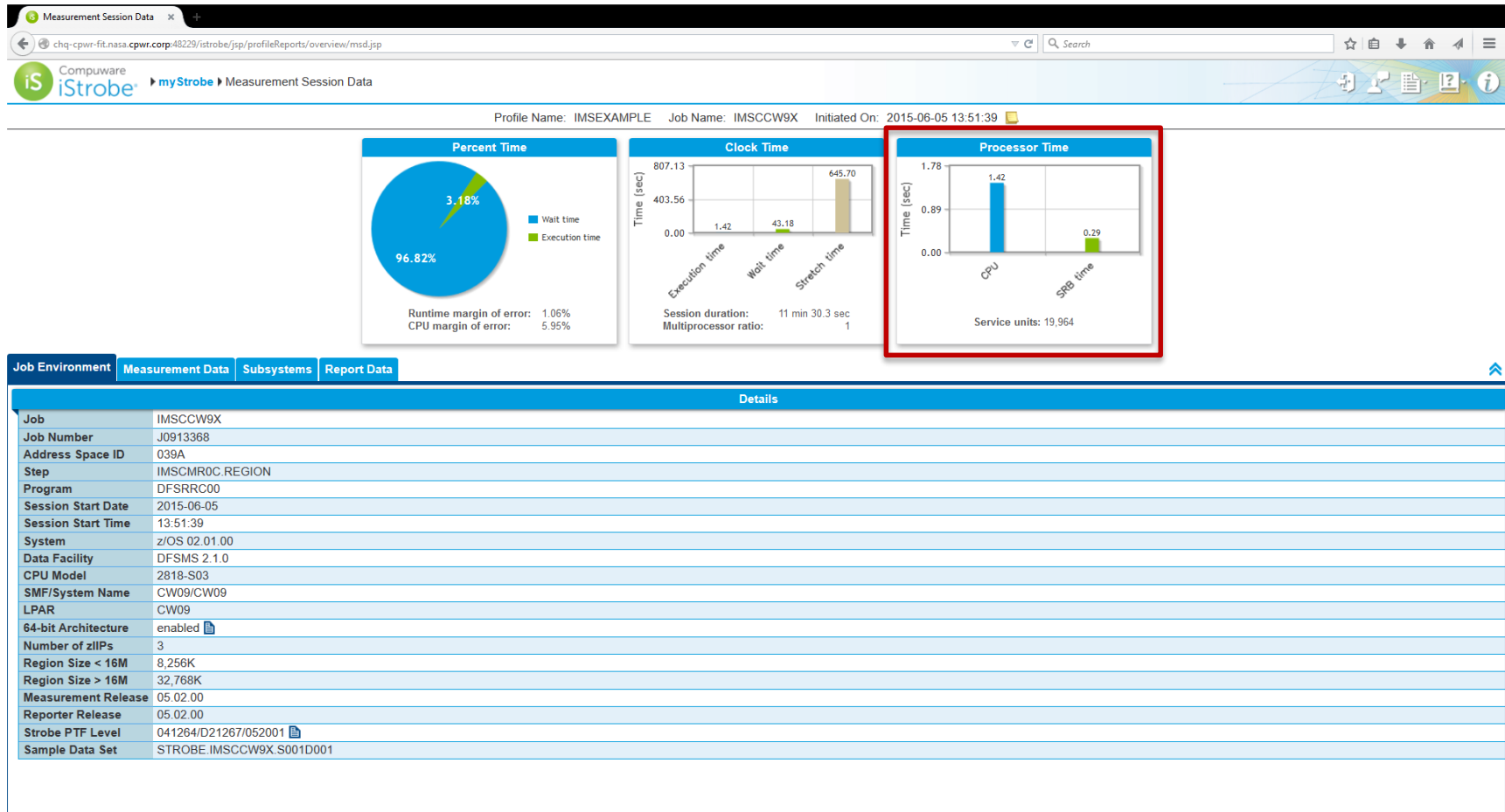
To  Davies, Dave

Retention Policy 6 Month Inbox Delete (6 months) Expires 12/20/2015

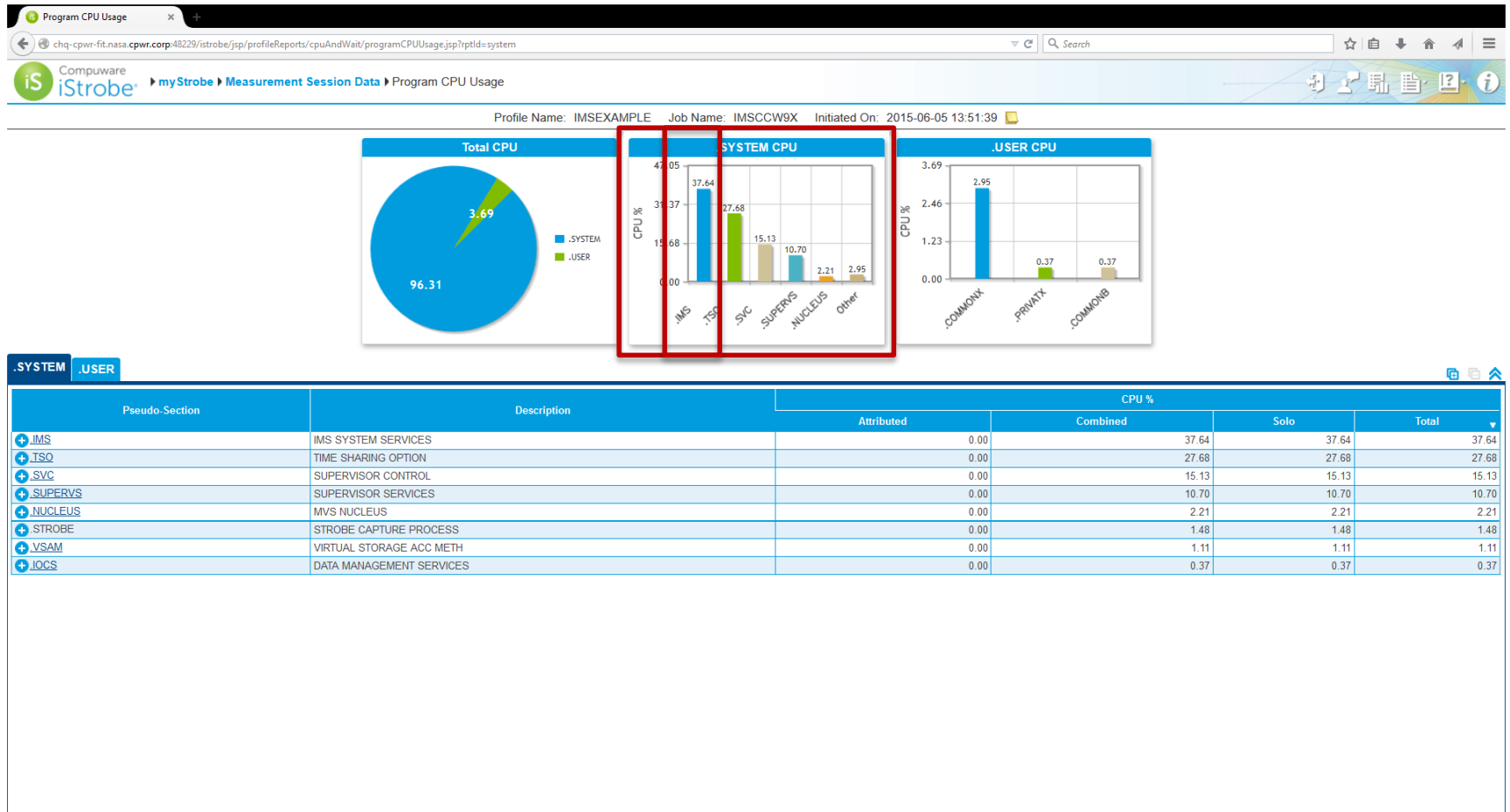
 You forwarded this message on 6/17/2015 9:29 AM.

Click [here](#) to view the **iStrobe MSD Report** for the profile **STRBPROF**.

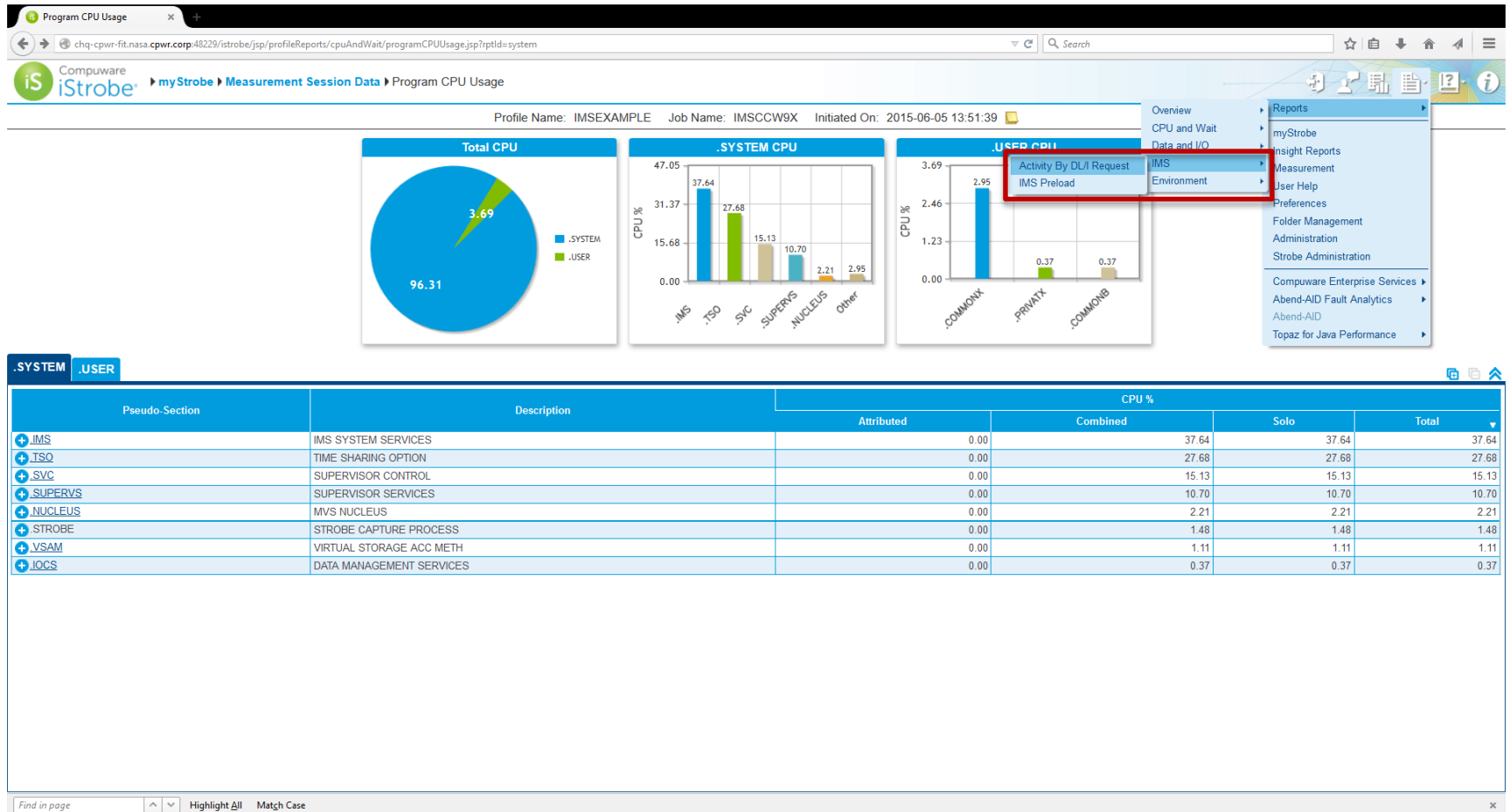
# Performance Analysis – Overview



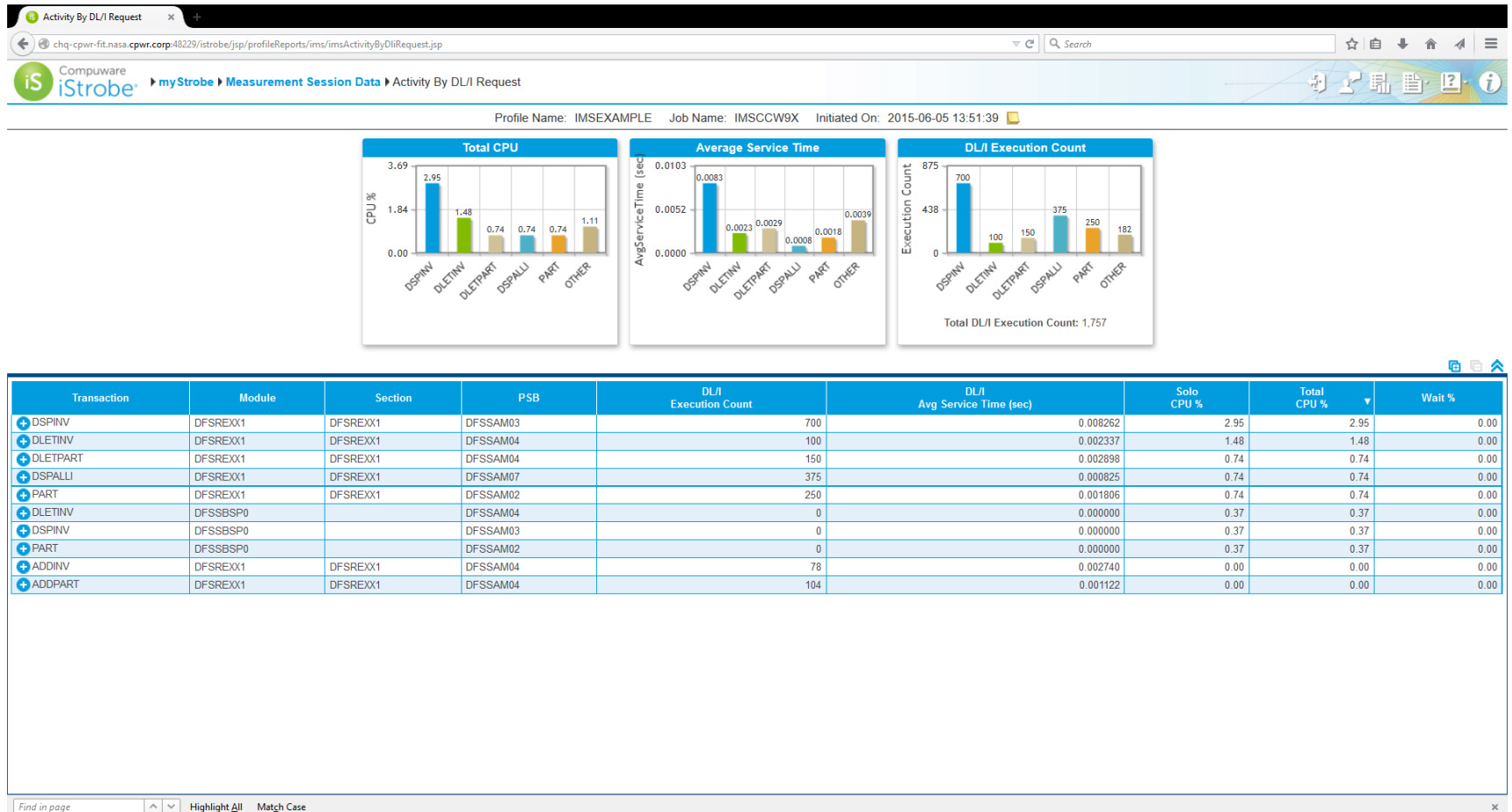
# Drill into CPU consumption



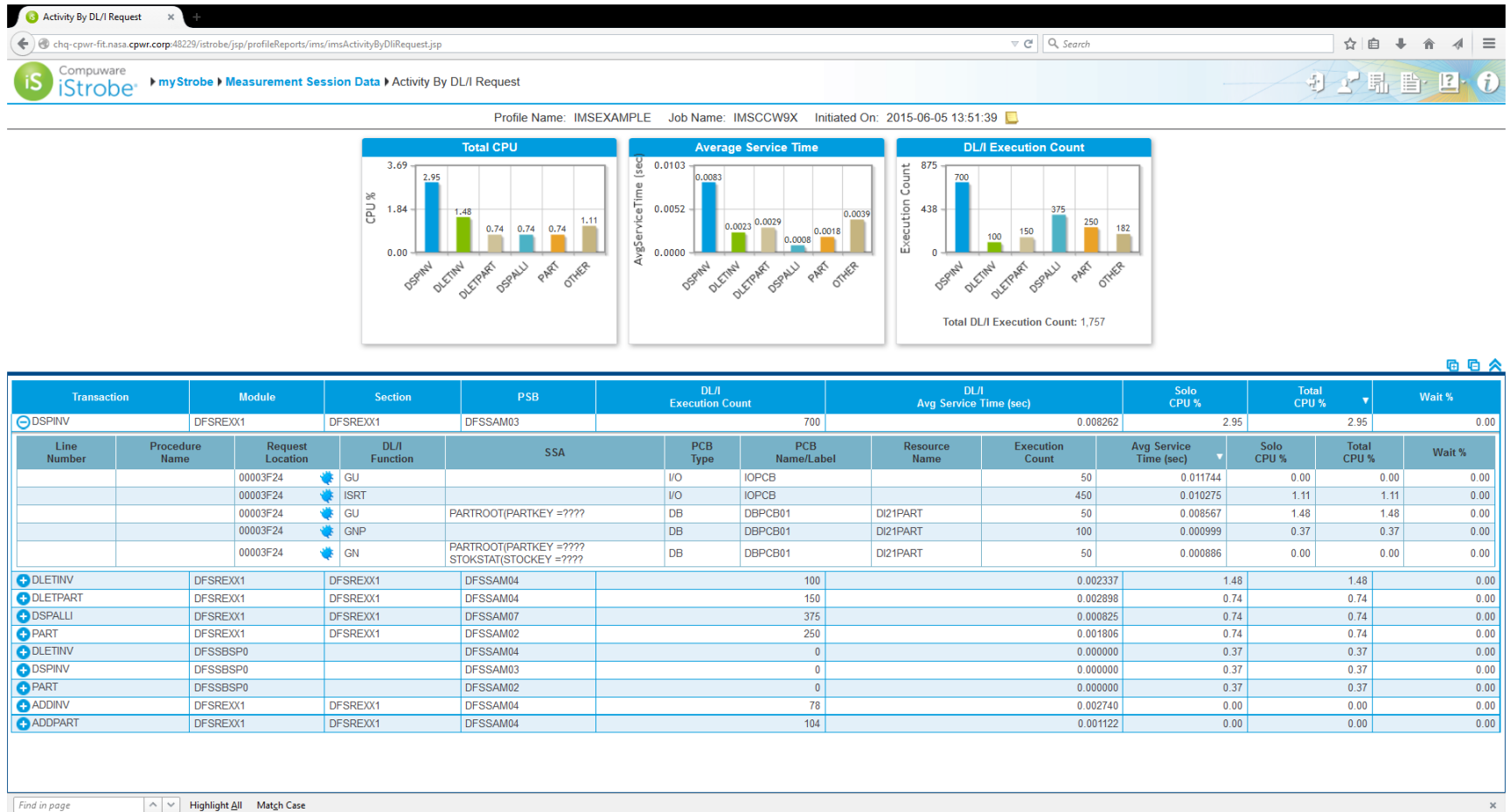
# Goto IMS specific analysis



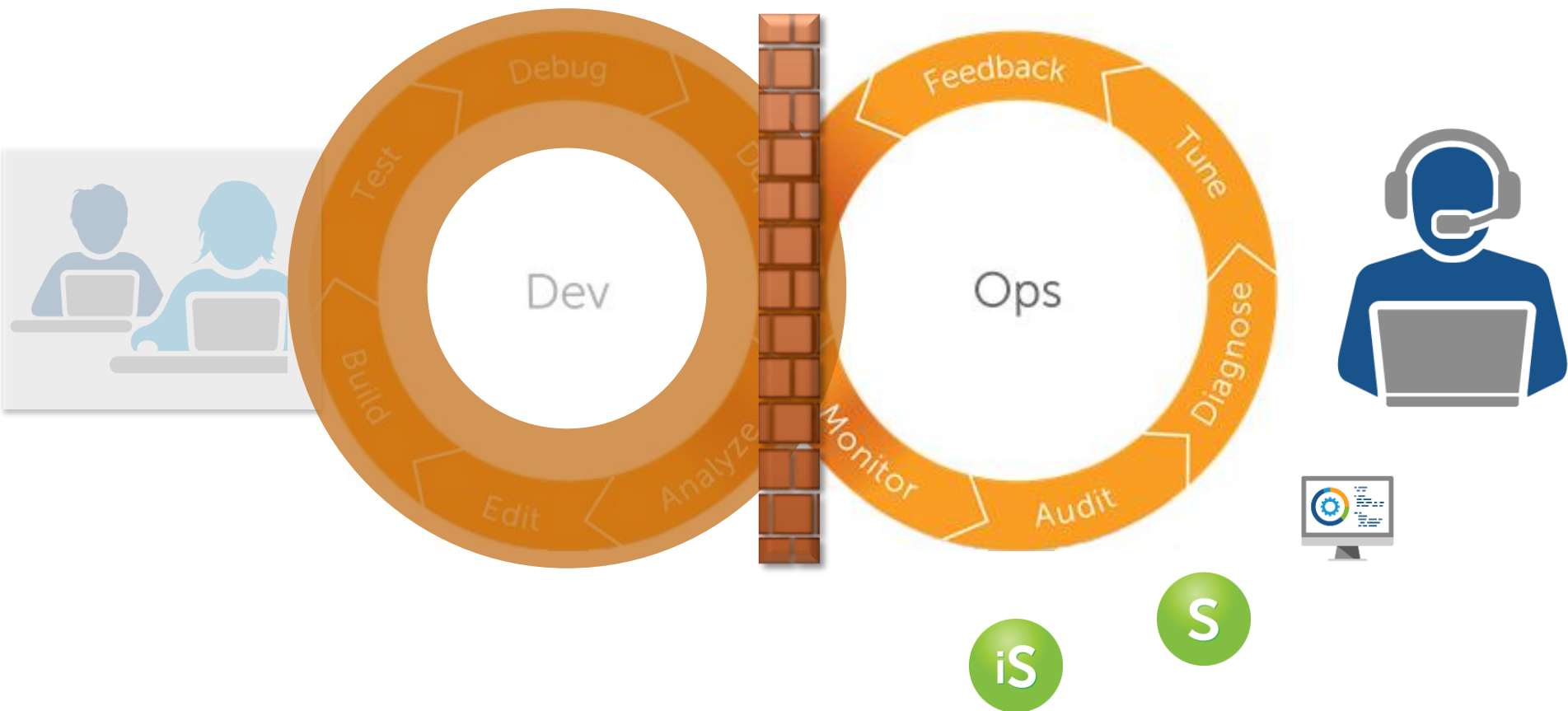
# IMS Tx causing CPU consumption



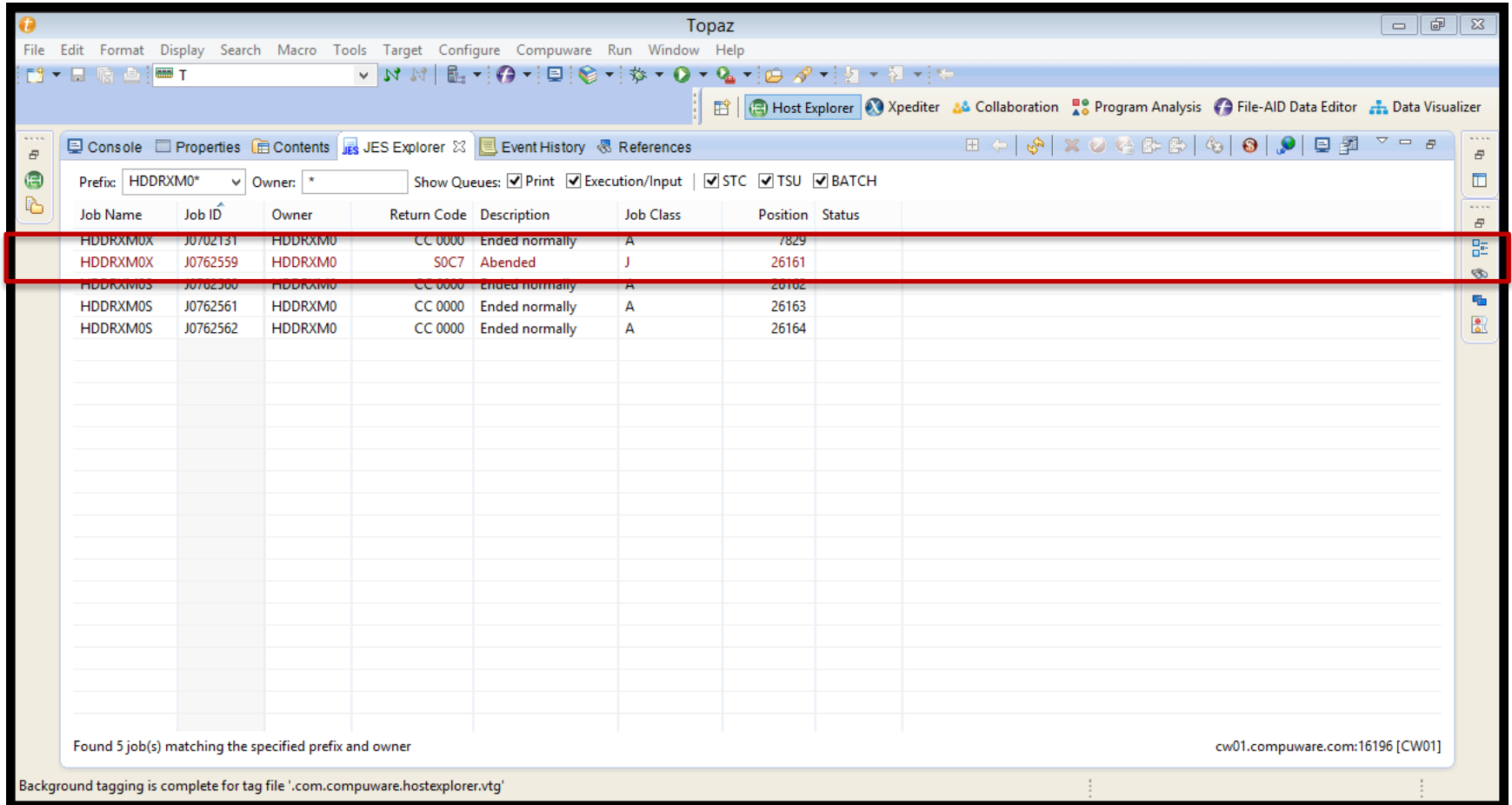
# Drill down into Transactions



# Ops – Performance Monitoring



# Joblist



The screenshot shows the Topaz Joblist interface. The main window displays a table of jobs. A red box highlights the first two rows of the table. The table has the following columns: Job Name, Job ID, Owner, Return Code, Description, Job Class, Position, and Status. The first two rows are:

Job Name	Job ID	Owner	Return Code	Description	Job Class	Position	Status
HDDRXM0X	J0702131	HDDRXM0	CC 0000	Ended normally	A	7829	
HDDRXM0X	J0762559	HDDRXM0	S0C7	Abended	J	26161	

Below the table, a status bar indicates: "Found 5 job(s) matching the specified prefix and owner". The bottom of the window shows a message: "Background tagging is complete for tag file '.com.compuware.hostexplorer.vtg'".



# Joblog links to Analysis of Fault

The screenshot shows the Topaz software interface. On the left, a table lists jobs matching the prefix 'HDDRXM0\*'. The job 'HDDRXM0X\_J0762559' is highlighted with a red background and a red 'A' in the status column.

Job Name	Job ID	Owner	Return Code	D
HDDRXM0X	J0702131	HDDRXM0	CC 0000	Er
HDDRXM0X	J0762559	HDDRXM0	S0C7	AI
HDDRXM0S	J0762560	HDDRXM0	CC 0000	Er
HDDRXM0S	J0762561	HDDRXM0	CC 0000	Er
HDDRXM0S	J0762562	HDDRXM0	CC 0000	Er

Found 5 job(s) matching the specified prefix 1.compuware.com:16196

The main window displays the job log for 'HDDRXM0X\_J0762559.jes'. The log contains the following text:

```
08.10.32 J0762559 ---- THURSDAY, 25 FEB 2016 ----
08.10.32 J0762559 IRR010I USERID HDDRXM0 IS ASSIGNED TO THIS JOB.
08.10.35 J0762559 ICH70001I HDDRXM0 LAST ACCESS AT 08:09:50 ON THURSDAY, FEBRUARY 25, 2016
08.10.35 J0762559 $HASP373 HDDRXM0X STARTED - WLM INIT - SRVCLASS CLASSJ - SYS CW01
08.10.36 J0762559 +DFS671I HDDRXM0X.RUNPROG. - FOR THIS EXECUTION, DBRC IS SET TO NO IB01
08.10.36 J0762559 +DFS0435I NUMBER OF BUFFERS INVALID ON CARD 001 IB01
08.10.36 J0762559 +DFS0447I NUMBER OF BUFFERS FOR VSAM SUBPOOL SIZE 32768 CHANGED TO 004, POOL ID XXXX. :
08.10.36 J0762559 +DFS0435I NUMBER OF BUFFERS INVALID ON CARD 002 IB01
08.10.36 J0762559 +DFS0447I NUMBER OF BUFFERS FOR VSAM SUBPOOL SIZE 12288 CHANGED TO 004, POOL ID XXXX. :
08.10.36 J0762559 +DFS035I BATCH INITIALIZATION COMPLETE IB01
08.10.37 J0762559 +AB400A ===== ABEND-AID ===== 865
865 REPORT WRITTEN TO:
865 SYS2.CPWR.AA.REPORT.SHRDIR
865 REPORT NUMBER: 6385155
865 JOB-HDDRXM0X STEP-RUNPROG
865 LE COND CODE=CEE3207S / EXPECTED COMP CODE=S0C7
865 Enter one of the following commands when in job output
865 with AB400A message to be taken directly to report:
865 AAH - for AbendAID Viewing Server AA01VS01 (CW01)
865 AAS - for AbendAID viewing Server AA01VS01 (CW01)
08.10.37 J0762559 +AB400B http://CW01.NASA.CPWR.CORP:06952/AAVIEW?RPT=6385155
08.10.37 J0762559 +DFS629I THIS BATCH REGION ABEND- SYS 00C7 TR01
08.10.37 J0762559 +DFS629I PSW AT ERROR = 078D1000 800CC41E IB01
08.10.37 J0762559 +DFS036I BATCH BACKOUT NOT REQUIRED FOR HDDRXM0X IB01
08.10.37 J0762559 DFS627I IMS RTM CLEANUP ( EOT ) COMPLETE FOR JS HDDRXM0X.RUNPROG . ,RC=00
08.10.37 J0762559 IEF450I HDDRXM0X RUNPROG - ABEND=S0C7 U0000 REASON=00000007
08.10.37 J0762559 - --TIMINGS (MINS.)--
08.10.37 J0762559 -JOBNAME STEPNAME PROCSTEP RC EXCP CPU SRB CLOCK SERV PG PAGE SWAP
08.10.37 J0762559 -HDDRXM0X RUNPROG *S0C7 1471 .00 .00 .03 4771 0 0 0
08.10.37 J0762559 -HDDRXM0X ENDED. NAME=NUESSE TOTAL CPU TIME= .00 TOTAL ELAPSED TIME=
```

The job log is displayed in a window titled 'Browsing: HDDRXM0X\_J0762559.jes from .com.compuware.hostexplorer/cw01.compuware.com\_16196'. The log shows the job's execution details, including the ABEND message (AB400A) and the link to the analysis report (http://CW01.NASA.CPWR.CORP:06952/AAVIEW?RPT=6385155).

# Fault Diagnostic

Compuware's Abend-AID

Home Report Menu Diagnostic Summary

Report Number: 06385155 Job Name: HDDRXM0X Abend Code: S0C7

### Diagnostic Summary

A data exception occurred during execution of program [TRITST](#). The expected completion code is S0C7.

#### Analysis of Error

Root cause [analysis](#) is available for this abend.

[Impact Analysis](#) is available for this abend.

The data exception occurred in the following statement:

**000018** ADD A B GIVING A-N-B.

This statement is contained in paragraph VALIDATE-TRIANGLE in program TRITST .

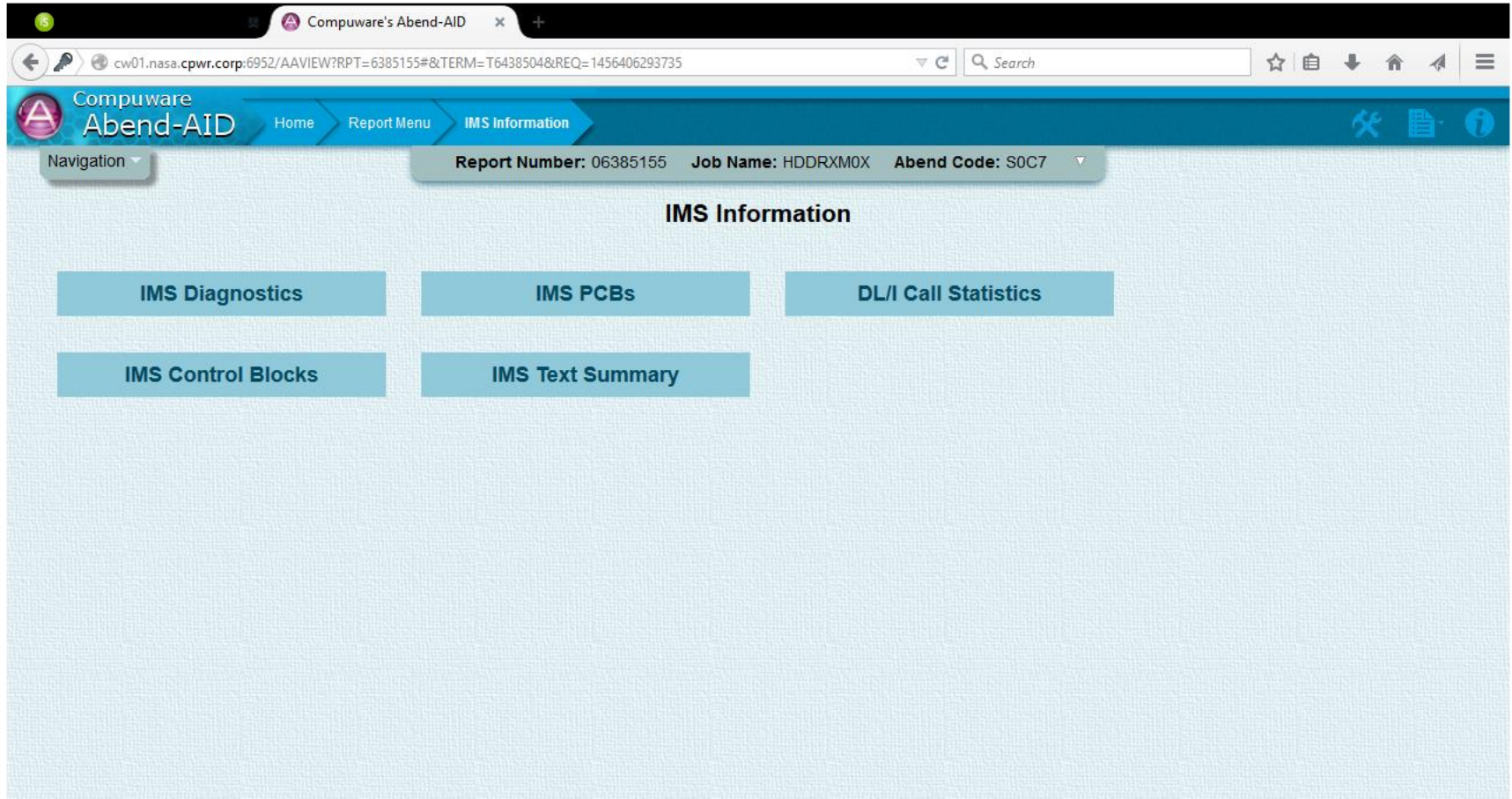
Current values of fields on this statement:

Level/Field Name	Picture/Type	Value
02 A	9	5
02 B	# 9	X'7B'
01 A-N-B	999	000

# - Indicates field contains invalid data that does not match the field description in the program. Note that even valid data could cause an error (for example, a zero divide).

The field causing the exception is located in a temporary work field in the DSA. The actual field in error is in the linkage section of program TRITST.

# If IMS is involved



# Fault Analysis – IMS Status Code

The screenshot displays the Compuware Abend-AID web application. The browser's address bar shows the URL: `cw01.nasa.cpwr.corp:6952/AAVIEW?RPT=6385155#&TERM=T6438504&REQ=1456406898787`. The application header includes the Compuware Abend-AID logo and a navigation menu with tabs: Home, Filter, Analysis, Results, and Last Call Status and Description. The 'Last Call Status and Description' tab is active. Below the header, a status bar displays: **Report Number:** 00167075 **Job Name:** EXMPP73 **Abend Code:** S0C7. The main content area is titled 'Last Call Status and Description' and contains a message box with the text: `AD-Invalid function code.`



# List of PCBs (DB or I/O)

Compuware's Abend-AID

Navigation

Report Number: 00167075 Job Name: EXMPP73 Abend Code: S0C7

### Database PCB Summary

PCB Address	Cur PCB	Database Name	Segment Level	Status Code	Process Options	Segment Name	Key Length	Number of Segments	PCB Name	PCB Relative Number	Key Feedback
*****	***	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
<a href="#">00017158</a>	#	CLTDBD01	01		GOTP	DOSRAC	14	3	N/A	3	From last call <a href="#">0001717C</a>
<a href="#">000171EC</a>		DBD0790	00		GOTP	SHISAM	0	1	N/A	4	

Compuware's Abend-AID

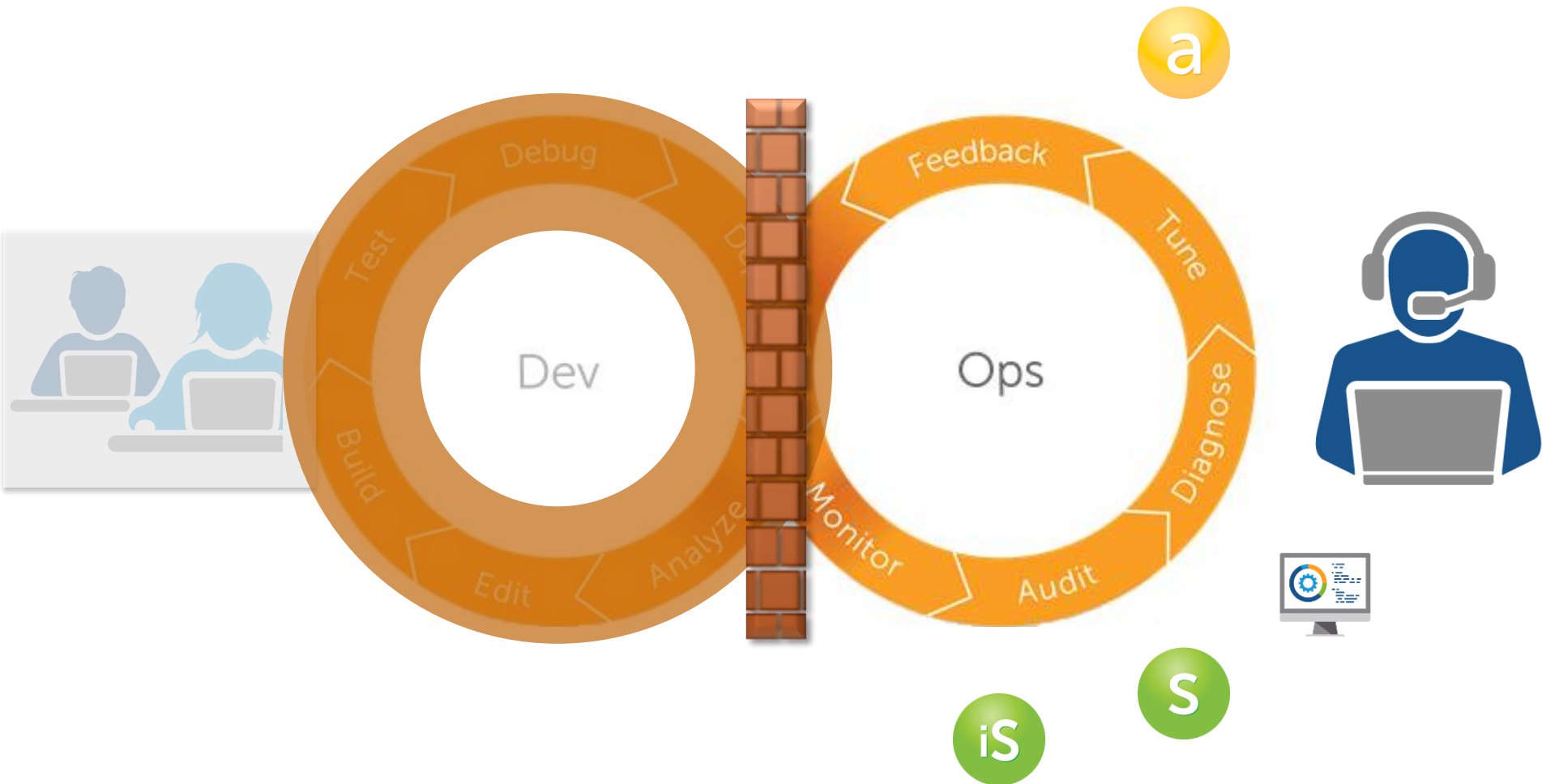
Navigation

Report Number: 00167075 Job Name: EXMPP73 Abend Code: S0C7

### I/O PCB Summary

PCB Address	Cur PCB	Logical Terminal	Status Code	IMS User ID	Last Message Date	Last Message Time	Message Count	Format Module
*****	***	*****	*****	*****	*****	*****	*****	*****
<a href="#">00017068</a>		SIUP0A77		SIUP0A77	2010/337	17:44:05.608621 (Local)	36,042	
<a href="#">000170E0</a>			AD					

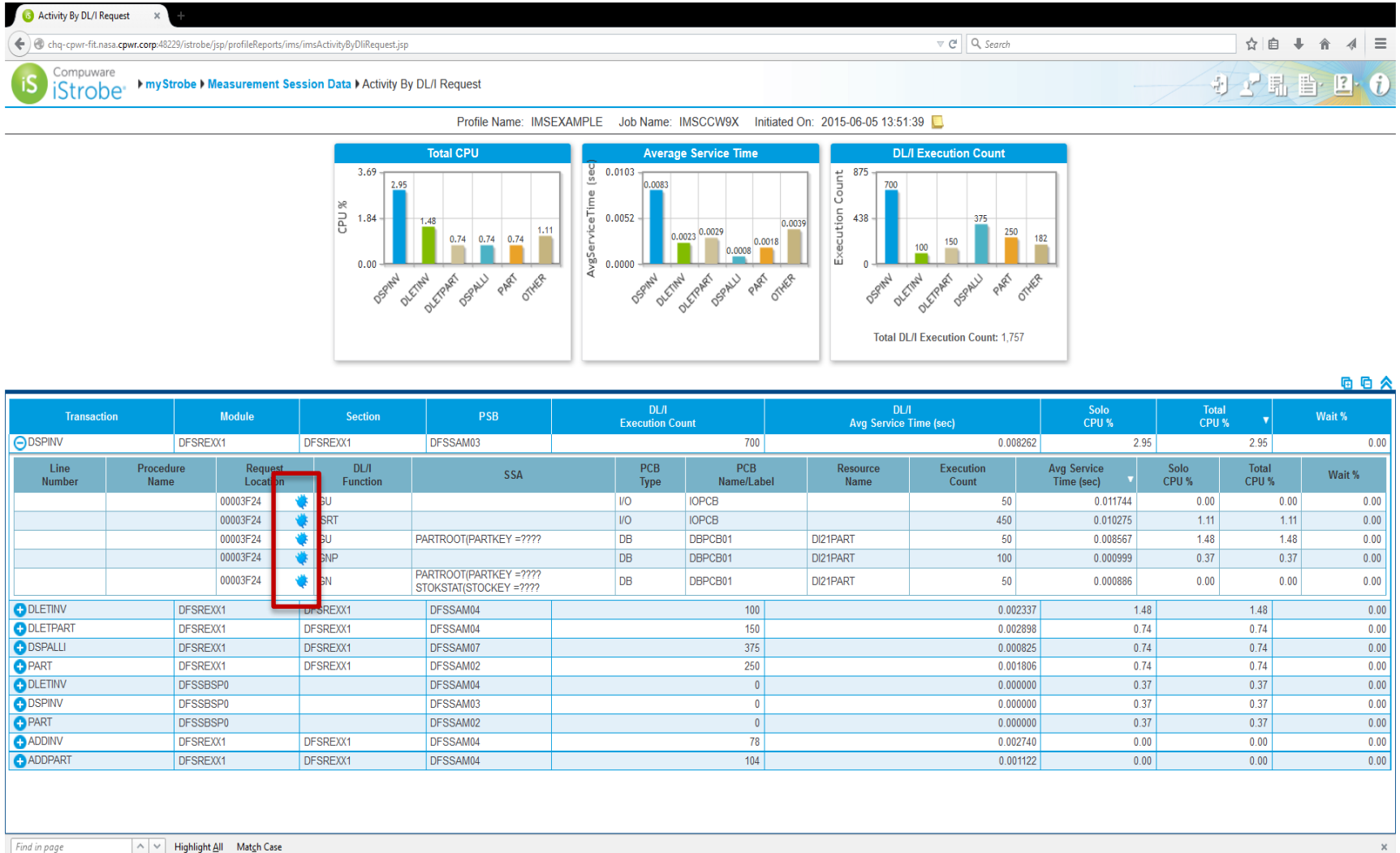
# Ops – Fault Detection



Find & Fix

# TEAR DOWN THE WALL

# Create a Ticket





# E.g. in JIRA

Activity By DL/I Request

chq-cpwr-fit.nasa.cpwrcorp:48229/istrobe/jsp/profileReports/ims/imsActivityByDliRequest.jsp

Profile Name: IMSEXAMPLE Job Name: IMSCCW9X Initiated On: 2015-06-05 13:51:39

### Submit Fix Request

Issue tracking  
JIRA RNU

Summary  
Performance Issue with Access to IMS DB PART

Description  
Found Tx DSPINV GU Call PART. Please Investigate

Tags  
Add a new tag

IMS × DSPINV × PART ×

Details

OK Cancel

**Total CPU**

Category	CPU %
DSPINV	2.95
DLETINV	1.48
DLETPART	0.74
DSPALLI	0.74

**DL/I Execution Count**

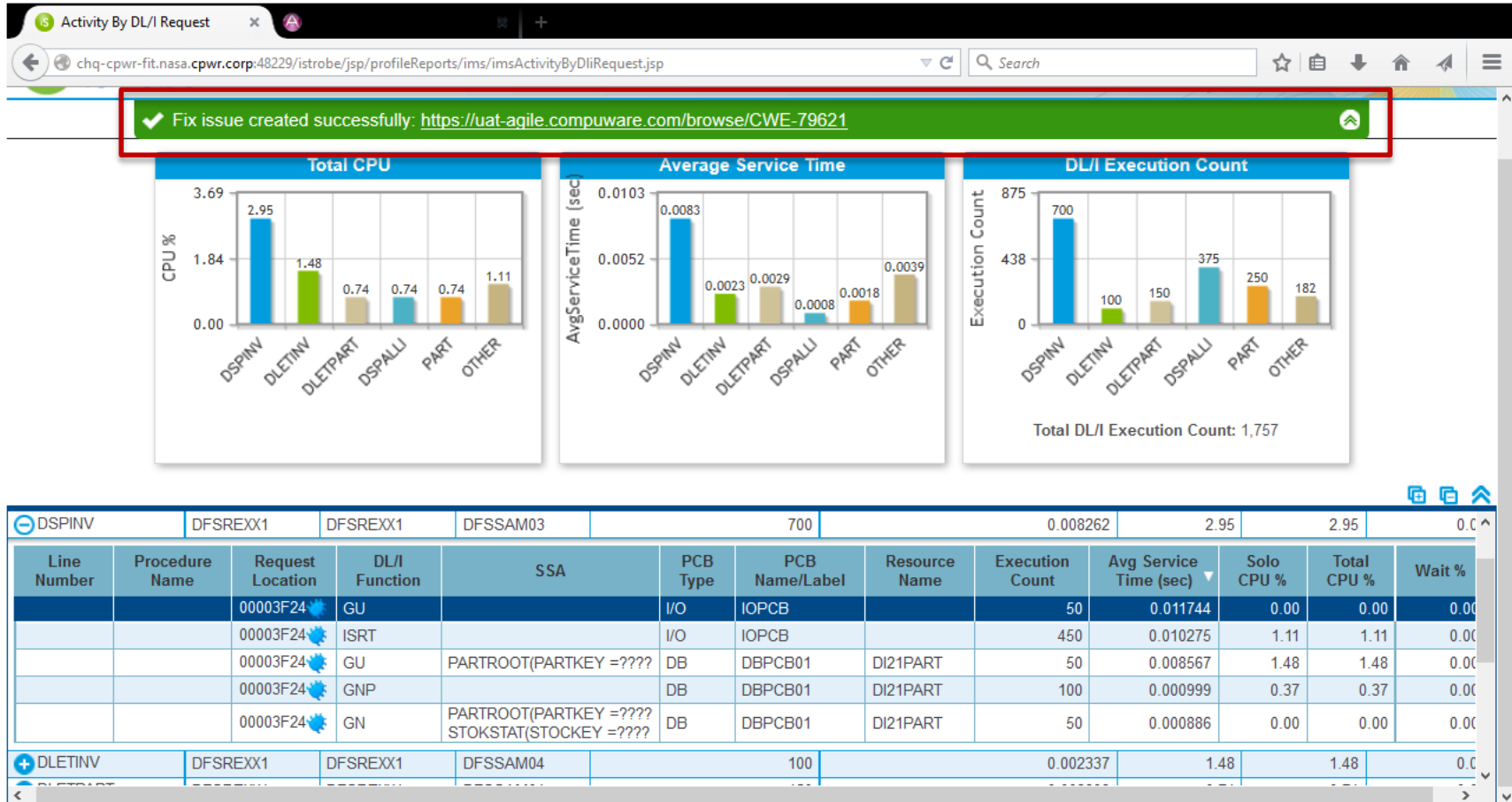
Category	Count
DLETINV	100
DLETPART	150
DSPALLI	375
PART	250
OTHER	182

DL/I Execution Count: 1,757

Line Number	Procedure Name	Request Location	DL/I Function
DSPINV	DFSREXX1	DFSREXX1	
		00003F24	GU
		00003F24	ISRT
		00003F24	GU
		00003F24	GNP
		00003F24	GN
DLETINV	DFSREXX1	DFSREXX1	
		00003F24	GU

	Avg Service Time (sec)	Solo CPU %	Total CPU %	Wait %
0	0.011744	0.00	0.00	0.00
0	0.010275	1.11	1.11	0.00
0	0.008567	1.48	1.48	0.00
0	0.000999	0.37	0.37	0.00
0	0.000886	0.00	0.00	0.00
2337		1.48	1.48	0.00

# Create Ticket – Issue Number



Find & Fix

# ON THE RECEIVING SIDE

# Ticket Attachment – Fix Request

The screenshot shows a Jira ticket interface for 'Access to IMS Database' (CWE-79617). The ticket is a Bug with a priority of 3 - Minor, status of OPEN, and resolution of Unresolved. The description is 'High average CPU consumption in access to PART DB'. The attachment section, highlighted with a red box, shows a file named 'Access to IMS Database fix' (0.9 kB, 2 minutes ago). The activity section shows no comments yet.

Compuware Engineering / CWE-79617  
**Access to IMS Database**

Comment Agile Board More Start Progress Send to Validation Workflow Export

**Details**

Type:	Bug	Status:	OPEN (View Workflow)
Priority:	3 - Minor	Resolution:	Unresolved
Affects Version/s:	02.04.00	Fix Version/s:	None
Component/s:	None		
Labels:	None		
Product/s:	Compuware Enterprise Services		
Customer Type:	Internal		
Reopen Count:	0		
Product Family:	Common		

**Description**  
High average CPU consumption in access to PART DB

**Attachments**

Access to IMS Database fix	0.9 kB	2 minutes ago
----------------------------	--------	---------------

**Activity**

All Comments Work Log History Activity

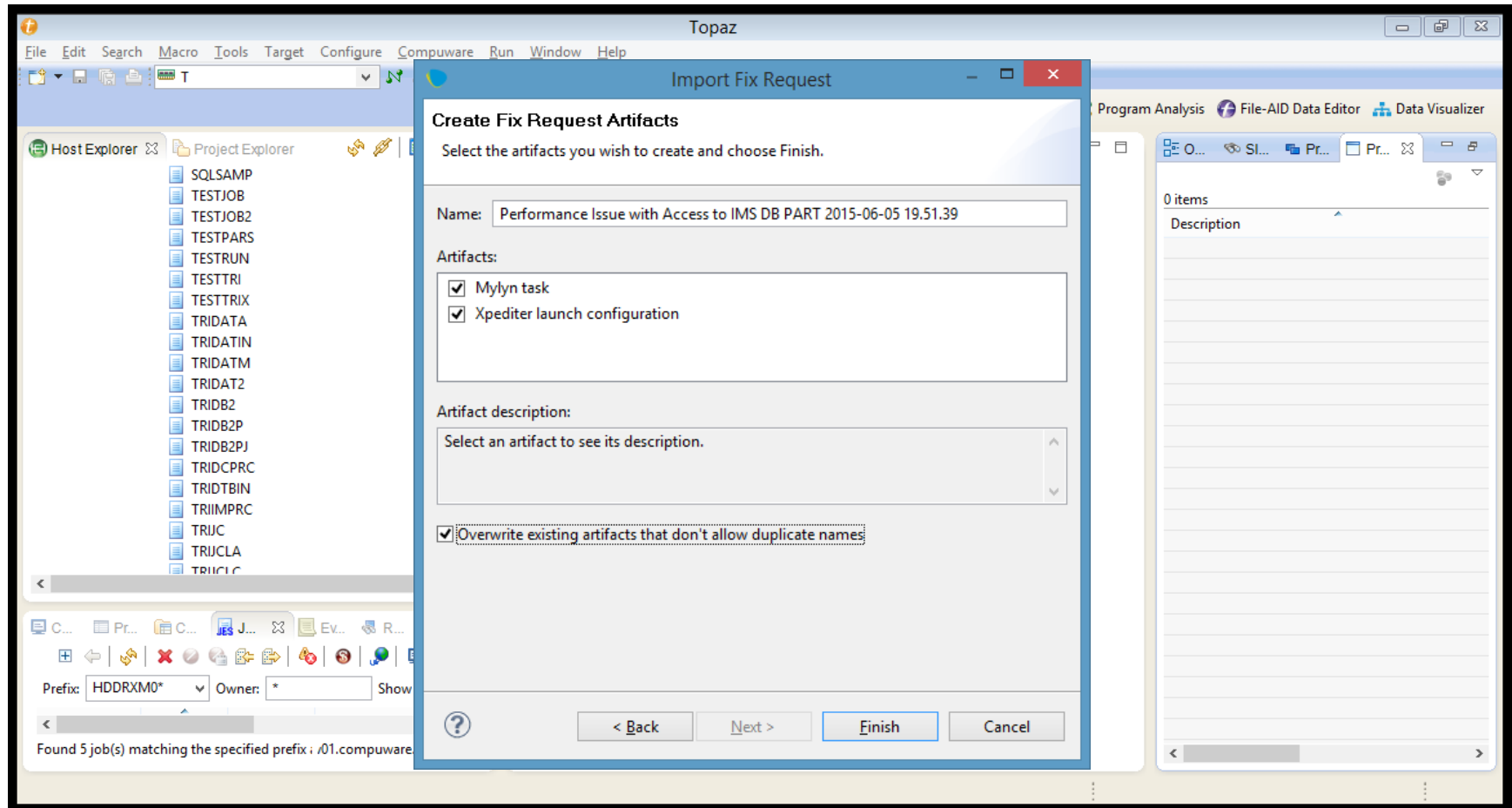
There are no comments yet on this issue.

Comment

Atlassian JIRA Project Management Software (v6.2.5#6262-sha1:8710e51) · About JIRA · Report a problem

Atlassian

# Developer's IDE



# Task List

The screenshot displays the Topaz software interface, which is used for managing tasks and analyzing system performance. The interface is divided into several panes:

- Host Explorer:** Located on the left, it shows a tree view of system components including SQLSAMP, TESTJOB, TESTJOB2, TESTPARS, TESTRUN, TESTTRI, TESTTRIX, TRIDATA, TRIDATIN, TRIDATM, TRIDAT2, TRIDB2, TRIDB2P, TRIDB2PJ, TRIDCPRC, TRIDTBIN, TRIIMPRC, TRIJC, and TRIJL.
- Task Pane:** The central pane displays a task titled "Performance Issue with Access to IMS DB PART 2015-06-05 19.51.3". The task is marked as "Incomplete" and was created on 25.02.2016. It is categorized as "Uncategorized". The description states: "Found Tx DSPINV GU Call PART. Please Investigate". The URL provided is <http://chq-cpwr-fit.nasa.cpwr.corp:48229/istrobe/jsp/profileReports/ims/imsActivityByDliRequest.jsp?profileID=220>. The event date is 2015-06-05 19.51.39, and the offset is 00003F24. The LPAR is CW09, the job name is IMSCCW9X, the step name is IMSCMR0C.REGION, and the load module is DFSREXX1.
- Task List Pane:** On the right, a list of tasks is shown under the "Uncategorized" category. The tasks include "CPU Verbrauch in Program INSPBAD1 2015", "Abend in TRITST2, please analyse 2016-02-1", "Abend in TRITST2, please analyse 2016-02-1", "Access to IMS Database 2015-11-11 18.06.4", and "Performance Issue with Access to IMS DB P".
- Connect Mylyn:** A button at the bottom right of the task list pane, labeled "Connect Mylyn", which links to the task and ALM tools or creates a new task.

# Task contains link to Information Source

The screenshot displays the Topaz software interface. On the left, the 'Host Explorer' and 'Project Explorer' panels show a list of files and folders, including 'SQLSAMP', 'TESTJOB', 'TESTJOB2', 'TESTPARS', 'TESTRUN', 'TESTTRI', 'TESTTRIX', 'TRIDATA', 'TRIDATIN', 'TRIDATM', 'TRIDAT2', 'TRIDB2', 'TRIDB2P', 'TRIDB2PJ', 'TRIDCPRC', 'TRIDTBN', 'TRIIMPRC', 'TRIJC', and 'TRUCL'. The main window shows a task titled 'Performance Issue with Access to IMS DB PART 2015-06-05 19.51.3'. The task status is 'Incomplete', created on '25.02.2016', and completed on '-'. The task is categorized as 'Uncategorized'. The 'Attributes' section shows 'Scheduled: This Week', 'Due: Choose Date', and 'Estimate: 0'. The 'Description' field contains 'Found Tx DSPINV GU Call PART. Please Investigate'. The 'Data imported from iStrobe' section is highlighted with a red box and contains the URL: <http://chq-cpwr-fit.nasa.cpwr.corp:48229/istrobe/jsp/profileReports/ims/imsActivityByDliRequest.jsp?profileID=220>. The 'Event Date' is '2015-06-05 19.51.39' and the 'Offset' is '00003F24'. The 'LPAR' is 'CW09', the 'Job Name' is 'IMSCCW9X', the 'Step Name' is 'IMSCMR0C.REGION', and the 'Load Module' is 'DFSREXX1'. The bottom panel shows the 'Prefix' as 'HDDR XM0\*' and the 'Owner' as '\*', with a note 'Found 5 job(s) matching the specified ipuware.com:16196'. The right panel shows a list of tasks under 'Uncategorized', including 'CPU Verbrauch in Program INSPBAD1 2015', 'Abend in TRITST2, please analyse 2016-02-1', 'Abend in TRITST2, please analyse 2016-02-1', 'Access to IMS Database 2015-11-11 18.06.4', and 'Performance Issue with Access to IMS DB P'. A 'Connect Mylyn' button is also visible at the bottom right.

# Task contains link to Information Source

The screenshot displays the Topaz software interface. The main window shows a task titled "Abend in TRITST2, please analyse 2016-02-02 11.22.49". The task status is "Incomplete", created on "04.02.2016", and categorized as "Uncategorized". The task description includes a link to a Compuware Abend-AID report: "Data imported from Compuware Abend-AID URL: [HTTP://CW01.COMPUWARE.COM:6952/AAVIEW?RPT=6383597](http://CW01.COMPUWARE.COM:6952/AAVIEW?RPT=6383597)". The task also includes event details such as "Event Date: 2016-02-02 11.22.49", "Abend Code: S0C7", "Offset: 00000318", "Line Number: 000021", "LPAR: CW01", "Job Name: HDDRXM0S", "Step Name: RUNPROG", "Load Module: TRITST2", "User ID: HDDRXM0", and "DDIO File: HDDRXM0.SCHUL.XPED.DB.S0000001". The task is currently set to "Private".

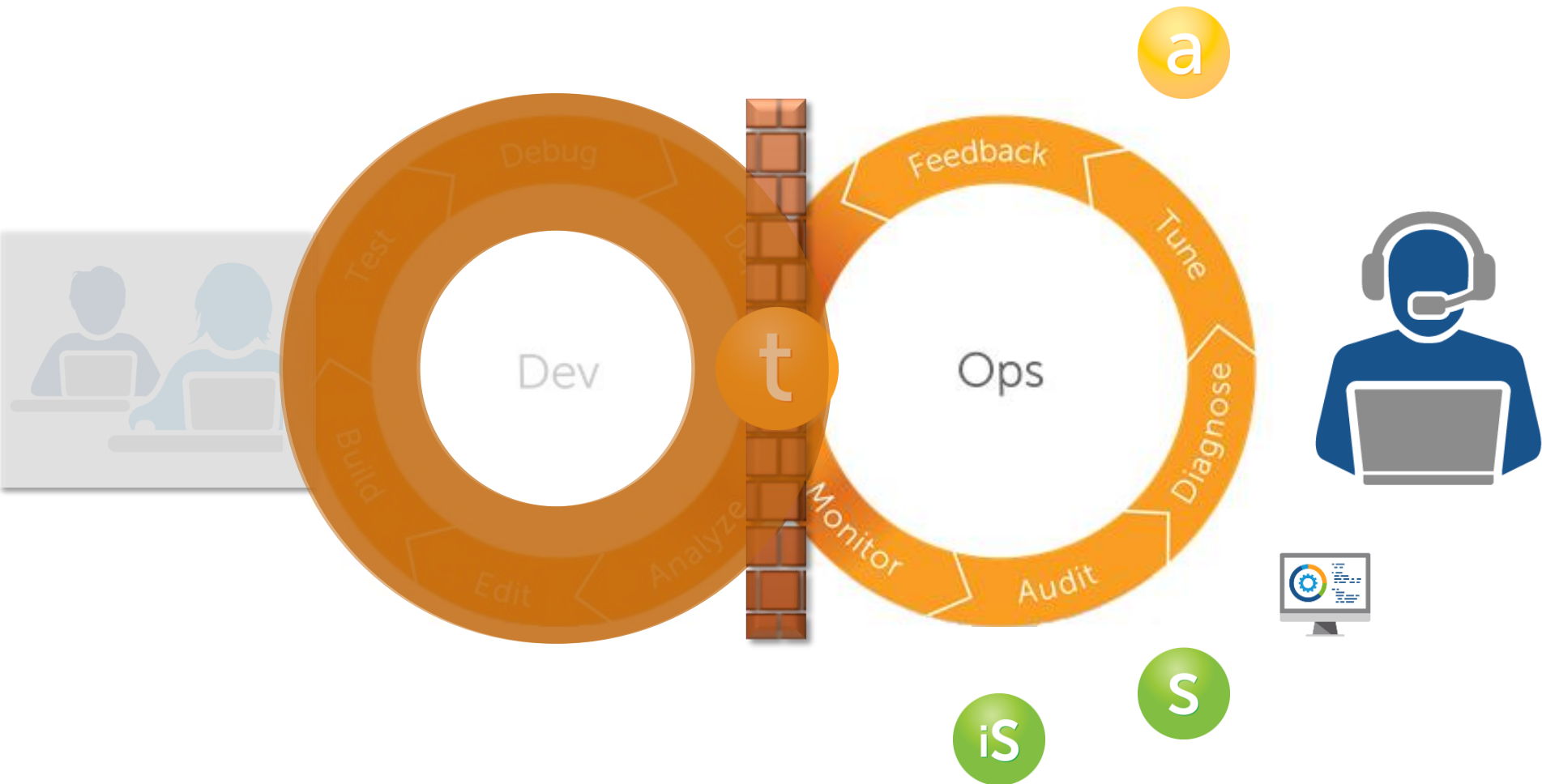
On the left, the "Host Explorer" pane shows a list of files and directories, including "SQLSAMP", "TESTJOB", "TESTJOB2", "TESTPARS", "TESTRUN", "TESTTRI", "TESTTRIX", "TRIDATA", "TRIDATIN", "TRIDATM", "TRIDAT2", "TRIDB2", "TRIDB2P", "TRIDB2PJ", "TRIDCPRC", "TRIDTBIN", "TRIIMPRC", "TRIJC", and "TRUCL".

On the right, the "Find" pane shows a list of search results, including "CPU Verbrauch in Program INSPBAD1 2015", "Abend in TRITST2, please analyse 2016-02-1", "Abend in TRITST2, please analyse 2016-02-1", "Access to IMS Database 2015-11-11 18.06.4", and "Performance Issue with Access to IMS DB P".

At the bottom, a "Connect Mylyn" button is visible, with a tooltip that reads: "Connect to your task and ALM tools or create a local task."



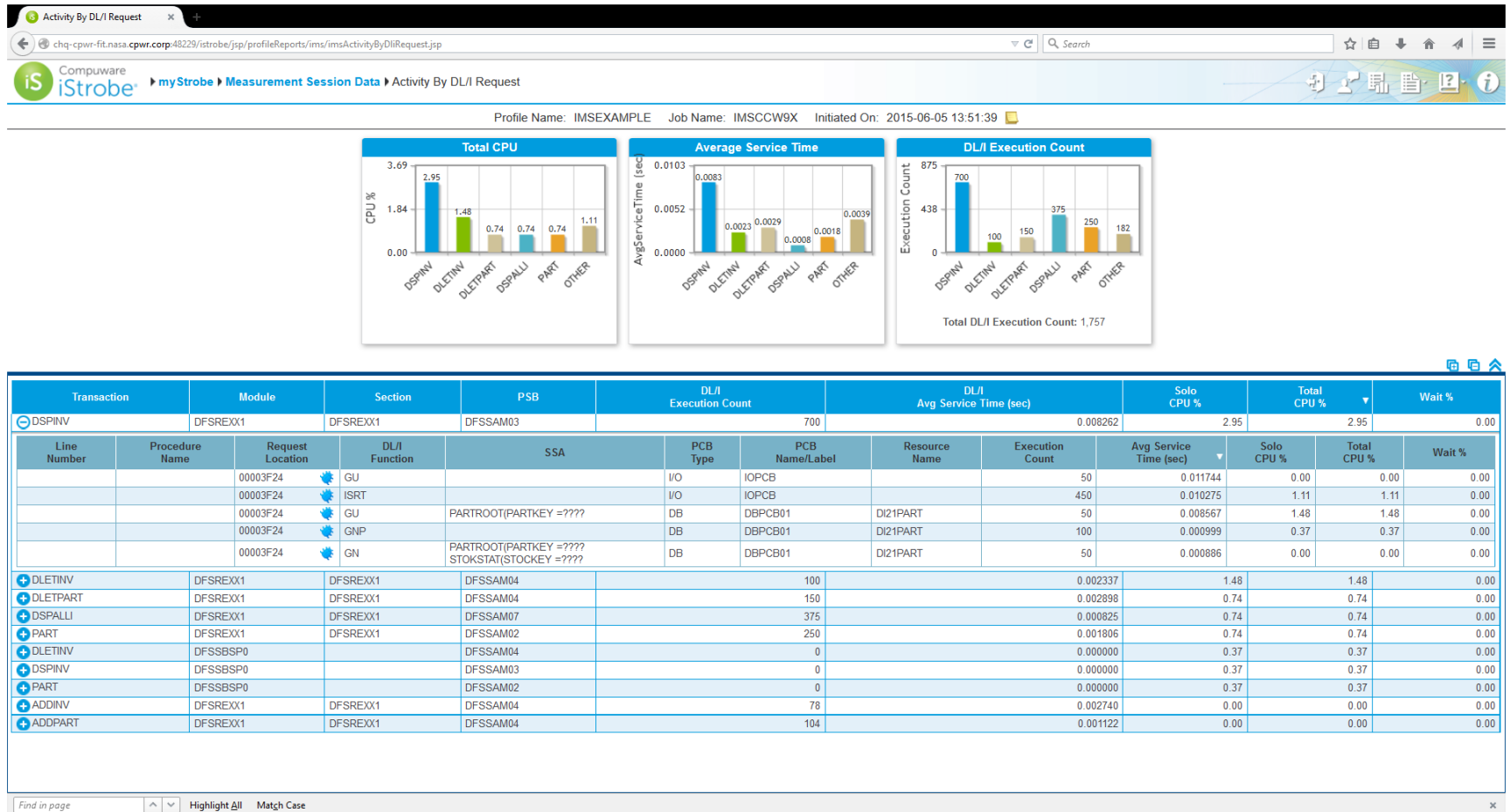
# Development get's involved



Development

# WHAT'S IN IT FOR THE DEVELOPER?

# Performance – Insight into Application



## Performance – Module Help (Knowledge Base)

The screenshot shows the Compuware iStrobe web application interface. On the left, there's a navigation pane with a tree view under 'Pseudo-Section' containing 'IMS'. Under 'IMS', there's a 'Module' section where 'DFSPCC20' is highlighted with a red box. The main content area displays the title 'DFSPCC20' followed by two paragraphs of descriptive text about its function as the IMS Program Controller for MPP and BMP environments. Below the text are sections for 'Hints' and 'Reference Sources'. The bottom right corner of the screen shows a portion of a table with columns 'Solo' and 'Total', displaying numerical data.

# Performance – IMS Preload List

IMS Preload								
chq-cpwr-fit.nasa.cpwr.corp.48229/istrobe/jsp/profileReports/ims/imsPreload.jsp								
Compuware iStrobe myStrobe Measurement Session Data IMS Preload								
Profile Name: IMSEXAMPLE Job Name: IMSCCW9X Initiated On: 2015-06-05 13:51:39								
Module	Activity	Size (bytes)	RMODE	AMODE	DDNAME	Dataset Name	Link-Edit Attributes	
DFSREXX1	YES	35,248	ANY	31	STEPLIB	IMS121A.SDFSRESL	NORENT,REUS,NOALIGNPAGE	
CFSCVA62	NO	28,392	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
CFSIXA32	NO	19,352	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
CFSEVA64	NO	16,344	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
CFSCCEE9	NO	16,024	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
CFSIVA64	NO	15,496	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
TRIPLMP	NO	14,464	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
TRIPMPC	NO	12,480	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
TRIPMPY	NO	12,480	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
CFSIYA34	NO	11,184	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
CFSIXA34	NO	11,040	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
BLF100A	NO	10,040	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
TRIIFP	NO	8,560	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
TRIXLMP	NO	7,704	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
TRITST	NO	4,896	ANY	31	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
LARIVA64	NO	16,784	24	24	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
DFSIVA64	NO	13,608	24	24	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
DFSIVA34	NO	10,152	24	24	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
DFSIVP34	NO	10,152	24	24	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
DFSIVA31	NO	9,496	24	24	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
DLICALL4	NO	6,808	24	24	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
DLICALL3	NO	6,760	24	24	STEPLIB	SB.IMS121A.LOADLIB	NORENT,NOREUS,NOALIGNPAGE	
DBFSAMA2	NO	2,536	24	24	STEPLIB	IMS121A.CW09.PGMLIB	NORENT,NOREUS,NOALIGNPAGE	
LRTT	NO	64	24	24	STEPLIB	SB.IMS121A.LOADLIB	RENT,REUS,NOALIGNPAGE	

Find in page Highlight All Match Case

# Performance – Programming Statements

Program CPU Usage

chq-cpwr-fit.nasa.cpwr.corp:48229/istrobe/jsp/profileReports/cpuAndWait/programCPUUsage.jsp?rptId=system

Home Name: COBOLCONE COB Name: COBOLCONE Invoked On: 2017-07-10 10:11:10

**.SYSTEM .USER**

Pseudo-Section		Description	CPU %			
			Attributed	Combined	Solo	Total
COBLIB		COBOL LIBRARY SUBROUTINE	0.00	99.54	99.54	99.54

Module	RMODE	Description	Interval Length	CPU %			
				Attributed	Combined	Solo	Total
IGZCPAC		COBPACK GENERAL	439104	0.00	99.54	99.54	99.54

Was Invoked By					Via			CPU %	
Transaction	Module	Section	Location	Line And Source Text / Description	Module	Section	Description	Solo	Total
	INSPBAD1	INSPBAD1	00000396	000074 INSPECT	IGZCPAC		COBPACK GENERAL	98.20	98.20
		Source Listing Text Of Invoking Statement							
Line Number									
000074		INSPECT PYPW-MAX-LENGTH-PW1 REPLACING ALL LOW-VALUES BY SPACES							
	INSPBAD1	INSPBAD1	0000044A	000087 INSPECT	IGZCPAC		COBPACK GENERAL	1.21	1.21
		Source Listing Text Of Invoking Statement							
Line Number									
000087		INSPECT PYPW-MAX-LENGTH-PW1 REPLACING ALL LOW-VALUES BY SPACES							
	INSPBAD1	INSPBAD1	00000396	000074 INSPECT				0.11	0.11
	INSPBAD1	INSPBAD1	0000044A	000087 INSPECT				0.02	0.02

PRIVATE		PRIVATE AREA	CPU %			
			Attributed	Combined	Solo	Total
			0.00	0.10	0.10	0.10

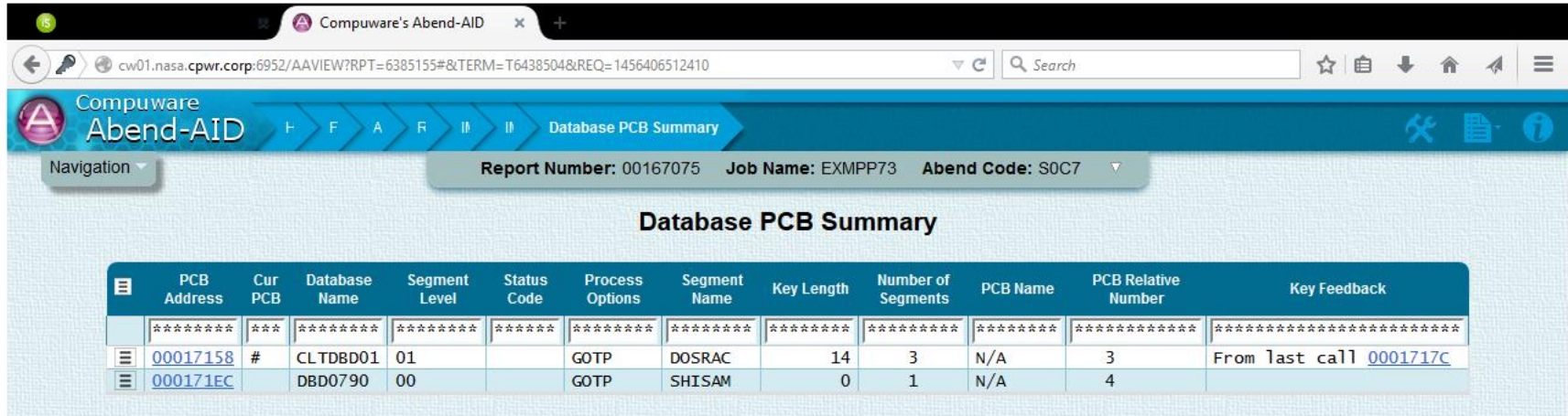
Find in page Highlight All Match Case

# Fault Analysis

The screenshot displays the Compuware Abend-AID web application. The browser's address bar shows the URL: `cw01.nasa.cpwr.corp:6952/AAVIEW?RPT=6385155#&TERM=T6438504&REQ=1456406293735`. The application's header includes the Compuware Abend-AID logo, a navigation menu with 'Home', 'Report Menu', and 'IMS Information' (the current page), and a search bar. Below the header, a status bar displays 'Report Number: 06385155', 'Job Name: HDDRXM0X', and 'Abend Code: S0C7'. The main content area is titled 'IMS Information' and contains five buttons: 'IMS Diagnostics', 'IMS PCBs', 'DL/I Call Statistics', 'IMS Control Blocks', and 'IMS Text Summary'.



# Fault Analysis – SSA and Key Feedback from last Call



The screenshot shows the 'Database PCB Summary' page in Compuware's Abend-AID. The browser address bar shows the URL: cw01.nasa.cpwr.corp:6952/AAVIEW?RPT=6385155#&TERM=T6438504&REQ=1456406512410. The page header includes the Compuware Abend-AID logo and navigation tabs: Home, Fault Summary - IMS Transaction, Abend-AID Directory, Report Menu, IMS Information, IMS PCBs, and I/O PCB Summary. The report details are: Report Number: 00167075, Job Name: EXMPP73, and Abend Code: S0C7. The title is 'Database PCB Summary'. Below the title is a table with 13 columns: PCB Address, Cur PCB, Database Name, Segment Level, Status Code, Process Options, Segment Name, Key Length, Number of Segments, PCB Name, PCB Relative Number, and Key Feedback. The table has three rows of data.

PCB Address	Cur PCB	Database Name	Segment Level	Status Code	Process Options	Segment Name	Key Length	Number of Segments	PCB Name	PCB Relative Number	Key Feedback
*****	***	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
00017158	#	CLTDBD01	01		GOTP	DOSRAC	14	3	N/A	3	From last call 0001717C
000171EC		DBD0790	00		GOTP	SHISAM	0	1	N/A	4	

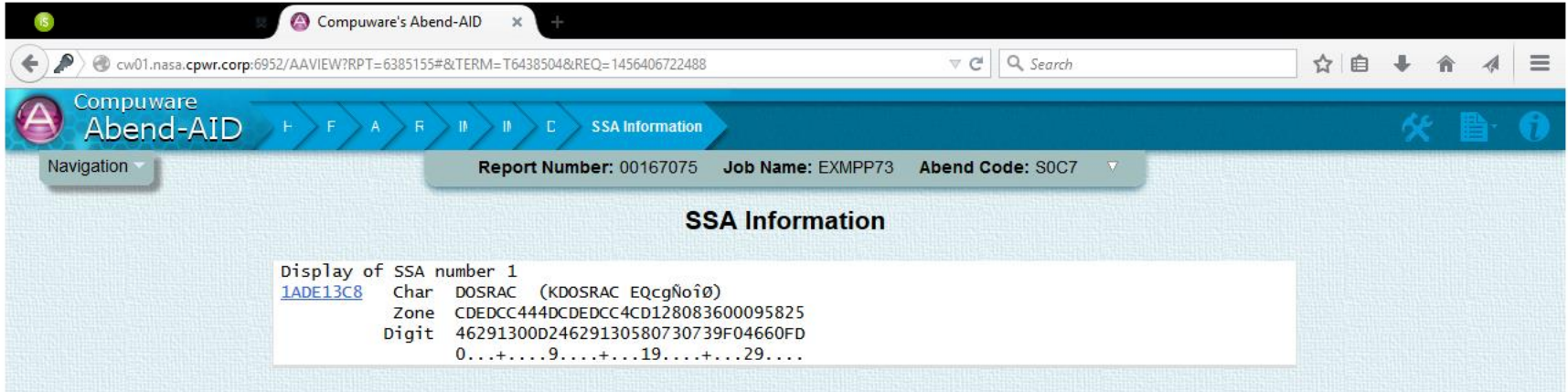


The screenshot shows the 'I/O PCB Summary' page in Compuware's Abend-AID. The browser address bar shows the URL: cw01.nasa.cpwr.corp:6952/AAVIEW?RPT=6385155#&TERM=T6438504&REQ=1456406534204. The page header includes the Compuware Abend-AID logo and navigation tabs: Home, Fault Summary - IMS Transaction, Abend-AID Directory, Report Menu, IMS Information, IMS PCBs, and I/O PCB Summary. The report details are: Report Number: 00167075, Job Name: EXMPP73, and Abend Code: S0C7. The title is 'I/O PCB Summary'. Below the title is a table with 9 columns: PCB Address, Cur PCB, Logical Terminal, Status Code, IMS User ID, Last Message Date, Last Message Time, Message Count, and Format Module. The table has three rows of data.

PCB Address	Cur PCB	Logical Terminal	Status Code	IMS User ID	Last Message Date	Last Message Time	Message Count	Format Module
*****	***	*****	*****	*****	*****	*****	*****	*****
00017068		SIUP0A77		SIUP0A77	2010/337	17:44:05.608621 (Local)	36,042	
000170E0			AD					

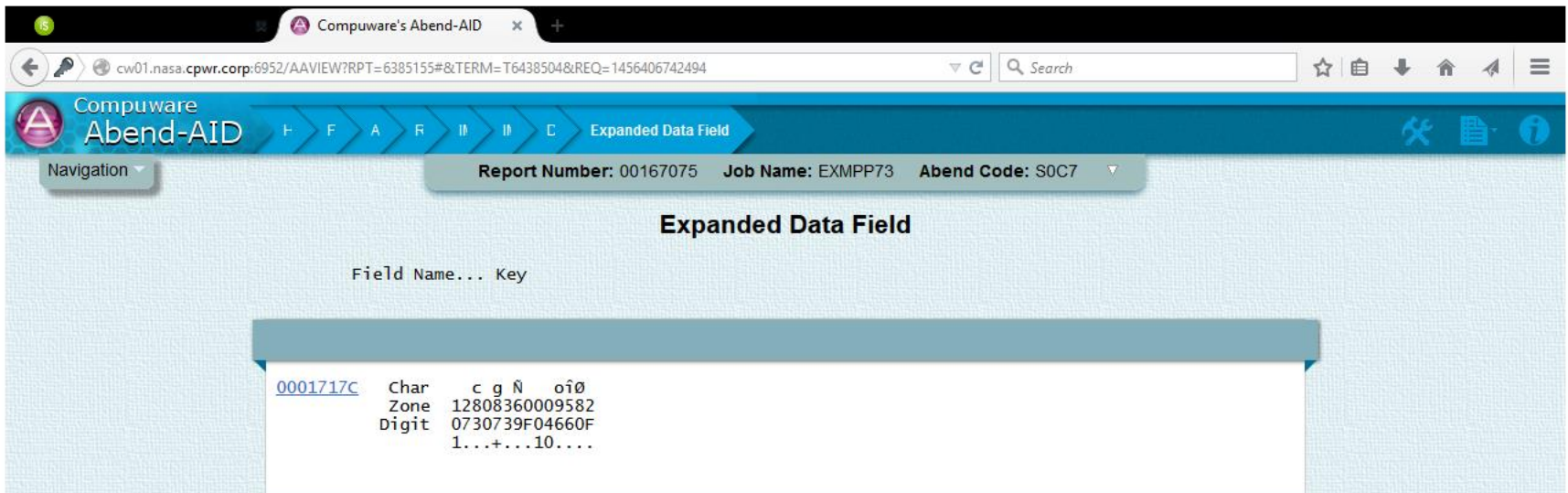


# Fault Analysis – SSA and Key Feedback from last Call



The screenshot shows the Compuware Abend-AID web interface. The browser address bar displays the URL: `cw01.nasa.cpwr.corp:6952/AAVIEW?RPT=6385155#&TERM=T6438504&REQ=1456406722488`. The page header includes the Compuware Abend-AID logo and a navigation menu with buttons for Home, Faults, Analysis, Reports, and SSA Information. The SSA Information section is active, showing the Report Number: 00167075, Job Name: EXMPP73, and Abend Code: S0C7. The main content area is titled "SSA Information" and displays the "Display of SSA number 1" for the key `1ADE13C8`. The data is presented in a table with columns for Char, Zone, and Digit.

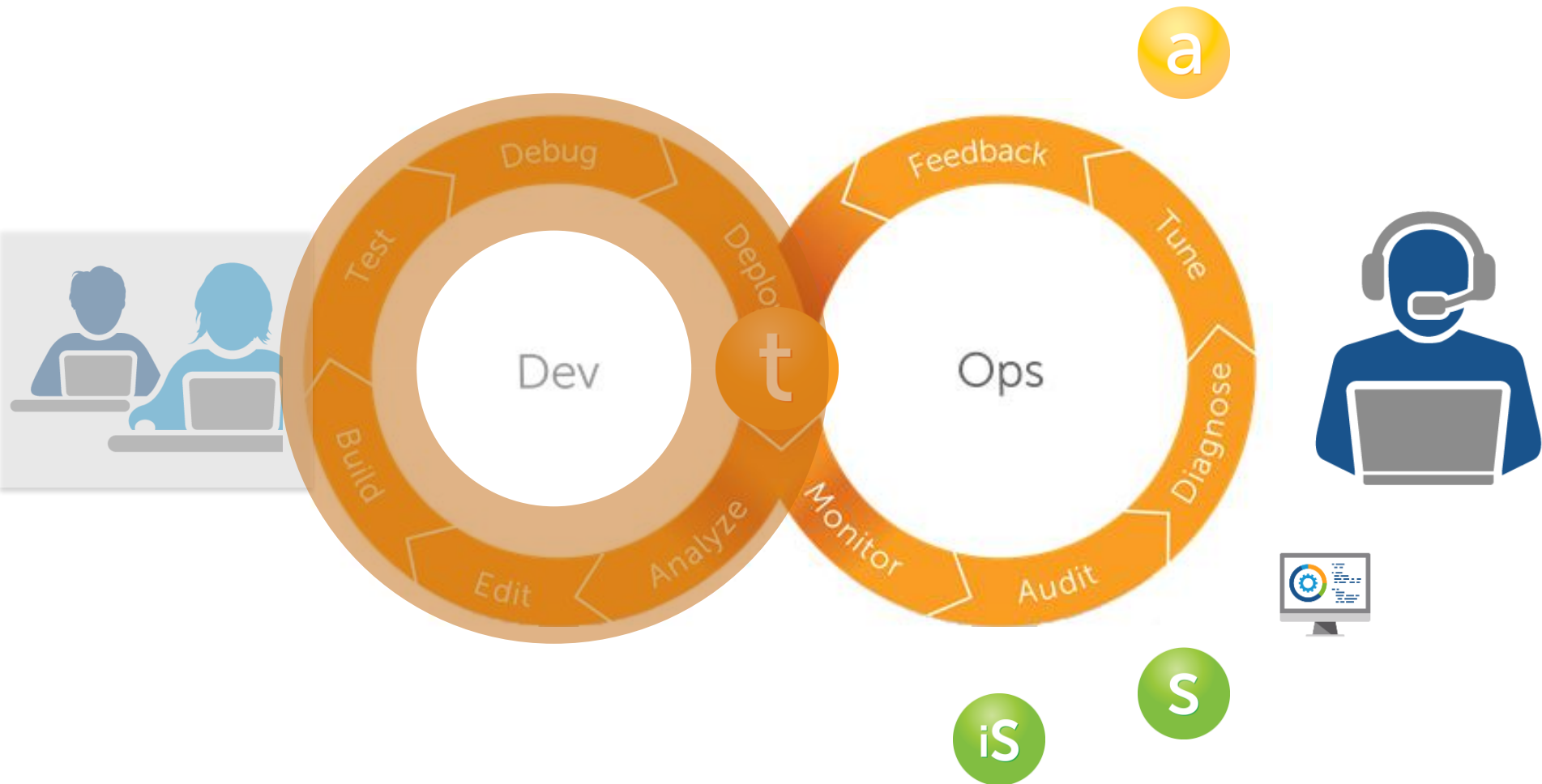
Char	Zone	Digit
DOSRAC (KDOSRAC EQcgNoiø)	CDEDCC444DCDEDCC4CD128083600095825	46291300D24629130580730739F04660FD
	0...+...9...+...19...+...29...	



The screenshot shows the Compuware Abend-AID web interface, specifically the Expanded Data Field section. The browser address bar displays the URL: `cw01.nasa.cpwr.corp:6952/AAVIEW?RPT=6385155#&TERM=T6438504&REQ=1456406742494`. The page header includes the Compuware Abend-AID logo and a navigation menu with buttons for Home, Faults, Analysis, Reports, and Expanded Data Field. The Expanded Data Field section is active, showing the Report Number: 00167075, Job Name: EXMPP73, and Abend Code: S0C7. The main content area is titled "Expanded Data Field" and displays the "Field Name... Key" for the key `0001717C`. The data is presented in a table with columns for Char, Zone, and Digit.

Char	Zone	Digit
c g N oiø	12808360009582	0730739F04660F
	1...+...10...	

# Dev – use the same Tools



# Fault Analysis – Segment Content

Compuware's Abend-AID

cw01.nasa.cpwr.corp:6952/AAVIEW?RPT=6385155#&TERM=T6438504&REQ=1456406632972

Compuware  
Abend-AID

Navigation

Report Number: 00167075 Job Name: EXMPP73 Abend Code: S0C7

Memory Display

Start Addr: 1ACEAC10 Comment:

Page Up Page Down

Address	Offset	Word 1	Word 2	Word 3	Word 4	Word 5	Word 6	Word 7	Word 8	Storage
<a href="#">1ACEAC10</a>	+00000000	<a href="#">10278300</a>	<a href="#">8733690F</a>	<a href="#">00049656</a>	<a href="#">802FF1F5</a>	<a href="#">F2F0F1F0</a>	<a href="#">F0F0F0F0</a>	<a href="#">F0F0F1F0</a>	<a href="#">F1F1F0F0</a>	* c.g . o " 152010000000101100*
<a href="#">1ACEAC30</a>	+00000020	<a href="#">F3F1F6F0</a>	<a href="#">40F0F0F0</a>	<a href="#">F0F0F0F0</a>	<a href="#">F0F0F0F0</a>	<a href="#">F0D440D6</a>	<a href="#">E440D4D4</a>	<a href="#">C540D7C5</a>	<a href="#">E3C9E340</a>	*3160 000000000000M OU MME PETIT *
<a href="#">1ACEAC50</a>	+00000040	<a href="#">D1D6E2C5</a>	<a href="#">D7C84040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">404040C9</a>	<a href="#">D5E2D6C6</a>	<a href="#">C9F0F1C6</a>	<a href="#">D5F14040</a>	*JOSEPH INSOFI01FN1 *
<a href="#">1ACEAC70</a>	+00000060	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">F0F1D6F1</a>	<a href="#">40D7D340</a>	<a href="#">F1C4C3F3</a>	* 0101 PL 1DC3*
<a href="#">1ACEAC90</a>	+00000080	<a href="#">F0F0F8F7</a>	<a href="#">F3F3F6F9</a>	<a href="#">F0F0F0F0</a>	<a href="#">F4F9F6F5</a>	<a href="#">F6F8F0F3</a>	<a href="#">F1F9F3F0</a>	<a href="#">F0F8F7F3</a>	<a href="#">F3F6F9F0</a>	*00873369000049656803193008733690*
<a href="#">1ACEACB0</a>	+000000A0	<a href="#">F0F0F0F4</a>	<a href="#">F9F6F5F6</a>	<a href="#">F8F0F3F1</a>	<a href="#">F9D54040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">404040F1</a>	<a href="#">F9F1F9F0</a>	*0004965680319N 19190*
<a href="#">1ACEACD0</a>	+000000C0	<a href="#">F4F0F8D5</a>	<a href="#">D44040D7</a>	<a href="#">C5E3C9E3</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40D1D6E2</a>	<a href="#">C5D7C840</a>	*408NM PETIT JOSEPH *
<a href="#">1ACEACE0</a>	+000000E0	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">4040D4D4</a>	<a href="#">F9F9F0F8</a>	* MM9908*
<a href="#">1ACEAD10</a>	+00000100	<a href="#">F0F4F1F9</a>	<a href="#">F5F4D5C1</a>	<a href="#">D5C3E840</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	*041954NANCY *
<a href="#">1ACEAD30</a>	+00000120	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">4040C640</a>	<a href="#">40F04040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	* F 0 *
<a href="#">1ACEAD50</a>	+00000140	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	* *
<a href="#">1ACEAD70</a>	+00000160	<a href="#">40404040</a>	<a href="#">4040F0F0</a>	<a href="#">F0F0F040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	* 00000 *
<a href="#">1ACEAD90</a>	+00000180	<a href="#">40404040</a>	<a href="#">40F04040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	* 0 *
<a href="#">1ACEADB0</a>	+000001A0	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40F0F0F0</a>	<a href="#">F0F04040</a>	<a href="#">40404040</a>	* 00000 *
<a href="#">1ACEADD0</a>	+000001C0	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">40404040</a>	<a href="#">F0F4C8C9</a>	<a href="#">E2E3D6D9</a>	<a href="#">C9D8E4C5</a>	* 04HISTORIQUE*
<a href="#">1ACEADF0</a>	+000001E0	<a href="#">40D5C1D9</a>	<a href="#">E5C1D340</a>	<a href="#">C3D6D4D7</a>	<a href="#">E3C5407A</a>	<a href="#">40D54040</a>	<a href="#">40F0F3F0</a>	<a href="#">F9F2F4F6</a>	<a href="#">F0F4F1E8</a>	* NARVAL COMPTE : N 0309246041Y*

# Fault Analysis – Go to Editor

The screenshot shows the Topaz software interface. The main window displays the 'Database PCB Summary' screen. The navigation bar at the top includes 'Home', 'Fault Summary', 'Directory - IMS/TM Transactions', 'Report Menu', 'Diagnostic Summary', 'IMS PCBs', and 'Database PCB Summary'. The 'Database PCB Summary' screen shows a table with the following data:

PCB Address	Cur PCB	Database Name	Segment Level	Status Code	Process Options	Segment Name	Key Length	Number of Segments	PCB Name	PCB Relative Number	Key Feedback
00017158	#	CLTDBD01	01		GOTP	DOSRAC	14	3	N/A	3	From last call 0001717C
0001717C		00790	00		GOTP	SHISAM	0	1	N/A	4	

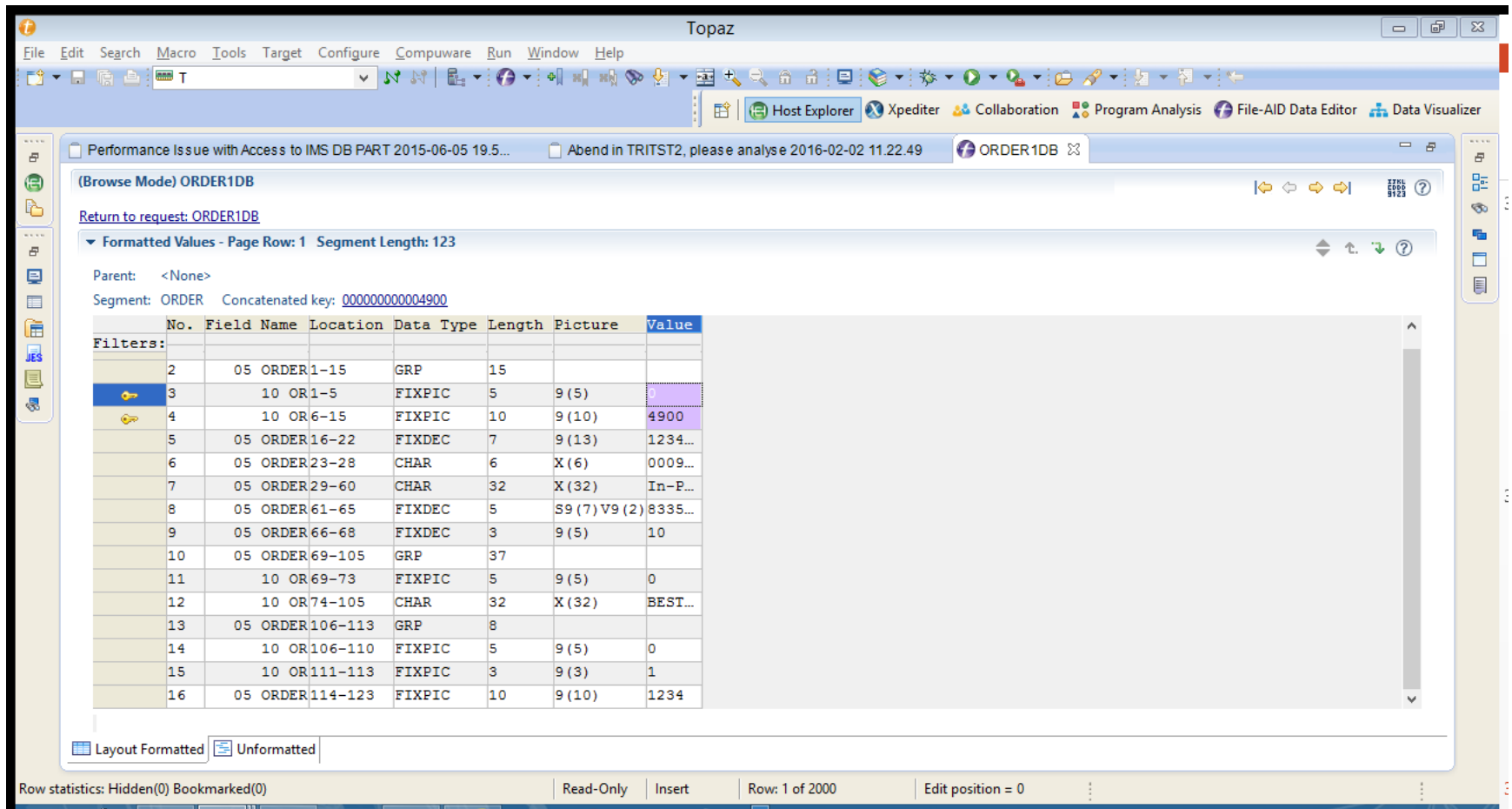
A context menu is open over the first row of the table, showing the following options:

- JCB Call Trace
- SSA Information
- Segment Summary
- Edit
- Browse

The 'Edit' option is highlighted with a red box.



# Browse (Edit) of IMS Database



The screenshot shows the Topaz software interface in Browse (Edit) mode for the ORDER1DB database. The main window displays a table of field information with columns: No., Field Name, Location, Data Type, Length, Picture, and Value. The table lists 16 fields, including ORDER1-15, ORDER16-22, ORDER23-28, ORDER29-60, ORDER61-65, ORDER66-68, ORDER69-105, ORDER69-73, ORDER74-105, ORDER106-113, ORDER106-110, ORDER111-113, and ORDER114-123. The Value column shows various data types and values, such as GRP, FIXPIC, FIXDEC, CHAR, and numeric values like 0, 4900, 1234, 0009, In-P..., 8335, 10, BEST..., 0, 1, and 1234.

No.	Field Name	Location	Data Type	Length	Picture	Value
2	05 ORDER1-15	GRP	15			
3	10 OR1-5	FIXPIC	5	9 (5)	0	
4	10 OR6-15	FIXPIC	10	9 (10)	4900	
5	05 ORDER16-22	FIXDEC	7	9 (13)	1234...	
6	05 ORDER23-28	CHAR	6	X (6)	0009...	
7	05 ORDER29-60	CHAR	32	X (32)	In-P...	
8	05 ORDER61-65	FIXDEC	5	S9 (7) V9 (2)	8335...	
9	05 ORDER66-68	FIXDEC	3	9 (5)	10	
10	05 ORDER69-105	GRP	37			
11	10 OR69-73	FIXPIC	5	9 (5)	0	
12	10 OR74-105	CHAR	32	X (32)	BEST...	
13	05 ORDER106-113	GRP	8			
14	10 OR106-110	FIXPIC	5	9 (5)	0	
15	10 OR111-113	FIXPIC	3	9 (3)	1	
16	05 ORDER114-123	FIXPIC	10	9 (10)	1234	

Row statistics: Hidden(0) Bookmarked(0) | Read-Only | Insert | Row: 1 of 2000 | Edit position = 0

# Navigate through Database

The screenshot displays the Topaz database editor interface. The main window shows the 'ORDER1DB' database in 'Browse Mode'. A table of 'Unformatted Database Segments' is visible, with columns for Menu, Level, Segment, and Location. The 'Navigation' menu is open, showing various options for navigating through the database segments. The status bar at the bottom indicates 'Row statistics: Hidden(0) Bookmarked(0)', 'Read-Only', 'Insert', 'Row: 1 of 2000', and 'Edit position = 1'.

Topaz

File Edit Search Macro Tools Target Configure Compuware Run Window Help

Host Explorer Xpediter Collaboration Program Analysis File-AID Data Editor Data Visualizer

Performance Issue with Access to IMS DB PART 2015-06-05 19.5... Abend in TRITST2, please analyse 2016-02-02 11.22.49 ORDER1DB

(Browse Mode) ORDER1DB

Return to request: ORDER1DB

Unformatted Database Segments

Page Segment: 1 Location: 1

Menu	Level	Segment	Location
1	1	ORDER	000000000004900...
2	2	ORDITEM	0000000001...."
3	2	ORDITEM	0000000002....^
4	2	ORDITEM	0000000003....±
5	2	ORDITEM	0000000004....
6	2	ORDITEM	0000000005....
7	2	ORDITEM	0000000006....
8	2	ORDITEM	0000000007.....
9	2	Bookmark Row	Ctrl+B
10	2	Remove Bookmark	Ctrl+Shift+D
11	1	Remove All Bookmarks	Ctrl+Shift+B
12	2	Find	Ctrl+F
13	2	Navigation	
14	1	Hide Segment/Segments	Ctrl+H
15	2	Flip	Alt+Ctrl+F
16	2	Unhide All	Ctrl+Shift+H
17	2	Export	Alt+Ctrl+E

First Page Ctrl+PageUp  
Previous Page PageUp  
Next Page PageDown  
Last Page Ctrl+PageDown  
Go To First Segment Ctrl+Home  
Go To Last Segment Ctrl+End  
Go To Segment by Specific Row Ctrl+\n  
Go To Bookmark Ctrl+g  
Go To Root Segment  
Go To Parent Segment  
Go To Twin Segment  
Go To Next Segment  
Go To Previous Segment  
Go To Child Segment  
Go To Segment By Key

004900  
...i<...00000BESTBOLTS 0000000100000  
000BriteMfg  
000Johnson  
000Johnson  
000BriteMfg  
000Fasteners  
000Fasteners  
000NailCity  
000Fasteners  
000Johnson  
.. kæ...00000BESTBOLTS 0000000100000  
000Johnson  
000Fasteners  
.....?00000BESTBOLTS 0000000100000  
00000Fasteners  
00000NailCity  
00000NailCity

Layout Formatted Unformatted

Row statistics: Hidden(0) Bookmarked(0) Read-Only Insert Row: 1 of 2000 Edit position = 1

# Search for Key

Topaz

File Edit Search Macro Tools Target Configure Compuware Run Window Help

Segment name:

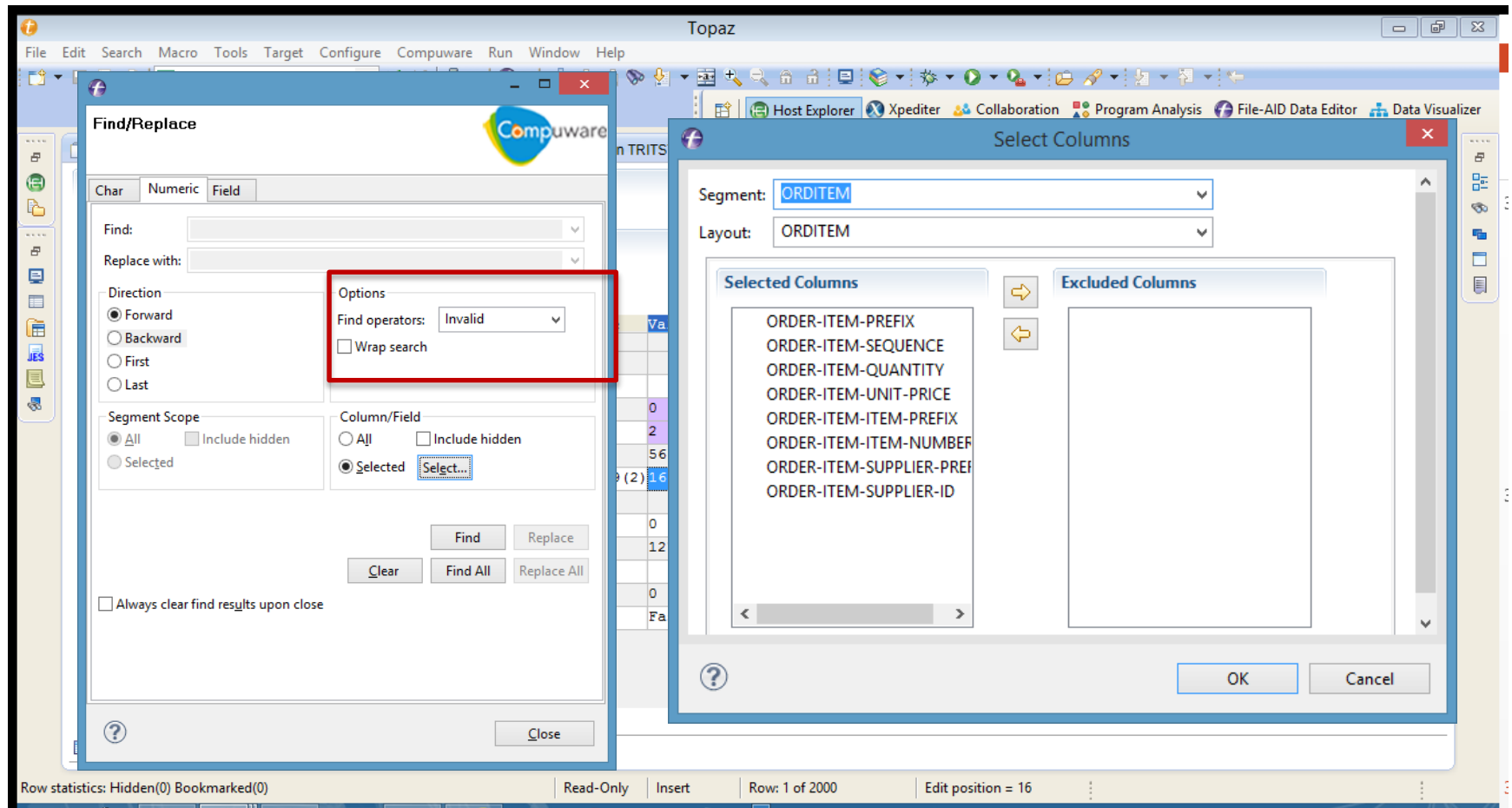
Key Specification

Level Number/Field Name	Location	Data Type	Length	Picture	Operator	Field Value
Level 1 ORDER		GRP			is equal to	
10 ORDER-PREFIX	1-5	FIXPIC	5	9(5)		0
10 ORDER-NUMBER	6-15	FIXPIC	10	9(10)		4901
Level 2 ORDITEM		GRP			is equal to	
10 ORDER-ITEM-PREFIX	16-20	FIXPIC	5	9(5)		0
10 ORDER-ITEM-SEQUENCE	21-25	FIXPIC	5	9(5)		2

Go To Key Cancel

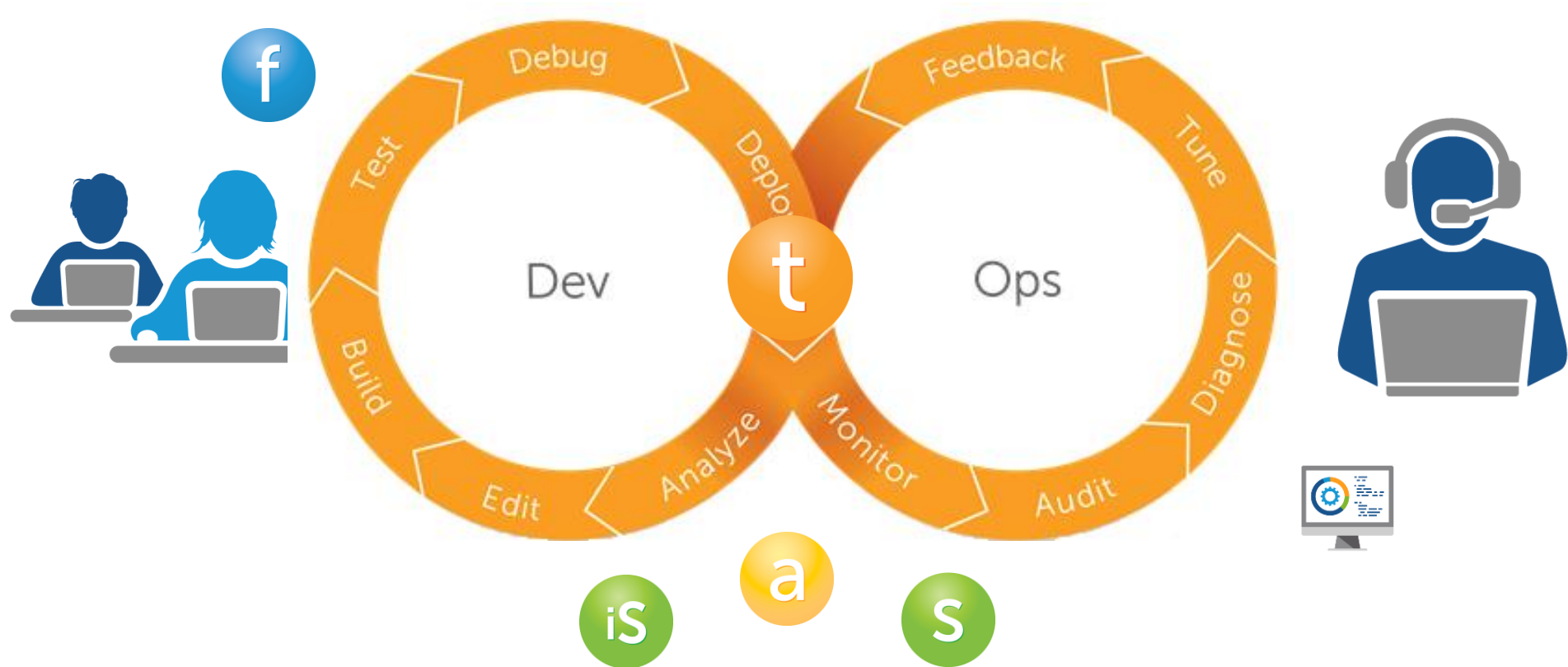
Row statistics: Hidden(0) Bookmarked(0) Read-Only Insert Row: 1 of 2000 Edit position = 1

# Search other Values

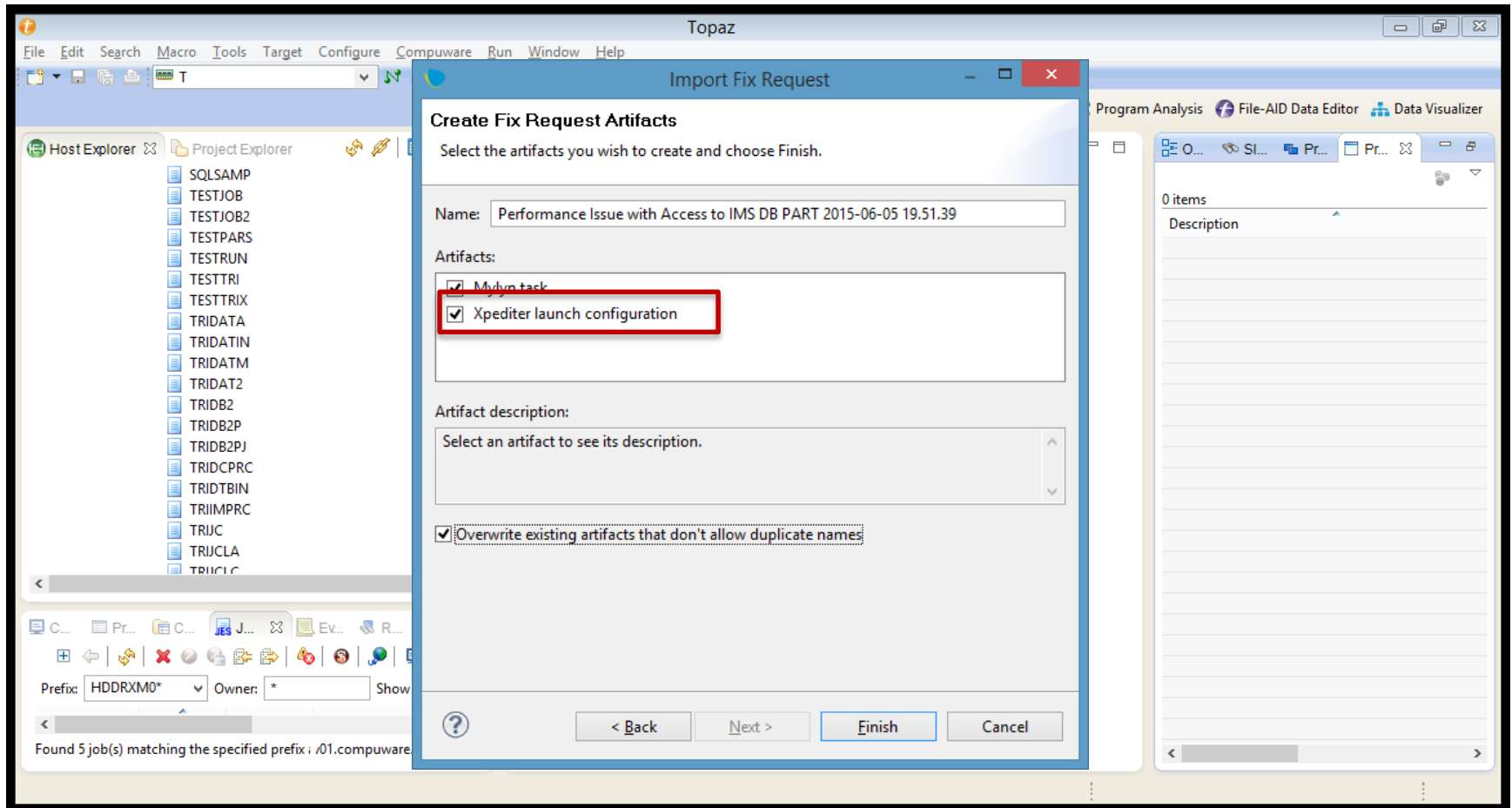




# Dev – Data Editing



# Identify the Root Cause/Debugging



# Pre-Configured Debugging Configuration

**Debug Configurations**

Create, manage, and run configurations  
Setup information for your Xpediter IMS MPP debugging session.

Name: Access to IMS Database 2015-11-11 18.06.45

Target system

Host connection: cw01.compuware.com:16196 [CW01]

Login credentials: Use saved credentials

IMS MPP JCL location

Dataset(member): HDDRXM0.SCHUL.XPED.JCL(IMSBCW01) Browse... View...

Debug criteria

Job name: IMSCCW9X

Step name: REGION

IMS user ID: \*

Programs and transactions:

Program	Transaction	Data
DFSREXX1		

Filter matched 26 of 26 items

Apply Revert Debug Close

# Pre-Configured Debugging Configuration

The screenshot displays the 'Debug Configurations' window in Compuware. The left pane shows a tree of configurations, with 'Xpediter Batch Debug Session' selected. The right pane shows the configuration details for 'IMS Batch'.

**Configuration Details:**

- Name: IMS Batch
- Host connection: cw01.compuware.com:16196 [CW01]
- Login credentials: Use saved credentials
- Job to debug: Dataset(member): HDDRXM0.SCHUL.XPED.JCL(TRIJCLIM)
- Debug criteria: Select "Autofill" to populate the job name and steps/programs from the JCL.

**Steps/programs table:**

Step	Program	DB2/IMS	Created By
<input checked="" type="checkbox"/> RUNPROG	TRIIMSM	IMS	User

Buttons at the bottom: Apply, Revert, Debug, Close.

# Debugging the Program

The screenshot displays the Topaz debugger interface, which is used for debugging mainframe programs. The main window shows the source code of a program named P09900-CREATE-ORDER. The code includes a call to 'CBLTDLI' using ICF-GHU, ORDER-PCB, ORDER-SEGMENT, and ORDER-SSA-QUAL. The code is currently paused at a breakpoint.

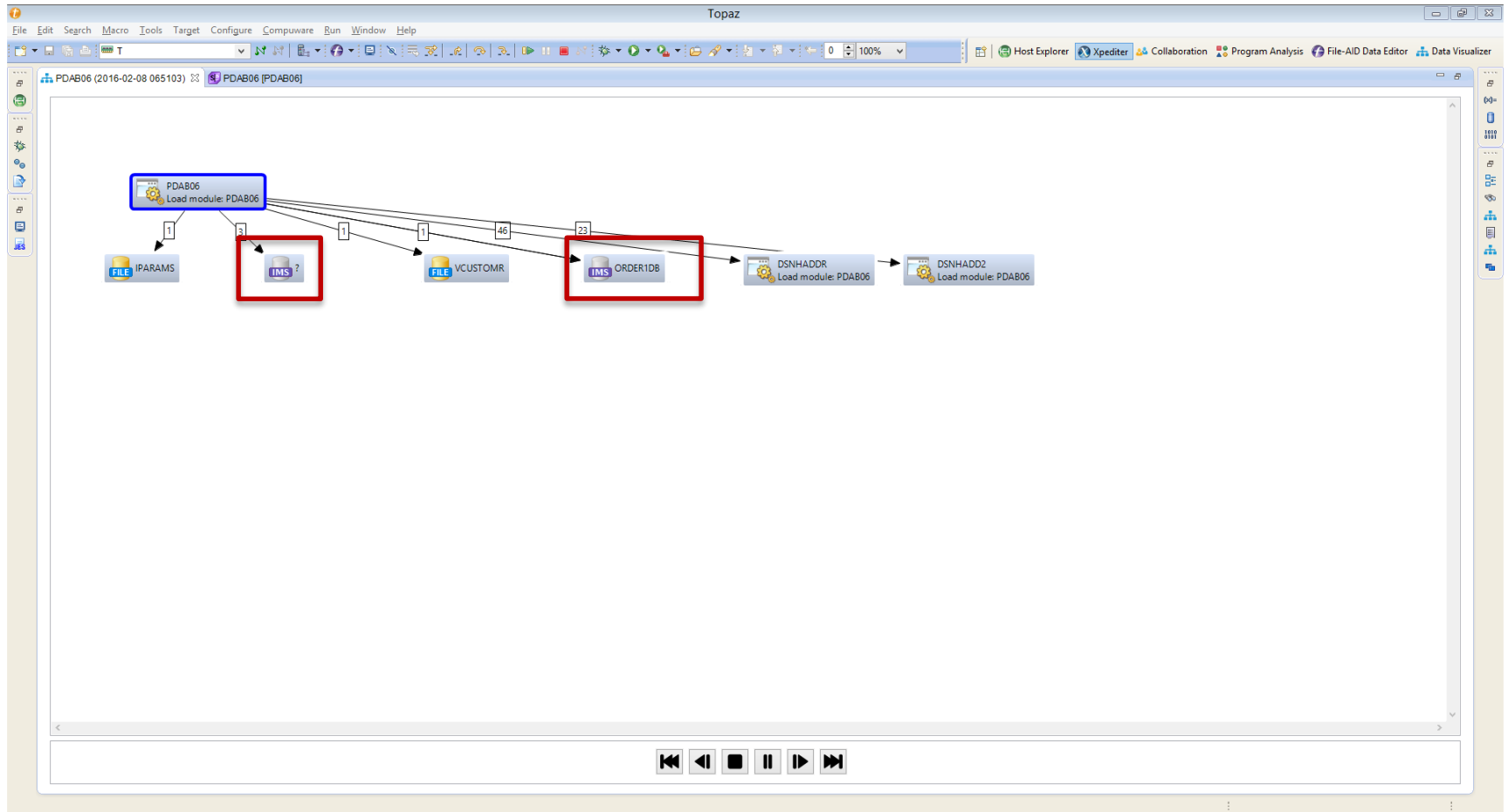
The Host Explorer on the left shows a list of host objects, including ST\_STROBE\_SSESSU, ST\_STROBE\_STROBEMS, ST\_STROBE\_STROBEO, ST\_VERIFY\_DETAIL, ST\_VERIFY\_HEADER, ST\_VERIFY\_REPORT, ST\_WORKBENCH, ST\_XPEDITOR\_XPEDDET, ST\_XPEDITOR\_XPEDU, STROBE\_MEASUREMENT\_FACT, STROBE\_SESSION\_FACT, STROBE\_SUMMARY\_FACT, TYPE\_DIM, USAGE\_MATURITY\_FACT, USER\_GROUP\_FACT, USERS\_DIM, VIPR\_PROCESS\_LOG, WORKBENCH\_FACT, XPEDITOR\_DETAIL\_FACT, XPEDITOR\_ROI\_DIM, and XPEDITOR\_SUMMARY\_FACT.

The Debug console at the bottom left shows the current thread (P09900 [P09900]) and the current step (P09900 [P09900] (procedure: SQL-INIT-END line: 5564)).

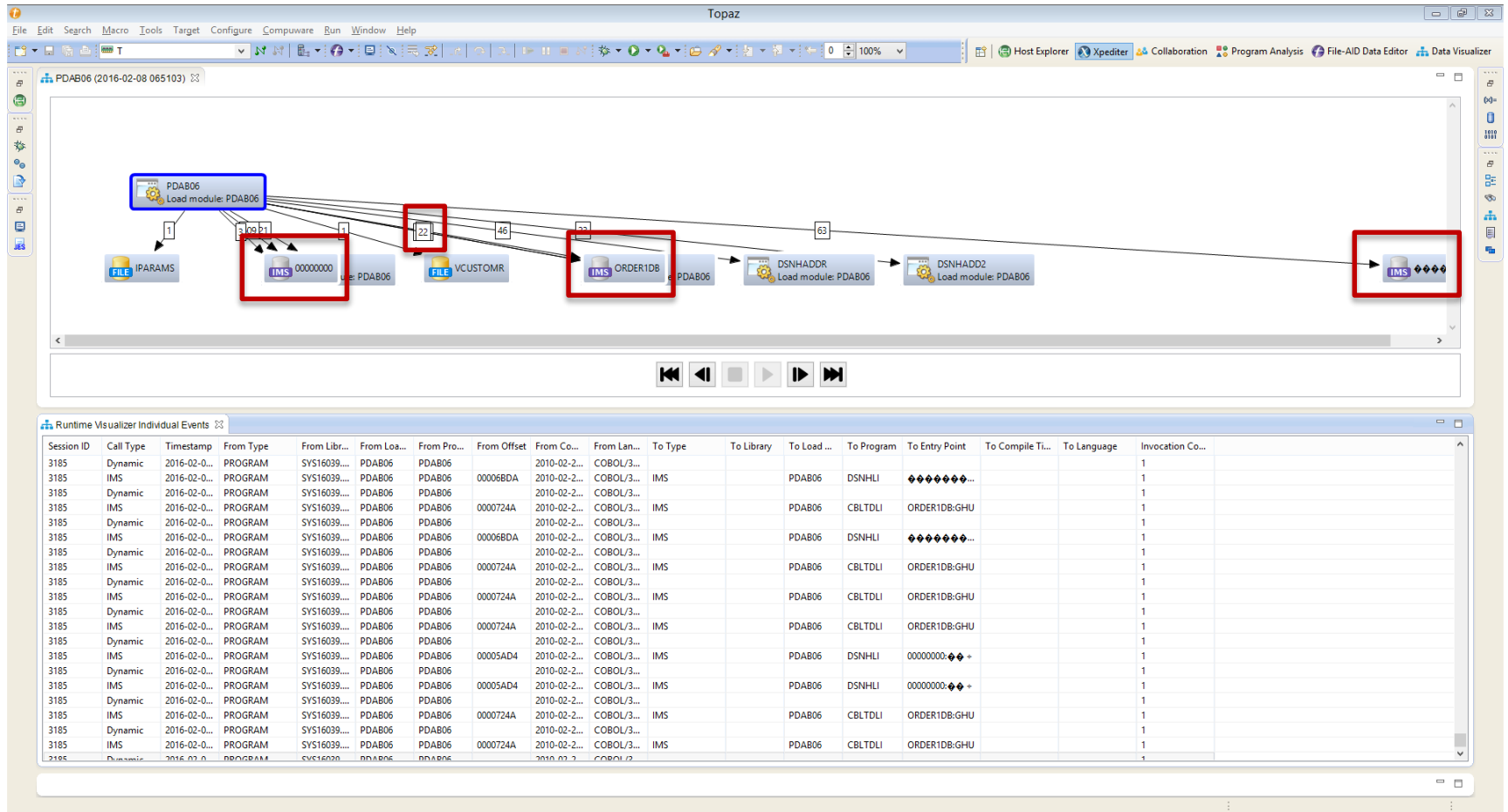
The Variables/Memory pane on the right shows the current values of various variables, including ICF-GHU, OP-STATUS, ORDER-PCB, OP-DBDNAME, OP-SEG-LEVEL, OP-STATUS, FILLER, OP-SEG-NAME, FILLER, OP-FEEDBACK-AREA, ORDER-SEGMENT, ORDER-KEY, ORDER-PURCHASE-N, ORDER-DATE-YMMM, ORDER-STATUS, ORDER-TOTAL-AMO, ORDER-NEXT-ITEM-S, ORDER-CUSTOMER-I, ORDER-PURCHASE-T, ORDER-SHIPPER-NUI, ORDER-SSA-QUAL, FILLER, FILLER, FILLER, FILLER, OSQ-ORDER-KEY, and FILLER.

The Console window at the bottom shows the output of the program, including the job name (HDDRXMOP), job ID (J0624023), owner (HDDRXM0), return code (CC 0000), description (Ended normally), job class (U), position (23991), and status (0).

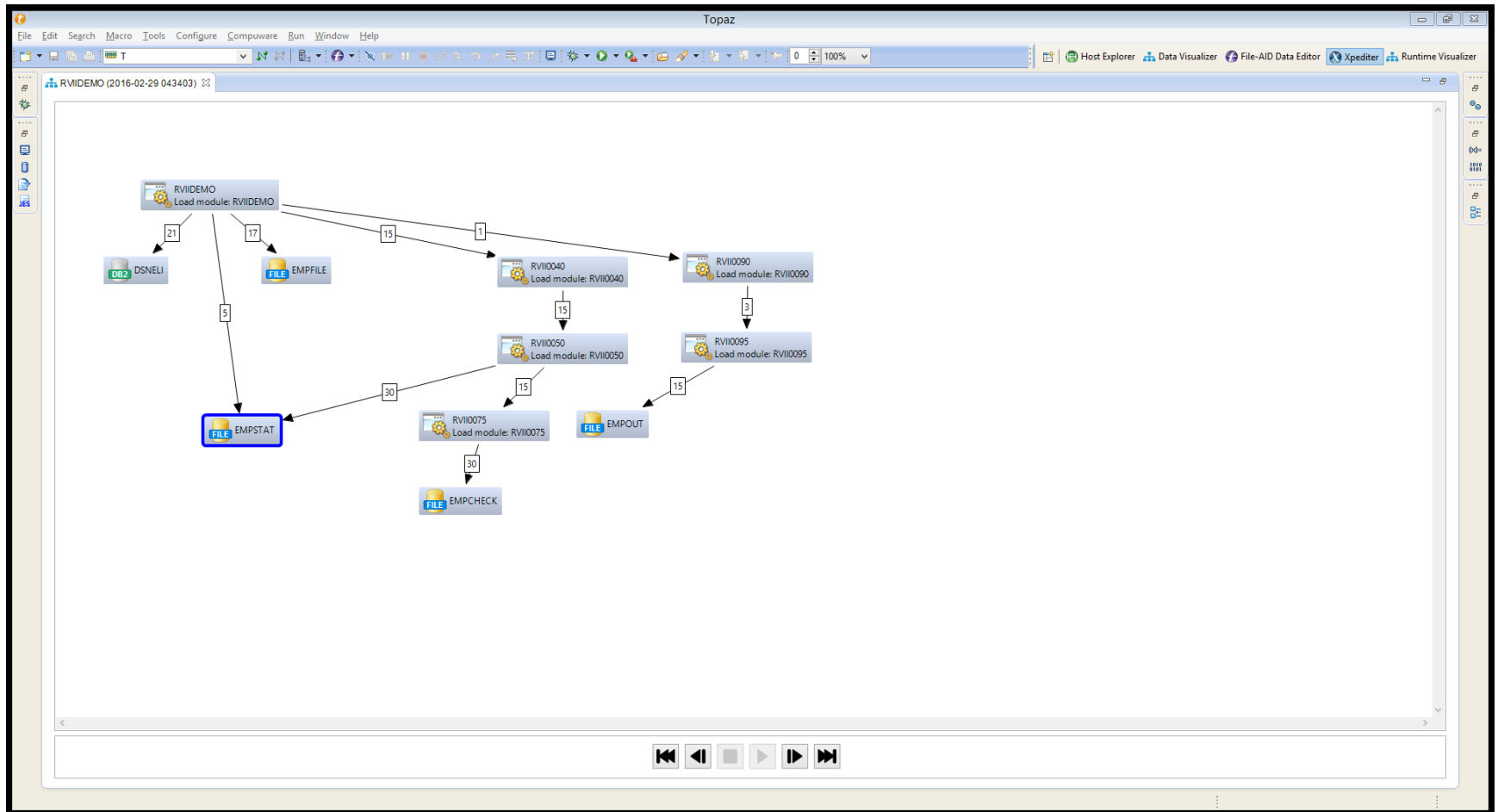
# While Debugging Runtime Visualization (real time)



# Runtime Visualization (Final Results)

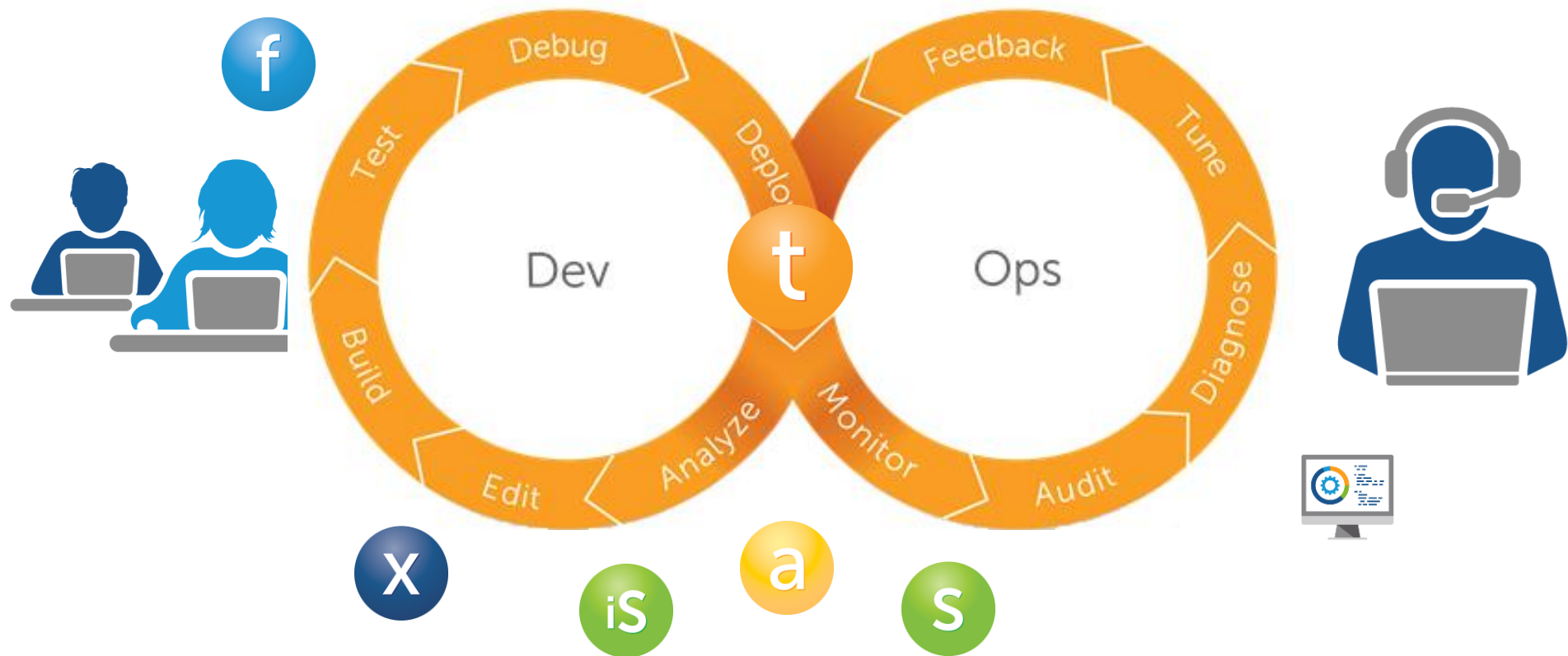


# Runtime Visualization (Final Results)

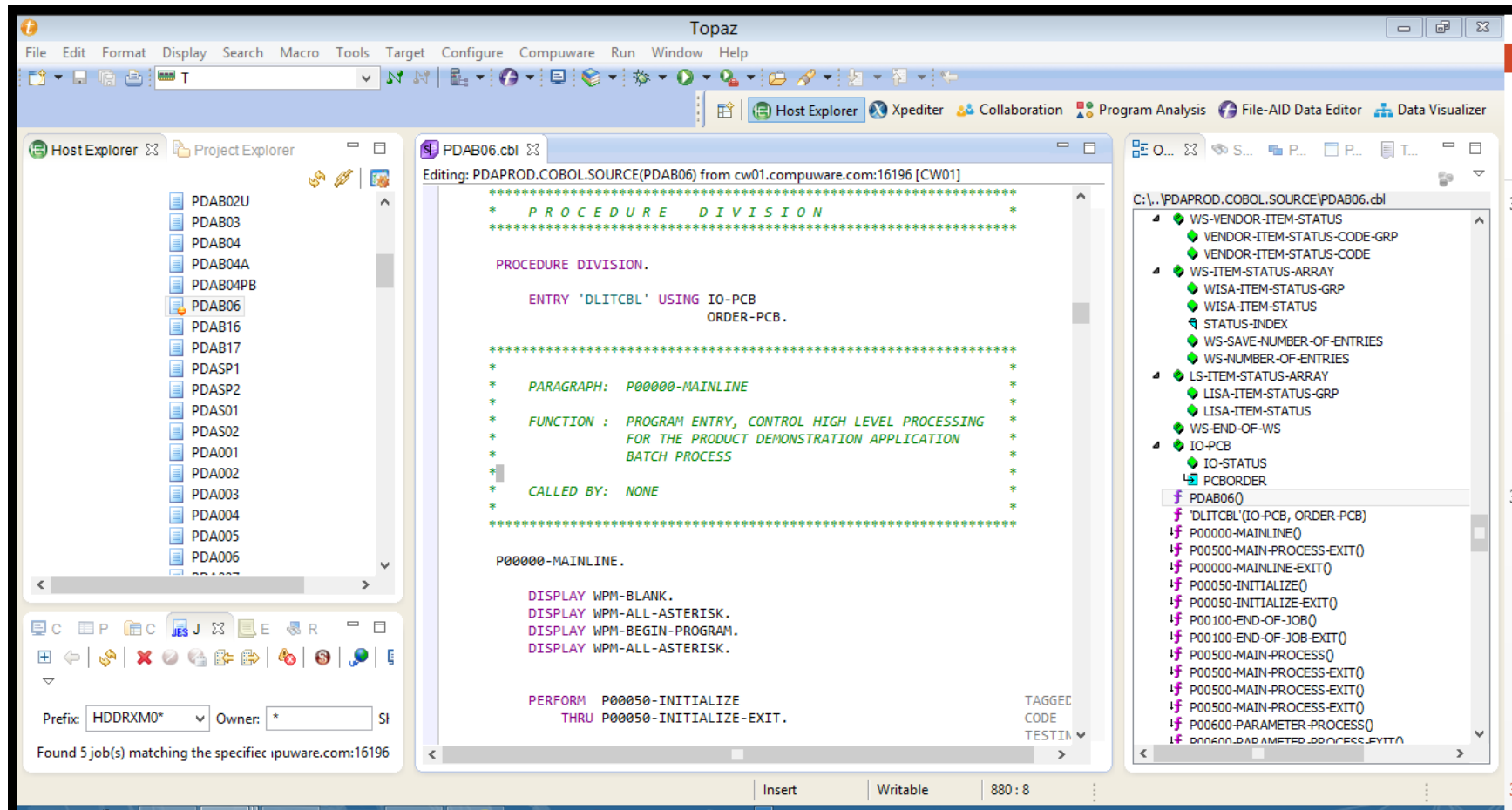




# Dev – Debugging and Analysis



# Source Code Editing



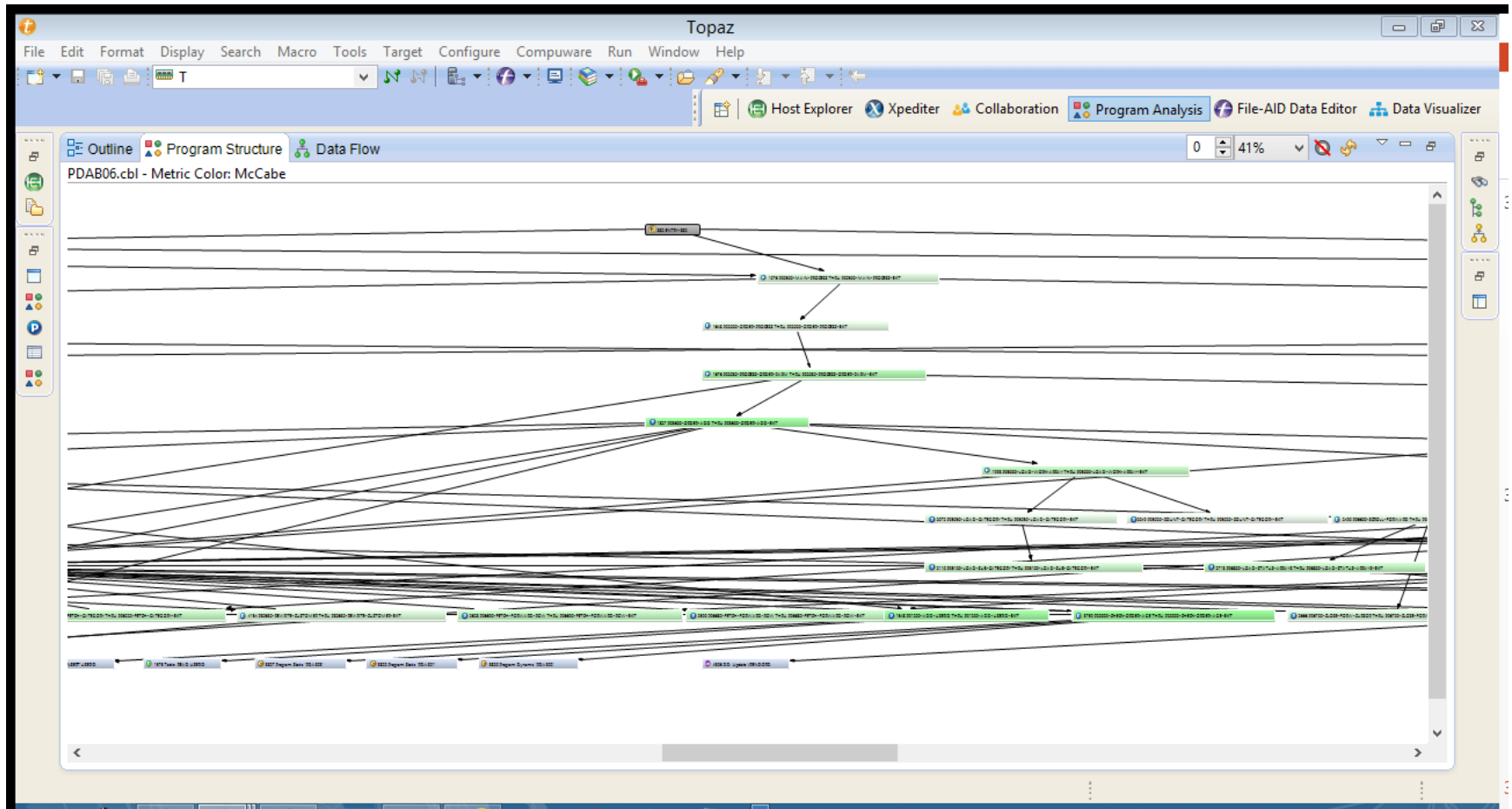
# Program Analysis and Visualization

The screenshot displays the Topaz software interface, which is used for program analysis and visualization. The interface is divided into several panes:

- Host Explorer:** Shows a list of projects, including PDAB02U and PDAB03.
- Project Explorer:** Shows a list of 25 items, including various files and folders.
- PDAB06.cbl:** The main editor window showing the source code of the program. The code is written in COBOL and includes comments and data statements. The code is as follows:

```
*****  
* PARAGRAPH: P02200-ORDER-CHANGE  
*  
* FUNCTION : ROUTINE TO PERFORM THE ORDER CHANGE PROC:  
* THE FUNCTIONALITY IS SIMILAR TO THE CICS  
* APPLICATION ORDER CHANGE PROCESS, THE ORD  
* DATE IS SET TO THE CURRENT DATE.  
*  
* CALLED BY: P02030-PROCESS-ORDER-PARM  
*****  
  
P02200-ORDER-CHANGE.  
  
*****  
* RETRIEVE THE ORDER FOR UPDATE -- NOT FOUND IS AN ERROR  
*****  
  
MOVE ZEROES TO OSQ-ORDER-PREFIX.  
MOVE WPR-ORDER-NUMBER TO OSQ-ORDER-NUMBER.  
  
PERFORM P80100-GHU-ORDER  
THRU P80100-GHU-ORDER-EXIT.  
  
IF OP-STATUS = SPACES  
NEXT SENTENCE  
ELSE  
DISPLAY WPM-BLANK  
DISPLAY WPM-ALL-ASTERISK  
MOVE WPR-ORDER-NUMBER TO WPM-ORDER-NUMBER-CHG  
DISPLAY WPM-ORDER-NOT-FOUND-CHANGE
```
- Program Structure:** A diagram showing the flow of the program. It includes a node for "882 ENTRY-882" and a node for "1076 P00500-MAIN-P".
- Logic Flow:** A diagram showing the flow of the program. It includes a node for "882 ENTRY-882", a node for "897 P00000-MAINLINE", a node for "909 IF", and a node for "910 PERFORM".

# Program Structure



# Procedure Complexity

Topaz

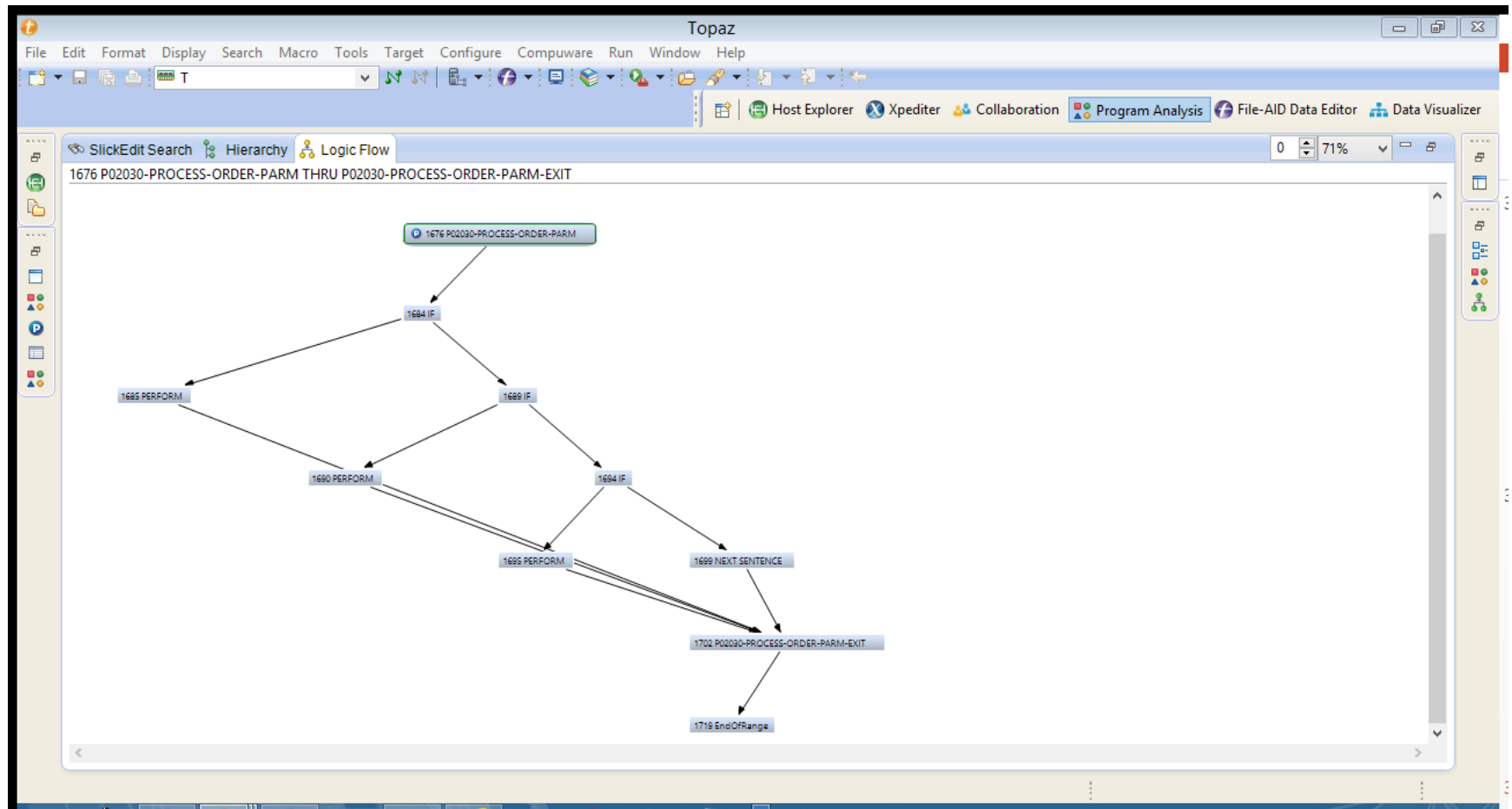
File Edit Format Display Search Macro Tools Target Configure Compuware Run Window Help

Host Explorer Xpediter Collaboration Program Analysis File-AID Data Editor Data Visualizer

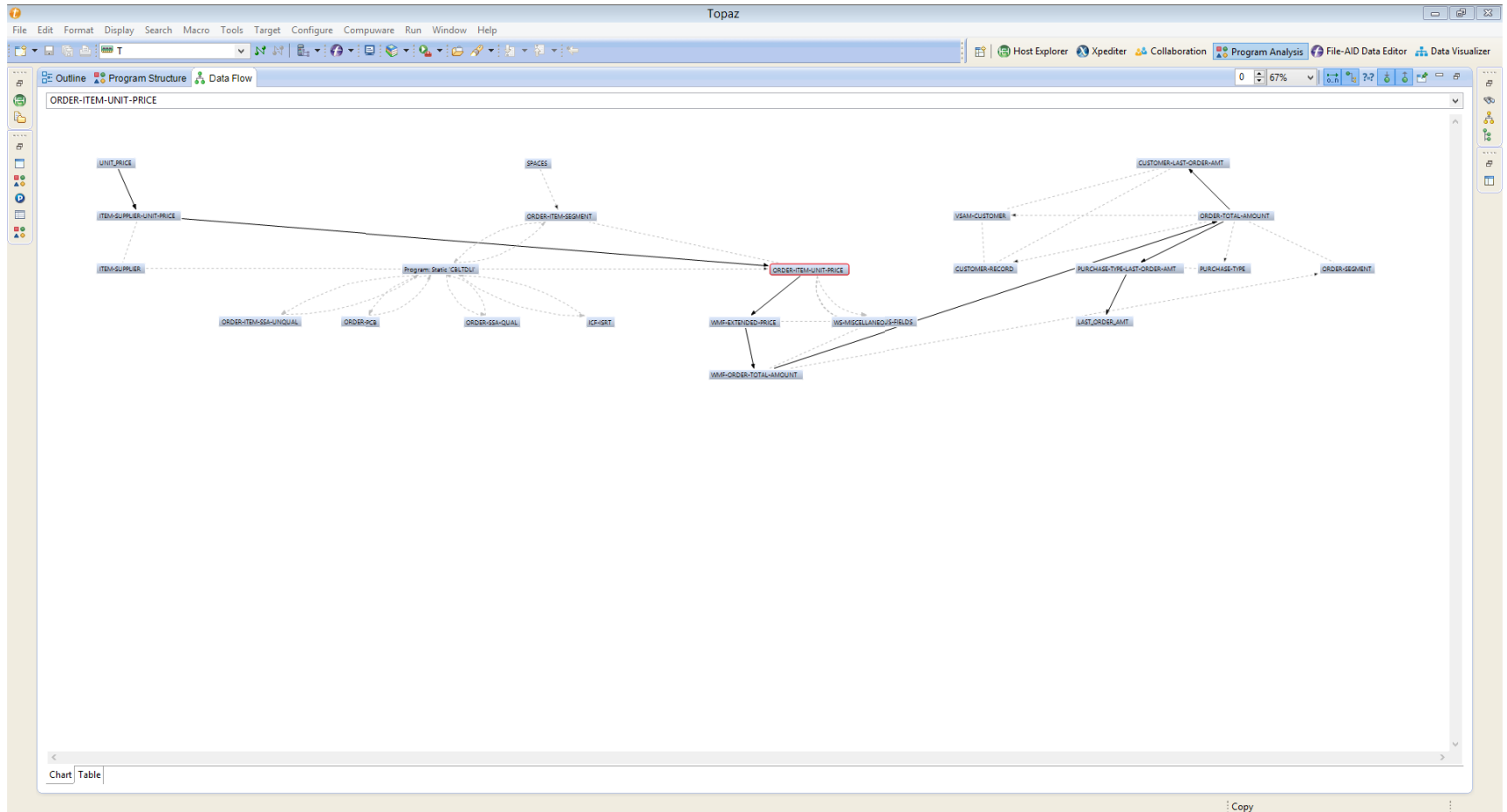
Problems Program Summary Procedures Properties Compiler Options

Procedure Name	McCabe	Statements	Blocks	Condition...	GOTOs	File I/O	Performs	Program C...	Perform R...	Group Ret...	Starting Line
P99500-PDA-ERROR THRU P99500-PDA-ERROR-EXIT	7	29	13	6	0	12	0	1	No	No	4432
P99400-ERROR-ROUTINE THRU P99400-ERROR-ROUTI...	1	15	2	0	0	12	0	0	No	Yes	4392
P80790-REWRITE-PEND-ORDER THRU P80790-REWRITE...	3	11	9	2	0	1	1	0	No	Yes	4341
P80760-WRITE-PEND-ORDER THRU P80760-WRITE-PEN...	3	11	9	2	0	1	1	0	No	Yes	4304
P80730-DELETE-PEND-ORDER THRU P80730-DELETE-P...	3	11	7	2	0	1	1	0	No	Yes	4266
P80710-READ-PENDORD-SEQ THRU P80710-READ-PEN...	5	11	9	2	0	1	1	0	No	Yes	4229
P80700-READ-PENDORD-RANDM THRU P80700-READ-...	4	11	9	2	0	1	1	0	No	Yes	4192
P80630-REWRITE-CUSTOMER THRU P80630-REWRITE-...	3	11	9	2	0	1	1	0	No	Yes	4154
P80600-READ-CUSTOMER THRU P80600-READ-CUSTO...	4	11	9	2	0	1	1	0	No	Yes	4117
P80500-ISRT-ORDER-ITEM THRU P80500-ISRT-ORDER-I...	3	12	9	2	0	0	1	1	No	Yes	4076
P80400-DLET-ORDER THRU P80400-DLET-ORDER-EXIT	3	12	9	2	0	0	1	1	No	Yes	4037
P80300-REPL-ORDER THRU P80300-REPL-ORDER-EXIT	3	12	9	2	0	0	1	1	No	Yes	3997
P80200-ISRT-ORDER THRU P80200-ISRT-ORDER-EXIT	3	12	9	2	0	0	1	1	No	Yes	3957
P80130-GN-ORDER THRU P80130-GN-ORDER-EXIT	5	12	9	2	0	0	1	1	No	Yes	3918
P80100-GHU-ORDER THRU P80100-GHU-ORDER-EXIT	5	12	9	2	0	0	1	1	No	Yes	3878
P80000-READ-PARAMETERS THRU P80000-READ-PARA...	2	11	8	1	1	6	0	0	No	Yes	3844
P20000-CHECK-ORDER-AGE THRU P20000-CHECK-OR...	10	32	42	9	0	0	2	3	No	Yes	3759
P09900-SCAN-ORDERS THRU P09900-SCAN-ORDERS-E...	1	2	2	0	0	0	1	0	No	Yes	3734
P09500-CHK-BRANCH-ORDERS THRU P09500-CHK-BR...	7	15	13	5	0	0	1	0	No	Yes	3683
P09130-UPDATE-PURCH-TYPE THRU P09130-UPDATE-...	3	12	9	2	0	0	1	0	No	Yes	3634
P09090-UPDATE-CUSTOMER THRU P09090-UPDATE-C...	3	15	7	2	0	0	3	0	No	Yes	3580
P09060-ORDER-ITEMS THRU P09060-ORDER-ITEMS-EXIT	5	28	13	3	1	0	3	0	No	Yes	3486
P09030-CREATE-ORDER-ROOT THRU P09030-CREATE-...	1	20	2	0	0	0	2	0	No	Yes	3438
P09000-CREATE-ORDER THRU P09000-CREATE-ORDER...	7	38	18	6	0	0	11	0	No	Yes	3315
P08290-CLOSE-ITEMSUPL-CSR THRU P08290-CLOSE-IT...	3	9	7	2	0	0	1	0	No	Yes	3279
P08260-FETCH-ITEMSUPL THRU P08260-FETCH-ITEMS...	5	22	10	4	1	0	2	0	No	Yes	3211

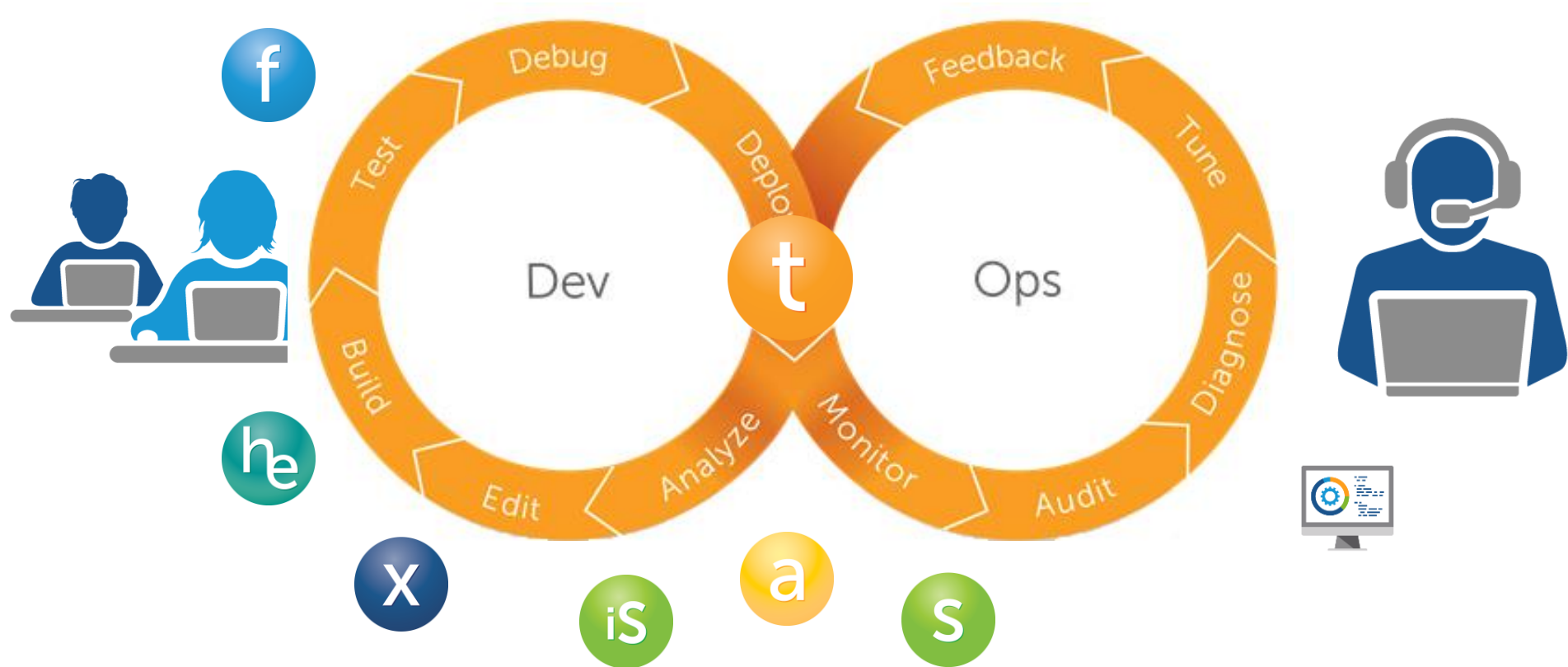
# Logic Flow of Procedures



# Data Flow between Fields



# Dev – Source Code Editing





# What about Testdata?

```
Vista TN3270 Session A
File Edit Font Transfer Macro Options Window Help
[Icons] A B C ?
-----
Display Filter View Print Options Search Help
-----
SDSF OUTPUT DISPLAY HDDRXM0B J0788503 DSID 103 LINE 0 COLUMNS 02- 81
COMMAND INPUT ==> SCROLL ==> CSR
***** TOP OF DATA *****
FILE-AID FOR IMS/FLEX 16.03.00 BATCH EXECUTION REPORT

COMMAND EXECUTION PHASE
RUN TYPE: DLI PSB MODE: DYNAMIC DBD NAME: ORDER1DB COMMAND DATASET: HDDR

STATEMENT LINE USER INPUT STATEMENT -OR-
NUMBER NUMBER SYSTEM SUPPLIED STATEMENT
-----
1 0
1 1 COUNT
1 2 SEGMENT=ORDER
1 3 OPTION=CKEY
1 4 ;
B809 THIS COMMAND WILL SCAN FROM THE START TO THE END
B802 PRIMARY COMMAND OF COUNT TERMINATED DUE TO END OF
LVL SEGMENT NBR NAME RETRIEVED QUALIFIED CHANGED DELETED INSERTED
1 ORDER 79,943 79,943 0 0 0
STATEMENT LINE USER INPUT STATEMENT -OR-
NUMBER NUMBER SYSTEM SUPPLIED STATEMENT
-----
2 1 COUNT
2 2 SEGMENT=ORDITEM
2 3 OPTION=CKEY
2 4 ;
B146 OUTPUT INFORMATION, MULTIPLE STATEMENTS ARE USING
B809 THIS COMMAND WILL SCAN FROM THE START TO THE END
B903 PRIMARY COMMAND OF COUNT TERMINATED DUE TO END OF
LVL SEGMENT NBR NAME RETRIEVED QUALIFIED CHANGED DELETED INSERTED
2 ORDITEM 752,132 752,132 0 0 0
STATEMENT LINE USER INPUT STATEMENT -OR-
NUMBER NUMBER SYSTEM SUPPLIED STATEMENT
-----
2 1
B113 END OF EXECUTE PHASE DUE TO END OF FILE ON INPUT,
Ma 1.4 02/29/16.060 08:18AM cw01.compuware.com a 4,21
```

# Selection Criteria against Source DB

```
File-AID for IMS ----- Field Criteria List ----- Row 1 to 2 of 2
COMMAND ==> SCROLL ==> CSR

Criteria set: 1
Segment name: ORDER

To create Field Criteria, select a line and enter the FORMATTED indicator (Y/N)
and the optional description
Enter S, I, D, or R to select, insert, delete, or repeat Field Criteria
The relationship between each field criterion is ORed

Line Criteria
Cmd Number Formatted -----Condition Description----- Data base
1 1 Y AMOUNT INVALID Access
2 2 Y SEQ INVALID SEQUENTIAL
*** END OF FIELD CRITERIA LIST ***
```

Ma 1.4 02/09/16.040 11:53AM cw01.compuware.com a 2,15

# The Result Set

Vista TN3270 Session A

File Edit Font Transfer Macro Options Window Help

Display Filter View Print Options Search Help

---

SDFS OUTPUT DISPLAY HDDRXM00 J0631067 DSID 108 LINE 12 COLUMNS 02- 133  
 COMMAND INPUT ==> SCROLL ==> CSR

DBD	DDNAME	DATASET NAME	ALLOCATION	DISP	DBRC REGISTRATION	SHR-LEV
ORDER10B	ORDER1DD	HDDRXM00.H0199999.ORDER10B	JCL	SHR	DBRC NOT ACTIVE	N
ORDEX10B	ORDEX1DD	HDDRXM00.H0199999.ORDEX10B	JCL	SHR	DBRC NOT ACTIVE	N

"TO" EXTRACT FILE: HDDRXM00.H0199999.ORDER.EXTRA

FILE-AID FOR IMS 16.03.00 DATA BASE EXTRACT REPORT PAGE 2

PRIMARY DATA BASE

			----- USING SELECTION CRITERIA -----			SEGS EXTRACTED	TOTAL
LEVEL	SOURCE	SEGMENTS	SEGMENTS	SEGMENTS	TO RESOLVE	SEGMENTS	SEGMENTS
	SEGMENT	READ	REJECTED	EXTRACTED	RELATIONSHIPS	EXTRACTED	EXTRACTED
1	DBD-ORDER10B	ORDER	79943	79828	115	0	115
2		ORDITEM	0	0	0	0	0
TOTALS			79943	79828	115	0	115

NOTE: DATA BASE ACCESS WAS SEQUENTIAL

FILE-AID FOR IMS 16.03.00 DATA BASE EXTRACT REPORT PAGE 3

SELECTION CRITERIA DATASET: HDDRXM00.FISAMP.SELCRIT MEMBER: SELORDR

SELECTION CRITERIA CONTENTS:

SELECT RELATED DATA BASE ACDS = Y

Ma 0.1 02/09/16.040 12:00PM cw01.compuware.com 4.21

# What about Data Privacy?

Parent: <None>  
Segment: ORDER Concatenated key: 00000000004900

No.	Field Name	Value
1	01 ORDER-SEGMENT	
2	05 ORDER-KEY	
3	10 ORDER-PREFIX	
4	10 ORDER-NUMBER	4900
5	05 ORDER-PURCHASE-NUMBER	1234567890123
6	05 ORDER-DATE-YYMMDD	000929
7	05 ORDER-STATUS	In-Progress
8	05 ORDER-TOTAL-AMOUNT	8335.74
9	05 ORDER-NEXT-ITEM-SEQUENCE	10
10	05 ORDER-CUSTOMER-KEY	
11	10 ORDER-CUSTOMER-PREFIX	0
12	10 ORDER-CUSTOMER-ID	BESTBOLTS
13	05 ORDER-PURCHASE-TYPE-KEY	
14	10 ORDER-PURCHASE-TYPE	0
15	10 ORDER-PURCHASE-TYPE	1

Parent: ORDER  
Segment: ORDITEM Concatenated key: 00000000004900.00

No.	Field Name	Value
1	01 ORDER-ITEM-SEGMENT	
2	05 ORDER-ITEM-KEY	
3	10 ORDER-ITEM-PREFIX	
4	10 ORDER-ITEM-SEQUENCE	1
5	05 ORDER-ITEM-QUANTITY	37
6	05 ORDER-ITEM-UNIT-PRICE	9.15
7	05 ORDER-ITEM-ITEM-KEY	
8	10 ORDER-ITEM-ITEM-PREFIX	0
9	10 ORDER-ITEM-ITEM-NUMBER	1494
10	05 ORDER-ITEM-SUPPLIER-KEY	
11	10 ORDER-ITEM-SUPPLIER	0
12	10 ORDER-ITEM-SUPPLIER	BriteMfg

HDDRXM0.H0199999.LAYOUTS(ORDER) ⓘ

**ORDER-SEGMENT.**

The following Data Elements & rules will be applied to objects using this metadata.

Find: ⓘ

Name	Rule	Type	Length	Picture	Value
ORDER-SEGMENT.					
ORDER-KEY					
ORDER-PREFIX		FIXPIC	5		
ORDER-NUMBER		FIXPIC	10	(5)	0
ORDER-PURCHASE-NUMBER		FIXDEC	13	(10)	4900
ORDER-DATE-YYMMDD		CHAR	6	(13)	1234567890123
ORDER-STATUS		CHAR	32	(6)	000929
ORDER-TOTAL-AMOUNT		FIXDEC	9,2	(32)	In-Progress
ORDER-NEXT-ITEM-SEQUENCE		FIXDEC	5	9 (7) V9 (2)	8335.74
ORDER-CUSTOMER-KEY					
ORDER-CUSTOMER-PREFIX		FIXPIC	5	(5)	10
ORDER-CUSTOMER-ID		CHAR	32		
DE: CUSTOMER ID	Customer ID encryption			(5)	0
ORDER-CUSTOMER-ID				(32)	RFYEDOBUY
ORDER-PURCHASE-TYPE-KEY					
ORDER-PURCHASE-TYPE-PREFIX		FIXPIC	5	(5)	0

HDDRXM0.H0199999.LAYOUTS(ORDER) HDDRXM0.H0199999.LAYOUTS(ORDITEM) ⓘ

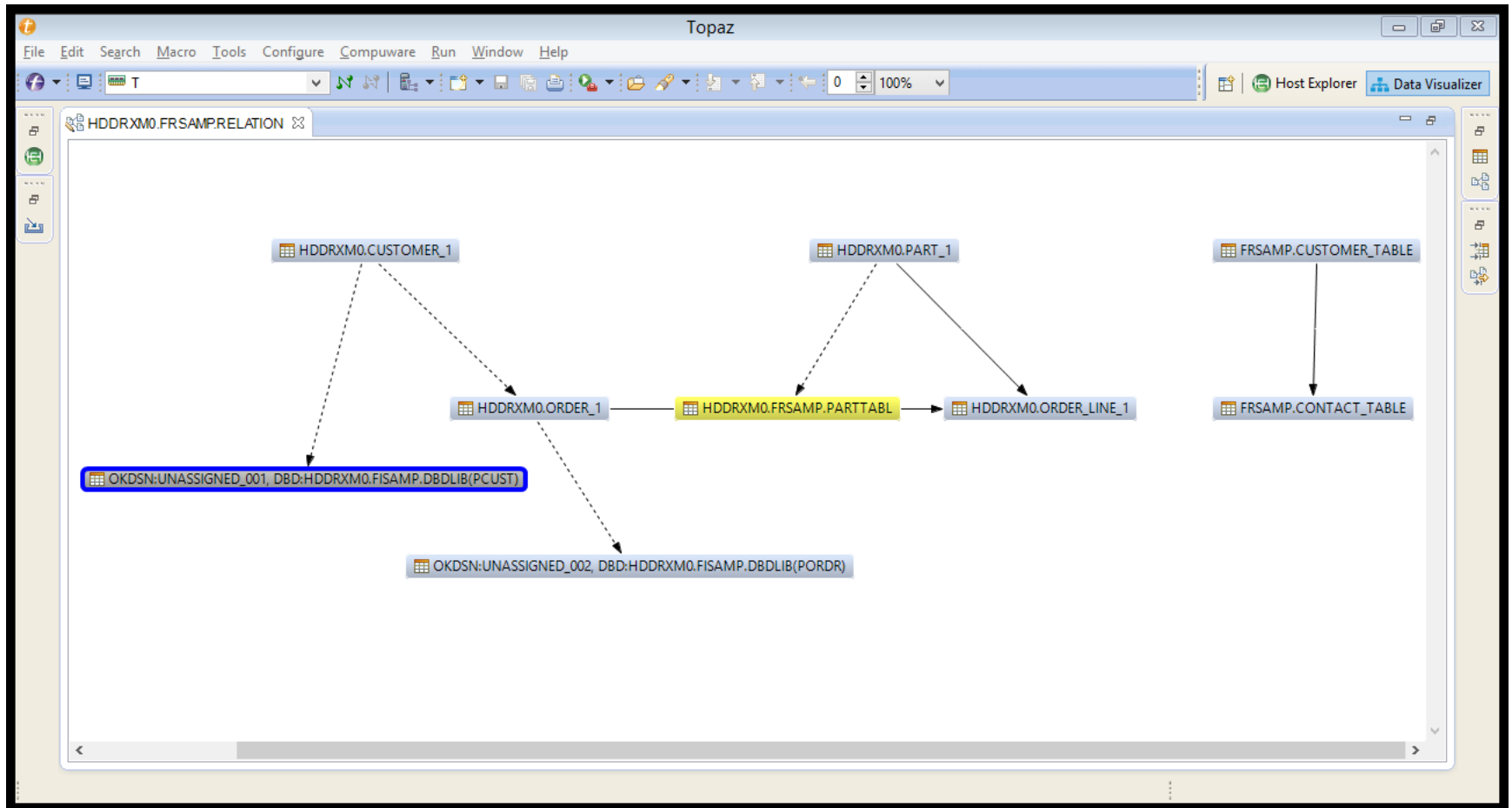
**ORDER-ITEM-SEGMENT.**

The following Data Elements & rules will be applied to objects using this metadata.

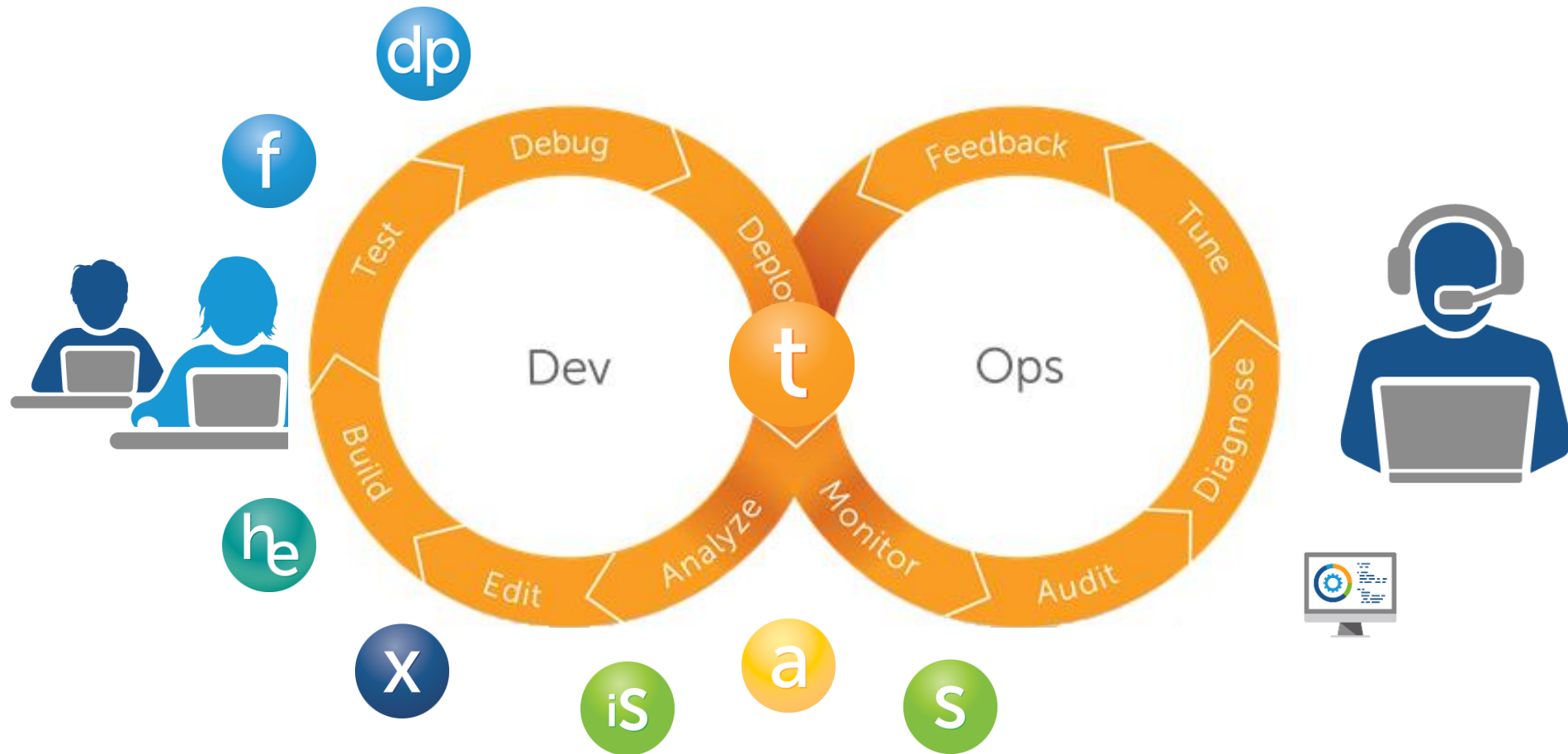
Find: ⓘ

Name	Rule	Type	Length	Picture	Value
ORDER-ITEM-SEGMENT.					
ORDER-ITEM-KEY					
ORDER-ITEM-PREFIX		FIXPIC	5		
ORDER-ITEM-SEQUENCE		FIXPIC	5	(5)	0
ORDER-ITEM-QUANTITY		FIXDEC	9	(5)	1
ORDER-ITEM-UNIT-PRICE		FIXDEC	10,2	(9)	37
ORDER-ITEM-ITEM-KEY				9 (8) V9 (2)	9.15
ORDER-ITEM-ITEM-PREFIX		FIXPIC	5		
ORDER-ITEM-ITEM-NUMBER		CHAR	32	(5)	0
ORDER-ITEM-SUPPLIER-KEY				(32)	1494
ORDER-ITEM-SUPPLIER-PREFIX		FIXPIC	5		
ORDER-ITEM-SUPPLIER-ID		CHAR	32		
DE: SUPPLIER ID	Supplier ID encryption			(5)	0
ORDER-ITEM-SUPPLIER-ID				(32)	RzkeoCfy

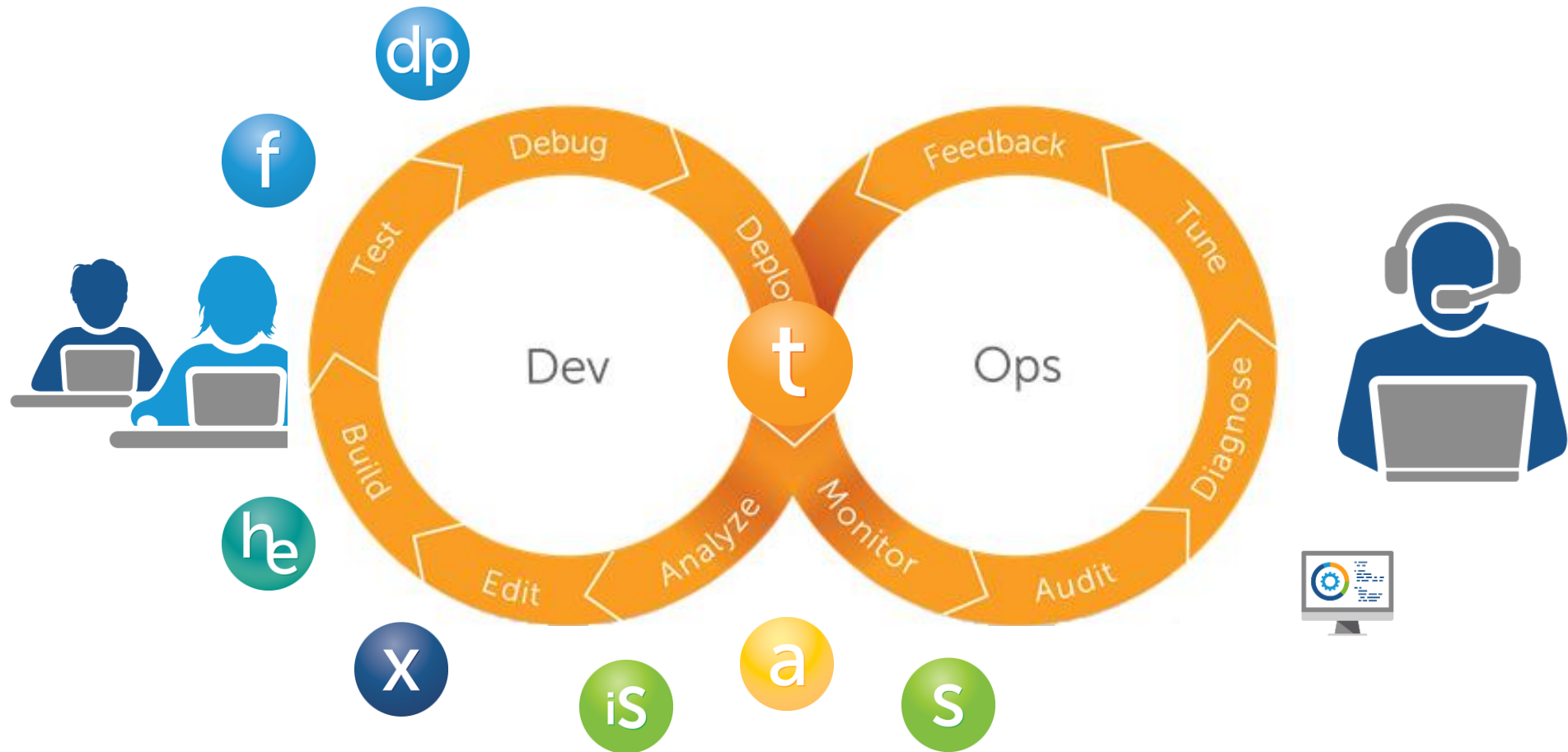
# Across all Platforms



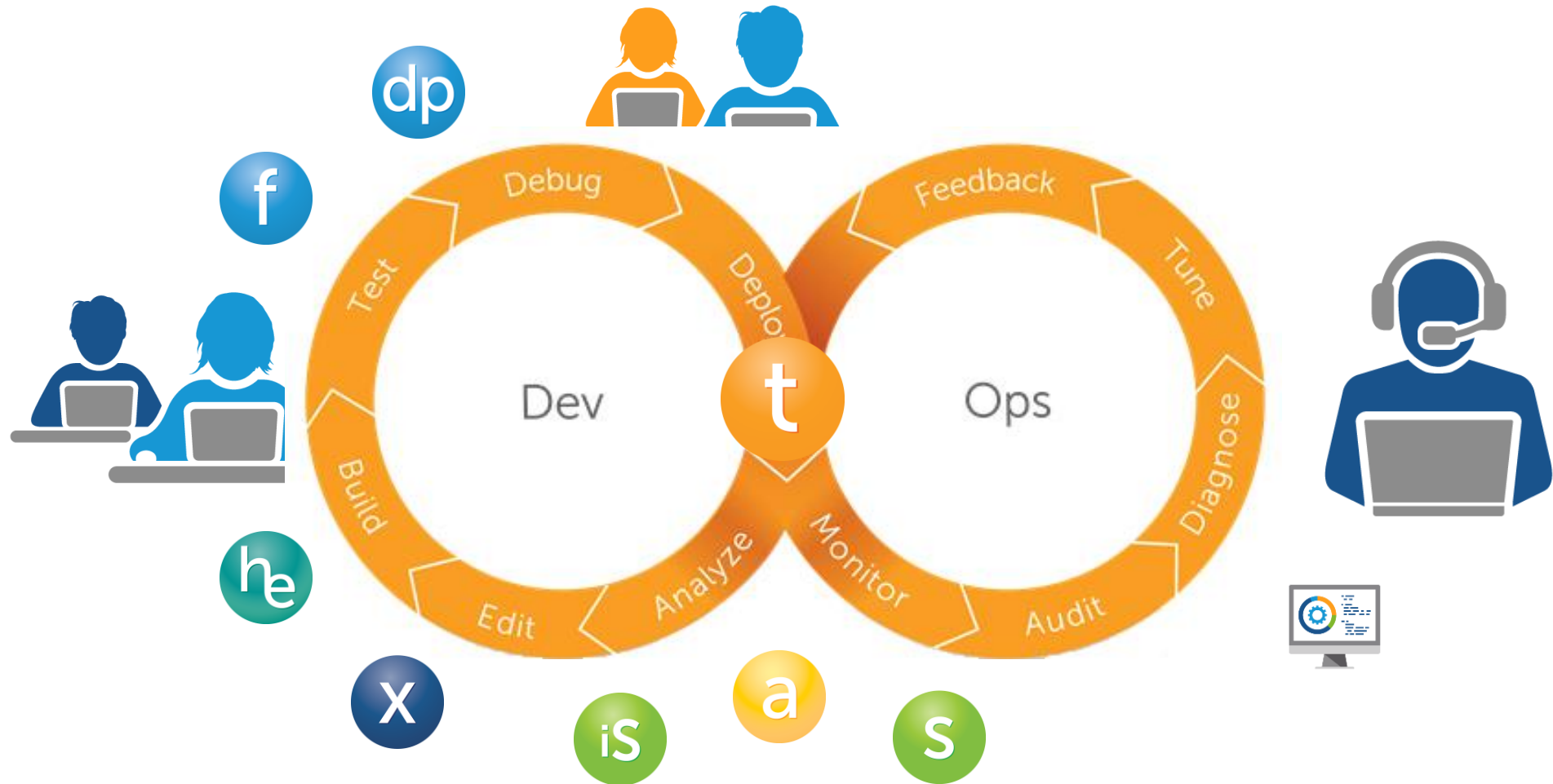
# Dev – Test Data Management



# Dev (?) – Test Data Management



# Dev, Test – Test Data Management





# Tx Testing – Capture/Replay/Compare

Vista TN3270 Session A

File Edit Font Transfer Macro Options Window Help

ZOOM:F23 ----- HIPERSTATION -----

Command ==>

SCRN# 00000008 IS: DELTA , CMDS: ACTUAL, DELTA, DIFFER, EXPECTED, CO, MACK

PDA008 BOLTS 'N THINGS

0001 PENDING ORDER

PLAYBACK COMPARE CHECK

Scroll ==> CSR

DATE: 02/26/16

TIME: 03:35:36

ACTION (C=CHANGE, D=DELETE)

-----

ORDER QTY	ITEM NO.	ITEM NAME	UNIT PRICE	EXT. PRICE	STATUS
2	1003	ANCHOR BOLTS - 4.5548 X 0.4537	19.33	1,933.00	IN STOCK
200	1	ANCHOR BOLTS - 4.5548 X 0.4537	23.40	4,680.00	IN STOCK
100	1000	ANCHOR BOLTS - 3.5277 X 1.0668	5.19	519.00	IN STOCK

TOTAL COST: 206,609.00

PF3 =PREVIOUS PF4 =PROCESS ORDER PF7 =SCROLL BACKWARD PF8 =SCROLL FORWARD

PF10=BROWSE CATEGORIES PF11=ORDER MENU PF12=MAIN MENU

UPDATE COMPLETE

\*\*\*\*\* END OF VIRTUAL TERMINAL SPACE \*\*\*\*\*

Ma 2.2 02/26/16.057 09:46AM cw01.compuware.com a a 2,15

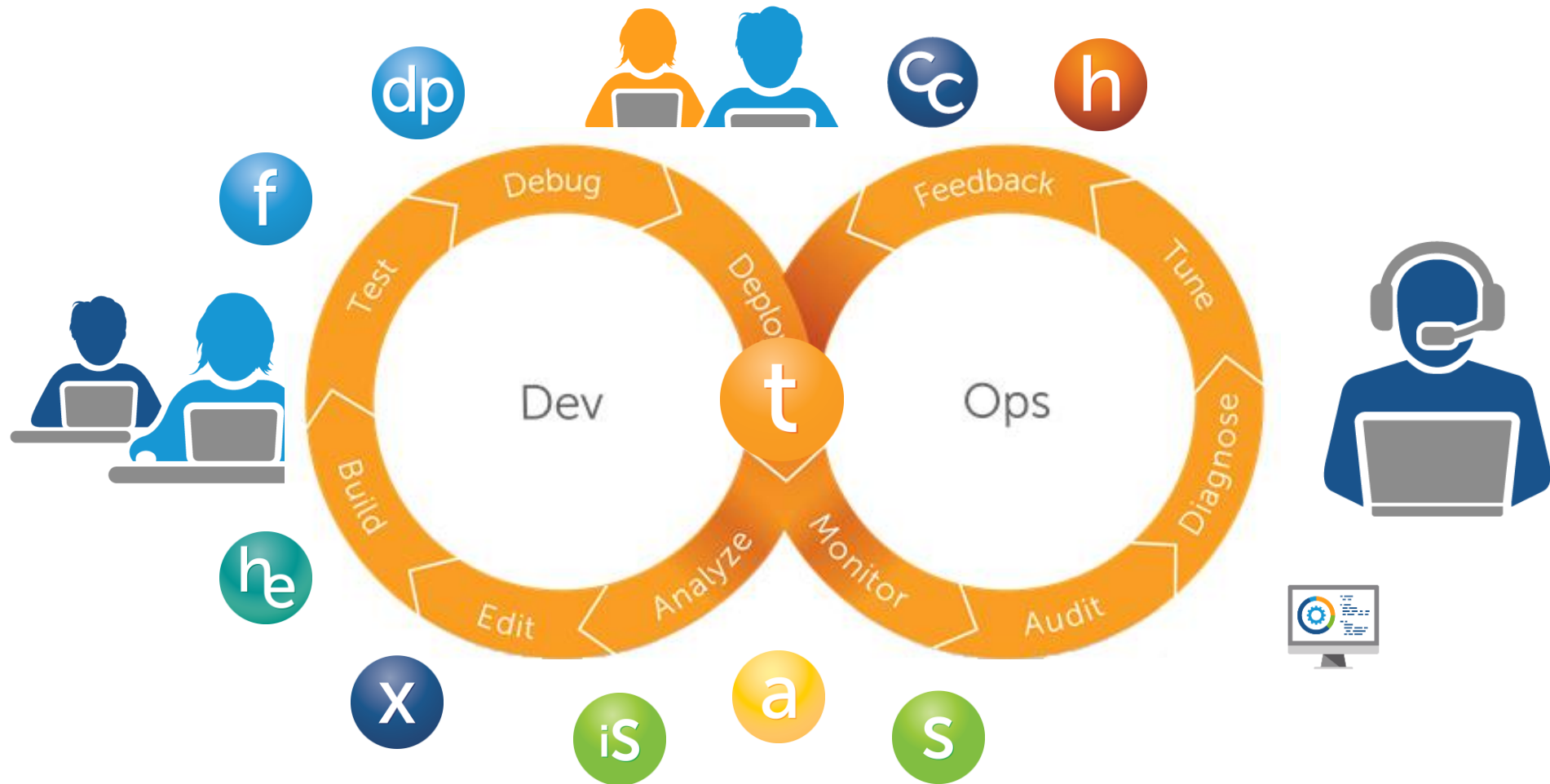
# Test Coverage

The screenshot displays the Topaz software interface, which is used for testing and analyzing COBOL programs. The interface is divided into several panes:

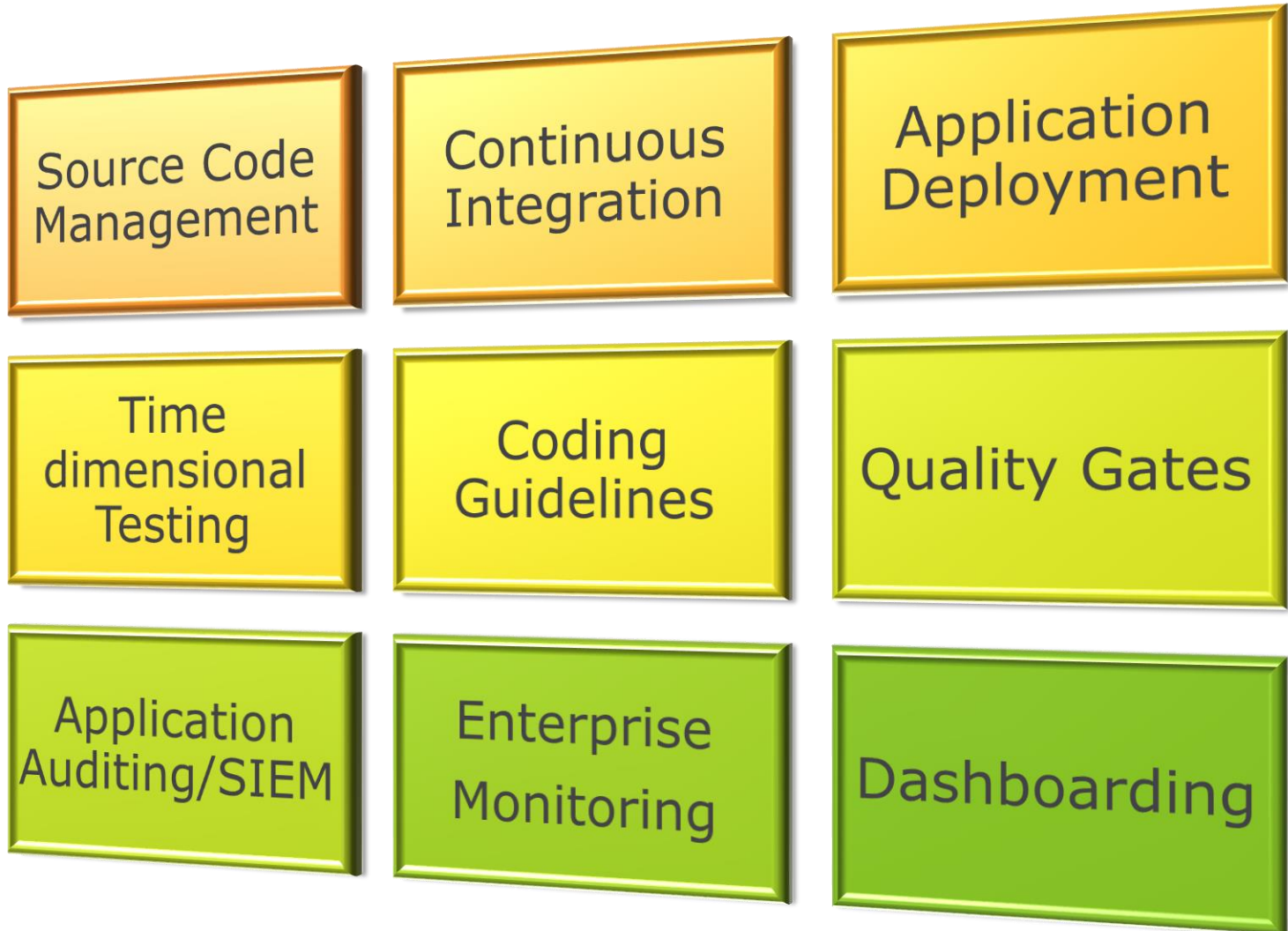
- Top Panel:** Contains the menu bar (File, Edit, Search, Macro, Tools, Configure, Compuware, Run, Window, Help) and a toolbar with various icons for file operations and analysis.
- Left Pane (Demo):** A tree view showing the project structure. It includes a table with columns: Name, Risk, Critical Verb %, Verb %, Critical Branch %, and Branch %.
- Bottom Left Pane (Annotations, Console, Report View):** The Report View is active, showing a table with columns: Execution Status, Filter Type, Branch Status, Line, Optimization, and Execution. It displays a summary of test results for the program TRIMAIN2.
- Right Pane (Code Coverage):** Displays the source code of the program TRIMAIN2 (2016-02-02 11:21:23). The code is color-coded to show coverage status: green for executed lines and red for unexecuted lines. A red line indicates an overflow error: "ON OVERFLOW DISPLAY 'INVALID NAME: ' N-NAME".

Background tagging is complete for tag file 'com.compuware.codecoverage.vtg'

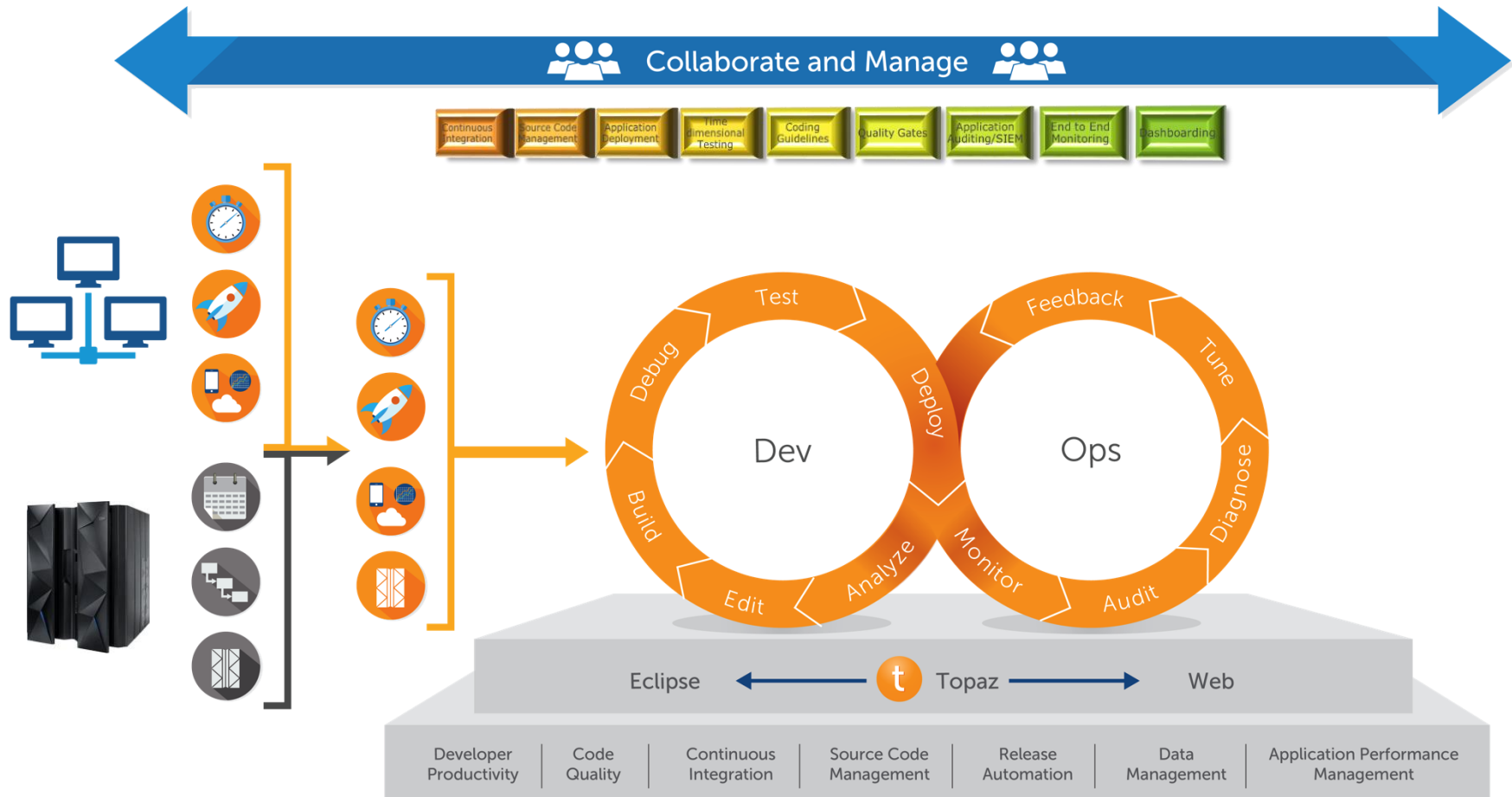
# Dev, Test, Ops – The (almost) complete Picture



# Just a few additional topics



# DevOps across the Enterprise



Comments?  
Thoughts?  
Feedback?  
Curious?



The Mainframe Software Partner  
For The Next 50 Years