



Problem Determination for z Workloads

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Agenda

Problem Determination Tools Overview

The new GUI face of the IBM PD Tools

Fault Analyzer Interfaces

Debug Tool Interfaces

Application Performance Analyzer Interfaces

File Manager Interfaces

Summary

Q&A



IBM Problem Determination Tools Suite for z/OS

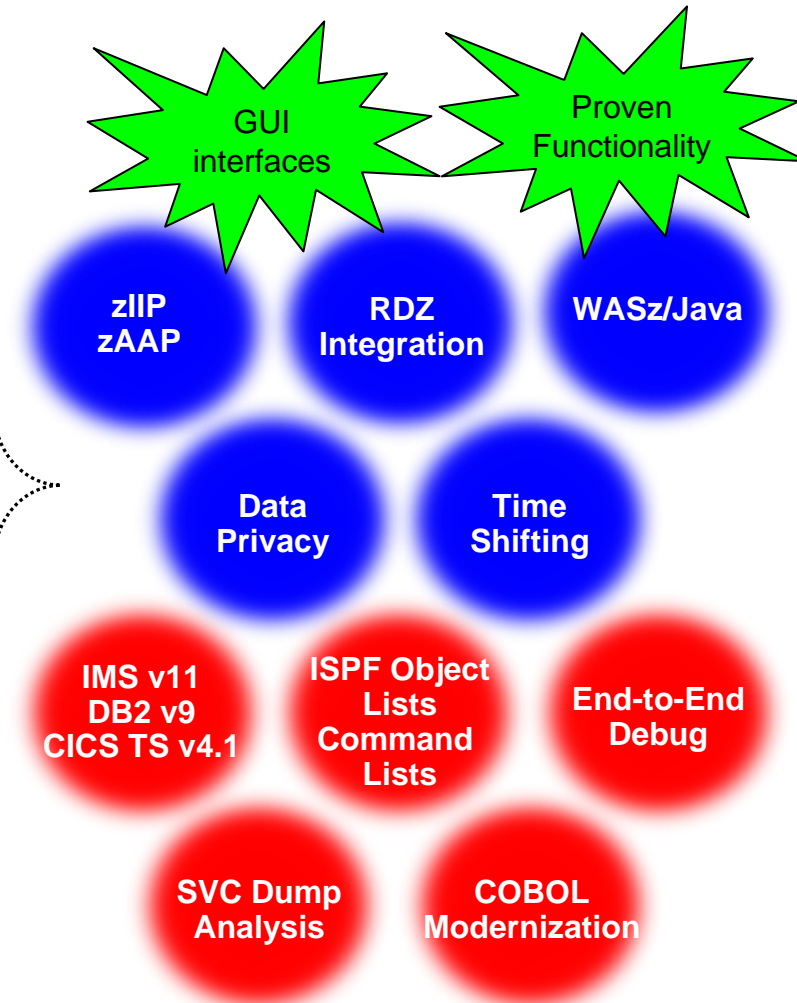
Best of breed application development tooling

IBM Problem Determination Tools

IBM 2010 Offerings



www.ibm.com/software/awdtools/deployment



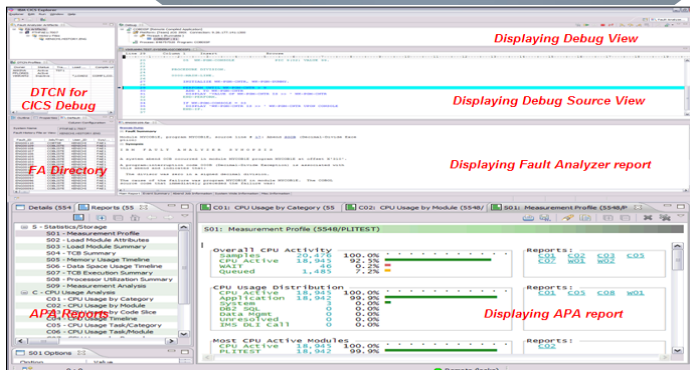
The new GUI face of the IBM PD Tools



IBM Problem Determination Tools V11 GUIs

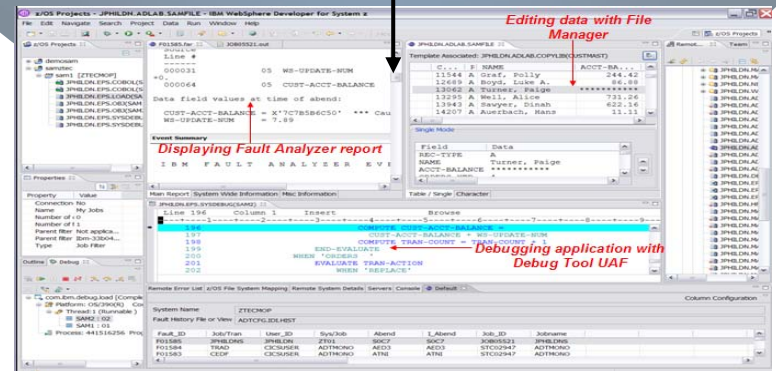
- The GUIs are available as plug-ins to CICS Explorer, or integrated with Rational Developer for System z

PD V10 GUI plug-ins in CICS Explorer



RDz

System z Application Lifecycle



The tools also provide excellent, traditional 3270-based interfaces

Fault Analyzer
Application Performance Analyzer
Debug Tool

Synopsis

Command ==>

JOBNAME: DNE

Source

Line #

000088

000089

000090

The COBOL so

Source

Line #

000059

000066

Data field v

BALANCE-TO

CUST-ACCT-

*** Bottom c

```

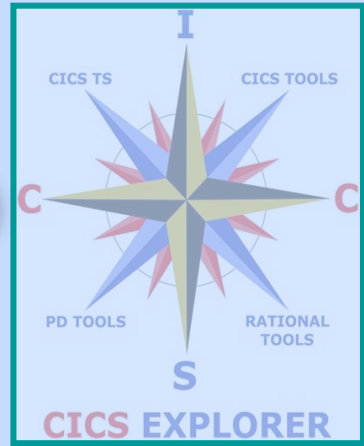
S01: Measureme
Command ==>
COBOL LOCATION: SAM1 :> 315.1
Command ==>
MONITOR +-----1-----2-----3-----4-----5-----6- LINE: 1 OF 5
-----+-----1-----2-----3-----4-----
0001 1 BALANCE-COUNT +0000006.00
0002 2 NUM-DETAIL-LINES +000000005
0003 3 ***** AUTOMONITOR *****
0004 02 CUST-NAME 'Parker, Ford'
0005 02 RPT-CUST-NAME 'Deeds, Darren'
***** BOTTOM OF MONITOR *****
SOURCE: SAM1 +-----1-----2-----3-----4-----5--- LINE: 312 OF 467
312 CALL 'SAM2' USING CUST-REC,
313 CUSTOMER-BALANCE-STATS
314 MOVE CUST-ID TO RPT-CUST-ID
315 MOVE CUST-NAME TO RPT-CUST-NAME
316 MOVE CUST-OCCUPATION TO RPT-CUST-OCCUPATION
317 MOVE CUST-ACCT-BALANCE TO RPT-CUST-ACCT-BALANCE
LOG 0-----1-----2-----3-----4-----5----- LINE: 23 OF 26
0023 GO ;
0024 STEP ;
0025 STEP ;
0026 GO ;
PF 1:? 2:STEP 3:QUIT 4:LIST 5:FIND 6:AT/CLEAR
PF 7:UP 8:DOWN 9:GO 10:ZOOM 11:ZOOM LOG 12:RETRIEVE
                
```

Many of the tools have graphical user interfaces

The image displays three overlapping graphical user interfaces (GUIs) for IBM PD Tools, each with a red callout box identifying it:

- Fault Analyzer:** Located in the top-left, it shows a window titled 'M/F6/IDI.HIST/F049' and 'Operator for System z'. It features a 'Fault Summary' section with a table of faults, a 'Synopsis' section, and a 'Source' section with a table of source lines. The table of source lines includes columns for 'Source Line #', '000088', '000089', and '000090'. Below this is another 'Source' section with lines '000059' and '000066'. At the bottom, there is a 'Data field va' section and a 'BALANCE-TOI' section.
- Application Performance Analyzer (APA/GUI):** Located in the middle-left, it shows a window titled 'APA/GUI'. It displays a table of 'APA Observations List (CA29) - Local' with columns for 'ReqNum', 'Owned By', and 'Description'. Below this is a 'Details (3944)' section and a 'Reports (3044)' section. The reports section includes a tree view with categories like 'S - Statistics/Storage', 'C - CPU Usage Analysis', 'D - DASD I/O Analysis', and 'W - CPU WAIT Analysis'.
- Debug Tool:** Located in the top-right and middle-right, it shows a window titled 'Debug - RemoteSystemsTempFiles/DebugViewFiles/8002_1720/ADTOOLS.ADLAB.SYSDEBUG(SAM2).cob'. It features a 'Debug' section with a tree view showing 'SAM1 [Remote Compiled Application]', 'Platform: OS/390(R)', 'Thread:1 (Runnable)', 'SAM2: 02', and 'SAM1: 01'. Below this is a 'Process: 539013544 Program: SAM1' section. The main area shows a code editor with a table of code lines, including 'Line 92', 'Column 1', 'Insert', and 'Browse'. The code includes comments like '*** Increment Record Count ***' and '*** Add this customer's BALANCE to the grand total ***'. On the right, there is an 'Outline' section showing a tree view of the program structure, including 'PROGRAM: SAM2', 'IDENTIFICATION DIVISION', 'ENVIRONMENT DIVISION', 'DATA DIVISION', 'PROCEDURE DIVISION', '000-MAIN', '100-CALC-BALANCE-STATISTICS', and '500-INIT-STATISTICS'. At the bottom, there is a 'Console' section with 'Process: 539013544 Program: SAM1'.

IBM CICS Explorer™



New!

Threadsafe, File, CPU, Response Time analysis
Graphical and Sheet views
PA

Daemon & Connection Status & Test
TG

Configuration Status Control, Test
MQ

Status Situations Topology
XE

Execution Tree Dependencies Queries Command Flow
IA

Deployment Discovery, Visualization, Automation & Control
DA

Develop Test Etc
RDz

CICS, IMS, DB2, & z/OS Abend Reporting & Diagnosis
FA

CICS, IMS, DB2, & z/OS Application Debugging
DT

CICS, IMS, DB2, & z/OS Observation Requests & Reporting
APA

CRUD/Install History, Audit Backout Search, Compare
CM

CRUD/Install Control, Filter Topology Events, ATOM
SM

- | | |
|----|-------------------------------|
| SM | CICS Transaction Server |
| IA | CICS Interdependency Analyzer |
| PA | CICS Performance Analyzer |
| CM | CICS Configuration Manager |
| DA | CICS Deployment Assistant |
| TG | CICS Transaction Gateway |

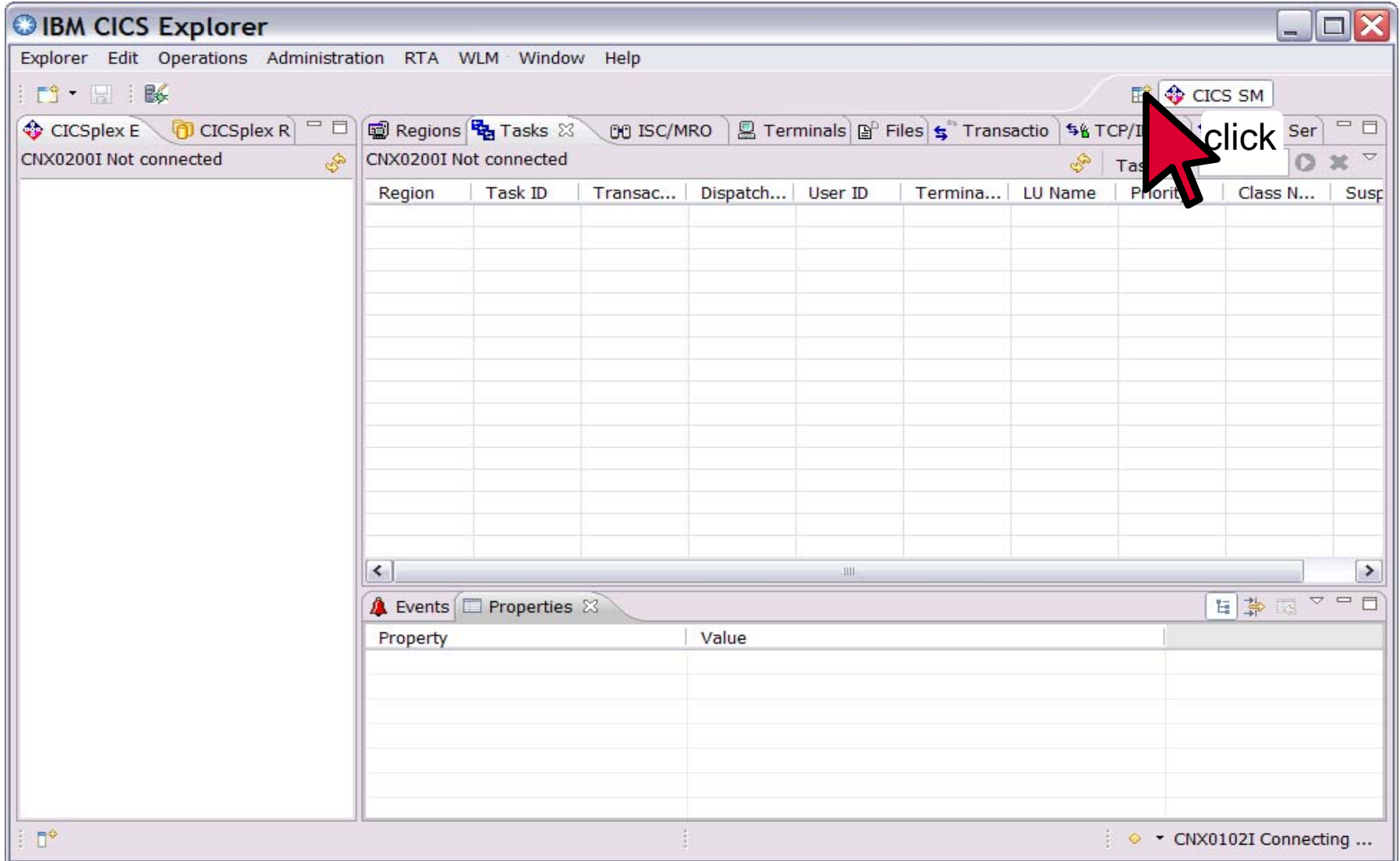
CICS TS

ibm.com/cics/tools
ibm.com/cics/explorer
ibm.com/cics/explorer/download

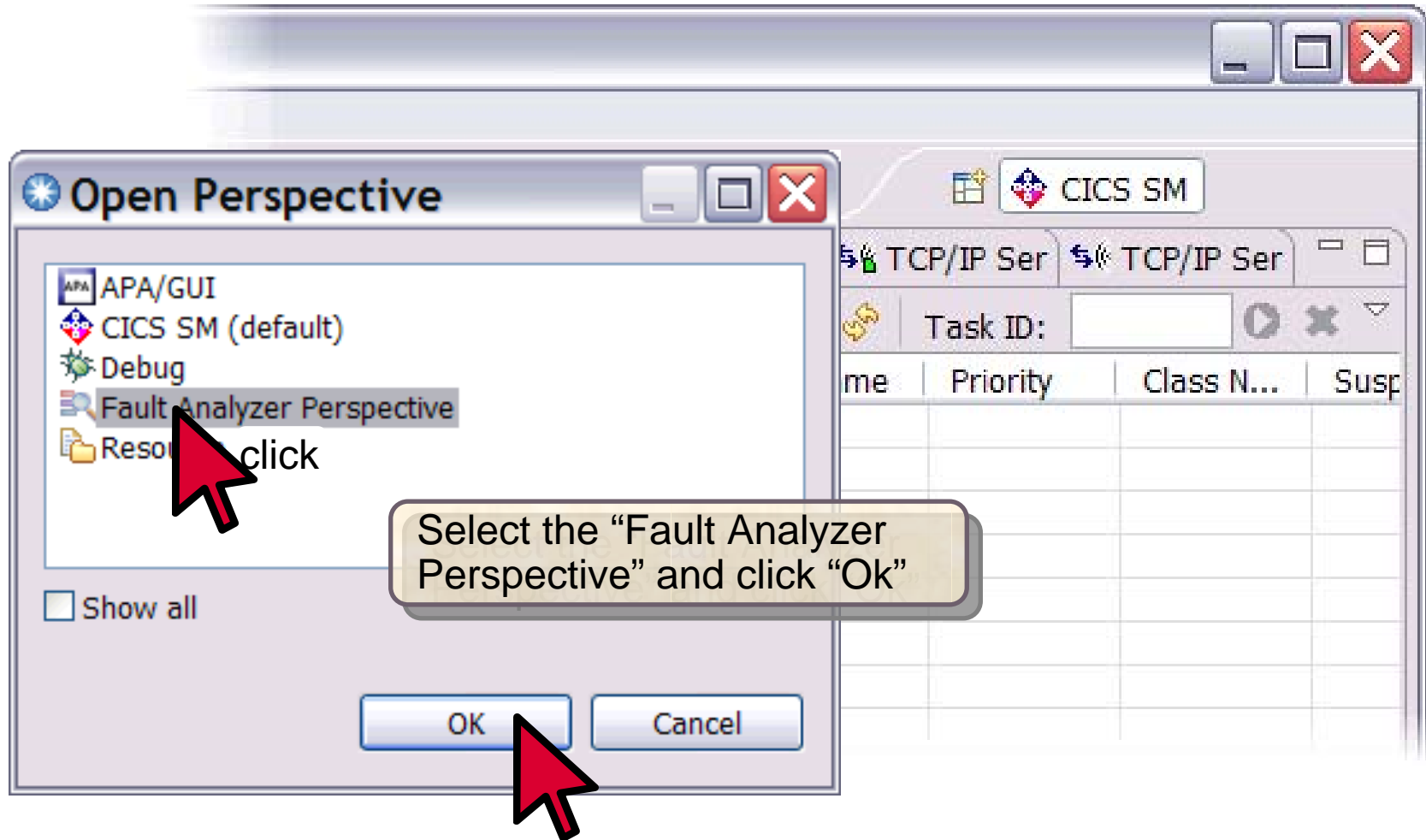
APA	Application Performance Analyzer
FA	Fault Analyzer
DT	Debug Tool
MQ	WebSphere MQ
XE	OMEGAMON XE for CICS
RDz	Rational Developer for System z



Open a "perspective" in CICS Explorer



Select a PD Tools perspective



An example of a PD Tools GUI in CICS Explorer

The screenshot displays the IBM CICS Explorer interface. On the left, the 'Fault Analyz' tree shows a hierarchy of artifacts, including '9.30.128.24:23' and '9.30.128.24:8000'. The main pane shows the 'Fault Summary' for module SAM2, program SAM2, source line # 89, with an abend code S0C7. The synopsis text reads: 'IBM FAULT ANALYZER SYNOPSIS' and 'A system abend 0C7 occurred in module SAM2 program SAM2 at of A program-interruption code 0007 (Data Exception) is associat'. A callout box highlights the text 'The Fault Analyzer perspective'. The right pane shows the source code for SAM2.cob, with line 89 highlighted. The code includes comments for calculating average, minimum, and maximum values. The bottom pane shows a search for '*S0C7*' with results for '0C7', explaining that it is a program interruption code where no routine was specified to handle the error.

The Fault Analyzer perspective

IBM CICS Explorer

Explorer Edit Window Help

Fault Analyz F05303.far SAM2.cob

Line 89 Column 1 Insert

```

    COMPUTE BALANCE-TOTAL =
      BALANCE-TOTAL + CUST-ACCT-BALANCE
    *   *** Calculate Average ***
    COMPUTE BALANCE-AVERAGE =
      BALANCE-TOTAL / BALANCE-COUNT
    *   *** Calculate Minimum ***
    IF WS-FIRST-TIME-SW = 'Y'
      MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
    IF CUST-ACCT-BALANCE < BALANCE-MIN
      MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
    *   *** Calculate Maximum ***
    *   *** There is a bug calculating the maximum.
    *   *** Can you find it?
    IF WS-FIRST-TIME-SW = 'Y'
      MOVE CUST-ACCT-BALANCE TO BALANCE-MAX
    IF CUST-ACCT-BALANCE > BALANCE-MAX
  
```

Search *S0C7* Go

Abend Codes Messages Miscellaneous Information

Explanation Results

0C7

Explanation: A program interruption occurred, but no routine had been specified to handle this type of interruption. Refer to the instruction description in Principles of Operation to find out how the instruction stops processing for the error condition.

The last digit of this completion code is a hexadecimal number that indicates the cause of the program interruption. Each X'0Cx' system completion code has

Refresh and update ...HIST(F05303)

The Fault Analyzer Interfaces



Fault Analyzer - Helps you rapidly pinpoint why and where an application failed

IBM 2010 Offerings

Debug Tool
for z/OS

File Manager
for z/OS

Fault Analyzer
for z/OS

Application
Performance
Analyzer for
z/OS

Workload Simulator
for z/OS & OS/390

Rational Functional Tester Ext
Rational Performance Tester z/OS

Optim Move
for DB2

Hourglass

ISPF
Productivity Tool

www.ibm.com/software/awdtools/deployment

Fault Analyzer for z/OS Highlights

- Automatic program abend capture and reporting
- Program source-level reporting
- Multiple languages and z/OS environments including CICS, DB2, IMS, Enterprise PL/I, Enterprise COBOL, C/C++, HLASM, JAVA and WebSphere Application Server for z/OS systems
- Provides a detailed report about program failures to help resolve them quickly
- Enables you to track and manage application failures and fault reports
- Offers a view of storage contents, trace tables and terminal screen images at the time of failure to help speed corrective action
- Provides the ability to customize message descriptions to be used in failure reports
- Interface to File Manager
- Eclipsed-based GUI plug-in available for download



IBM Fault Analyzer

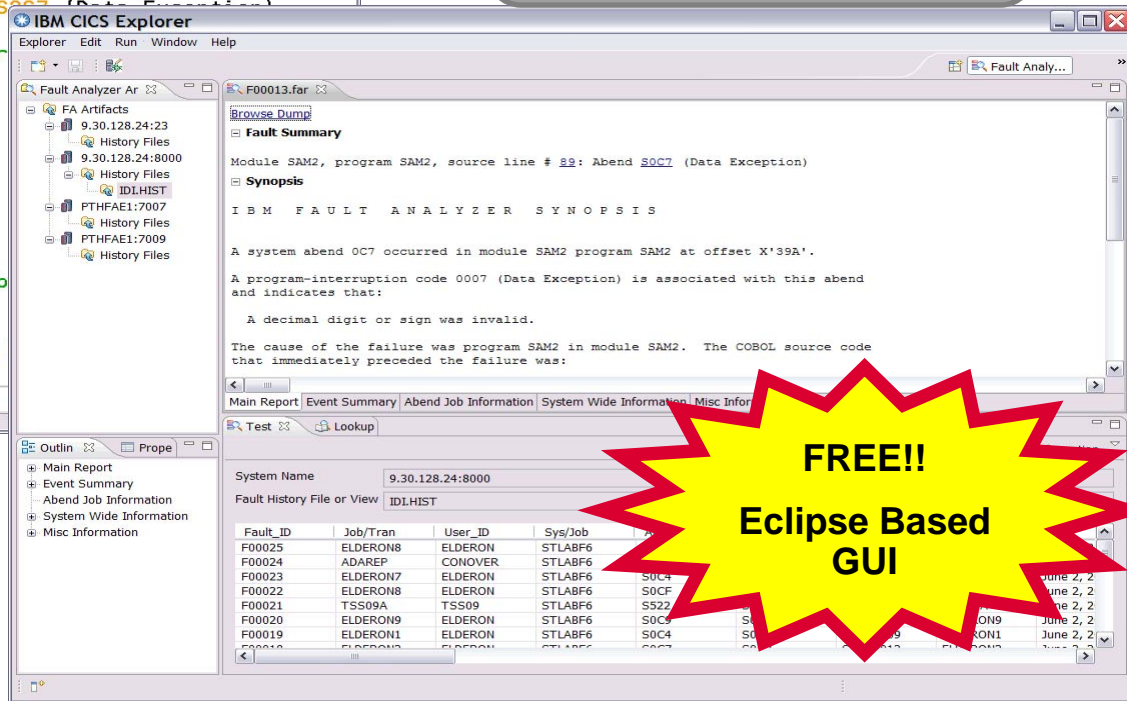
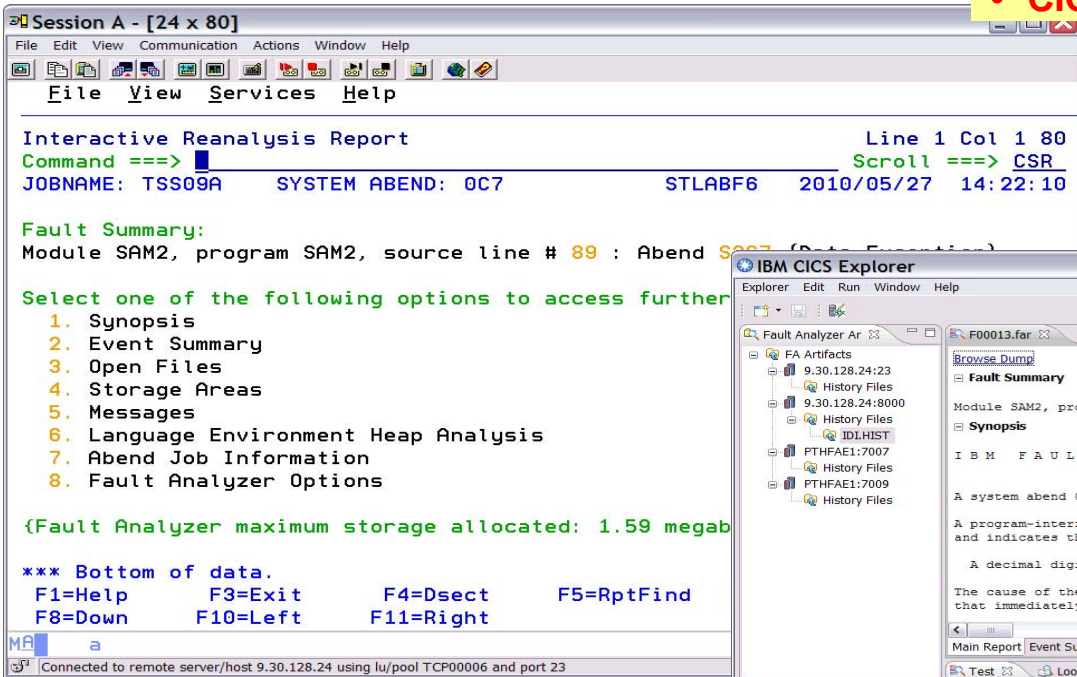
Multiple interfaces and modes of operation

New in FA 11.1

- Plug-in for CICS Explorer
- Java, C/C++, and Enterprise PL/I enhancements
- CICS support improvements

Interfaces

- ISPF
- RDz
- GUI
- CICS
- Web



Modes Of Operation

- Real-time analysis
- Batch dump re-analysis
- Interactive dump re-analysis

FREE!!

Eclipse Based GUI

The Fault Analyzer GUI Interface



Fault Analyzer: What's new in version 11?

- The IBM Fault Analyzer Plug-in for Eclipse, when integrated with Fault Analyzer for z/OS and CICS Explorer, provides access to problem reports for diagnosing mainframe application errors and abends. Key features include:
 - An interface to manage views and multiple fault history files
 - The ability to browse fault entries that were created during real-time analysis of abending programs
 - A browser for browsing the dump storage associated with a fault entry
 - A source listing of abending programs using side files
- Java support enhancements:
 - Integration of Java stack trace information into the Fault Analyzer event list
 - Java source support where Java source is included in the abending jar file
- C/C++ Dwarf file support.
- Latest Enterprise PL/I sysdebug file support.
- Fault Entry size management improvements:
 - Fault Analyzer will no longer include un-referenced storage pages in the minidump portion of a Fault Entry.
 - An option to control the size of the CICS trace table included from SDUMP analysis.
 - Support for CICS EXCI calls made from the Fault Analyzer listing exit.
 - CICS Auxiliary trace data set interpretation and viewing.
 - Enhancements to ISPF history file management operations to be similar to IDIUTIL.



Fault Analyzer Interface inside CICS Explorer

Double click on tabs to expand a view

Multiple views are displayed

IBM CICS Explorer
Explorer Edit Window Help

Fault Analyz

- FA Artifacts
 - 9.30.128.24:23
 - History Files
 - 9.30.128.24:8000
 - History Files
 - IDI.HIST
 - PTHFAE1:7007
 - History Files
 - PTHFAE1:7009
 - History Files

F05303.far

Browse Dump

Fault Summary

Module SAM2, program SAM2, source line # 89: Abend S0C7 (Data

Synopsis

IBM FAULT ANALYZER SYNOPSIS

A system abend 0C7 occurred in module SAM2 program SAM2 at of

SAM2.cob

```

Line 89      Column 1      Insert
-----*A-1-B-----2-----3-----4-----5-----6
      COMPUTE BALANCE-TOTAL =
          BALANCE-TOTAL + CUST-ACCT-BALANCE
      *   *** Calculate Average ***
      COMPUTE BALANCE-AVERAGE =
          BALANCE-TOTAL / BALANCE-COUNT
      *   *** Calculate Minimum ***
      IF WS-FIRST-TIME-SW = 'Y'
          MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
      IF CUST-ACCT-BALANCE < BALANCE-MIN
          MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
  
```

Outl

Main Report

- Event Summary
- Abend Job Information
- System Wide Information
- Misc Information

Search *S0C7* Go

Abend Codes

Messages

Miscellaneous Information

Explanation Results

0C7

Explanation: A program interruption occurred, but no routine had been specified to handle this type of interruption. Refer to the instruction description in Principles of Operation to find out how the instruction stops processing for the error condition.

The last digit of this completion code is a hexadecimal number that indicates the cause of the program interruption. Each X'0CX' system completion code has

Refresh and update ...HIST(F05303)

Default Fault History File View

System Name: F6
 Fault History File or View: IDI.HIST

Fault_ID	Job/Tran	User_ID	Sys/Job	Abend	I_Abend	Job_ID	Jobname
F04917	TSS09A	TSS09	STLABF6	S522	S522	JOB02390	TSS09A
F04916	TSS09A	TSS09	STLABF6	S0C7	S0C7	JOB02382	TSS09A
F04915	TSS09A	TSS09	STLABF6	S522	S522	JOB02377	TSS09A
F04914	TSS09A	TSS09	STLABF6	S0C7	S0C7	JOB02375	TSS09A
F04913	TSS09A	TSS09	STLABF6	S0C7	S0C7	JOB02373	TSS09A
F04912	TSS09A	TSS09	STLABF6	S0C7	S0C7	JOB02364	TSS09A
F04911	TSS09A	TSS09	STLABF6	S0C7	S0C7	JOB02363	TSS09A
F04910	TSS09A	TSS09	STLABF6	S0C7	S0C7	JOB02361	TSS09A
F04908	TSS09A	TSS09	STLABF6	S522	S522	JOB02273	TSS09A
F04907	TSS09A	TSS09	STLABF6	S522	S522	JOB02262	TSS09A
F04906	TSS09A	TSS09	STLABF6	S522	S522	JOB02247	TSS09A
F04905	TSS09A	TSS09	STLABF6	S522	S522	JOB02223	TSS09A
F04904	TSS09A	TSS09	STLABF6	S0C7	S0C7	JOB02211	TSS09A
F04903	TSS03RDZ	TSS03	STLABF6	S0C7	S0C7	JOB02183	TSS03RDZ

Annotations:

- If needed, click on "Column Configuration"
- Fault Entries are stored in fault history files
- Click on column to Sort



Opening a Fault Entry

The files have now been sorted based on the Abend Code

Fault_ID	Job/Tran	User_ID	Sys/Job	Abend	I_Abend	Job_ID	Jobname
F04660	MACHIN2	MACHIN2	STLABF6	S0C4	S0C4	TSU00158	MACHIN2
F04646	MACHIN2	MACHIN2	STLABF6	S0C4	S0C4	TSU00087	MACHIN2
F04645	MACHIN2	MACHIN2	STLABF6	S0C4	S0C4	TSU09949	MACHIN2
F04916	TSS09A			S0C7	S0C7	JOB02382	TSS09A
F04914	TSS09A			S0C7	S0C7	JOB02375	TSS09A
F04913	TSS09A			S0C7	S0C7	JOB02373	TSS09A
F04912	TSS09A			S0C7	S0C7	JOB02364	TSS09A
F04911	TSS09A			S0C7	S0C7	JOB02363	TSS09A
F04910	TSS09A			S0C7	S0C7	JOB02361	TSS09A
F04904	TSS09A			S0C7	S0C7	JOB02211	TSS09A
F04903	TSS03RDZ			S0C7	S0C7	JOB02183	TSS03RDZ
F04898	TSS09A			S0C7	S0C7	JOB02127	TSS09A
F04886	TSS09A			S0C7	S0C7	JOB00929	TSS09A
F04883	ABCDEFAB	KPHUME	STLABF6	S0C7	U4039	JOB00681	ABCDEFAB

1. Right click on the row (F04916)

2. Select "Browse Report" from the context menu

Once the member is found, right click and select "Browse Report" to view the Fault Analyzer Report



Fault Analyzer Main Report

MF6/IDL.HIST/F04916/F04916.far - IBM Rational Developer for System z

Run Window Help

TSS09.TSS09A.JOB02382.D0000002.JESMSGLG.spool F04916.far

[Browse Dump](#)

Fault Summary

Module SAM2, program SAM2, source line # [89](#): Abend [SOC7](#) (Data Exception)

Synopsis

IBM FAULT ANALYZER SYNOPSIS

A system abend 0C7 occurred in module SAM2 program SAM2 at offset X'39A'.

A program-interruption code 0007 (Data Exception) is associated with this abend and indicates that:

A decimal digit or sign was invalid.

The cause of the failure was program SAM2 in module SAM2. The COBOL source code that immediately preceded the failure was:

Source
Line #

000088 * *** Add this customer's BALANCE to the grand total ***
000089 COMPUTE BALANCE-TOTAL =
000090 BALANCE-TOTAL + CUST-ACCT-BALANCE

The COBOL source code for data fields involved in the failure:

Source
Line #

000059 05 CUST-ACCT-BALANCE PIC S9(7)V99 COMP-3.
000066 05 BALANCE-TOTAL PIC S9(7)V99 COMP-3.

Data field values at time of abend:

BALANCE-TOTAL = 10948.44
CUST-ACCT-BALANCE = X'7C7B5B6C50' *** Invalid numeric data ***

Main Report | Event Summary | Abend Job Information | System Wide Information | Misc Information

Default | Lookup

Column Configuration

No CICS SM connection

Fault Analyzer
Synopsis

Source code that
preceded the ABEND

Data Field Information

The Main Report “Hotkeys”

The screenshot displays the IBM Rational Developer for System z interface. The main window shows a fault report for a job named TSS09.TSS09A.JOB02382.D0000002.JESMSGLG.spool. The report is titled "Fault Summary" and contains the following text:

```
Module SAM2, program SAM2, source line # 89: Abend SOC7 (Data Exception)
```

The text "89" and "SOC7" are circled in green, indicating they are clickable hotkeys. A callout box with a yellow background and black border points to these hotkeys with the text: "Clickable fields that provide access to associated information".

Below the fault summary, the report includes a "Synopsis" section with the following text:

```
IBM FAULT ANALYZER SYNOPSIS
```

program SAM2 at offset X'39A'.
007 (Data Exception) is associated with this abend
and indicates that:

A decimal digit or sign was invalid.

The cause of the failure was program SAM2 in module SAM2. The COBOL source code
that immediately preceded the failure was:

Source

The interface also shows a navigation bar at the bottom with tabs for "Main Report", "Event Summary", "Abend Job Information", "System Wide Information", and "Misc Information". The "Main Report" tab is currently selected. The system name "F6" is visible in the bottom left corner.

Results of clicking Hotkeys

The screenshot displays the IBM PD Tools interface with several windows and callouts:

- Left Panel (Dump Browser):** Shows a list of memory addresses and their corresponding hex values. A callout points to a specific entry: "Browse the captured mini-dump data stored in the fault entry report in the Dump browser view".
- Top Panel (Lookup):** A search window with "S0C7*" entered. The results show "0C7" with an explanation: "Explanation: A program interruption specified to handle this type of interruption...". A callout states: "Clicking Abend code invokes the 'lookup' view".
- Bottom Panel (Source Code):** Shows a COBOL program snippet. A callout points to a specific line: "Clicking the source line number opens the sidefile copy of the source".

Navigating the Report

FA/F6/IDI.HIST/F04916/F04916.far - IBM Rational Developer for System z

File Run Window Help

TSS09.TSS09A.JOB02382.D0000002.JESMSGLG.spool F04916.far

[Browse Dump](#)

Fault Summary

Module SAM2, program SAM2, source line # [89](#): Abend [S0C7](#) (Data Exception)

Synopsis

I B M F A U L T A N A L Y Z E R S Y N O P S I S

A system abend 0C7 occurred in module SAM2 program SAM2 at offset X'39A'.

A program-interruption code 0007 (Data Exception) is associated with this abend and indicates that:

A decimal digit or sign was invalid.

The cause of the failure was program SAM2 in module SAM2. The COBOL source code that immediately preceded the failure was:

Main Report | Event Summary | Abend Job Information | System Wide Information | Misc Information

Default click

System Name

Column Configuration

Event Summary View

Perspective - FA/F6/IDI.HIST/F04916/F04916.far - IBM Rational Developer for System z

Search Project Run Window Help

F04916.far

[Browse Dump:](#)

IBM FAULT ANALYZER EVENT SUMMARY

The following events are presented in chronological order.

Event #	Type	Fail Point	Module Name	Program Name	EP Name	Event Location (*)	Loaded From
1	Call		SAM1	SAM1	SAM1	L#312 P+D30 E+D30	TSS09.ADLAB.LOAD
2	Call		IGZCPAC	n/a	IGZCFCC	E+2BE	CEE.SCEERUN
3	Abend SOC7	*****	SAM2	SAM2	SAM2	L#89 P+39A E+39A	TSS09.ADLAB.LOAD

(*) One or more of the following abbreviations might appear in the "Event Location" column:

F#n Source file number (refer to detailed event information for file identification)
 L#n Source file line number
 S#n Listing file statement number (refer to detailed event information for file identification)
 M+x Offset from start of load module
 P+x Offset from start of program
 E+x Offset from start of entry point

Event 1
 Event 2
 Event 3

EVENT 3 OF 3: ABEND SOC7

 ***** POINT OF FAILURE *****

Abend Code. : SOC7
 Program-Interruption Code . : 0007 (Data Exception)
 A decimal digit or sign was invalid.

Main Report | Event Summary | Abend Job Information | System Wide Information | Misc Information

Default | Lookup

click

Chronological order of events

Expandable event details

Highlighted "POINT OF FAILURE" event details

Abend Job Information View

ABEND Job details

IBM FAULT ANALYZER ABEND JOB INFO

IBM Fault Analyzer Abend Job Information:

```

Abend Date. . . . . : 2010/01/15
Abend Time. . . . . : 13:17:13
System Name . . . . . : STLABF6
Job Type. . . . . : Batch
Job ID. . . . . : JOB02382
Job Name. . . . . : TSS09A
Job Step Name . . . . . : RUNSAM1
ASID. . . . . : 34
Abend TCB Address . . . . . : 00AF6968
Job Execution Class . . . . . : A
Region Size . . . . . : 80M
EXEC Program Name . . . . . : SAM1
User ID . . . . . : TSS09
Accounting Information. . . : TSS09,H244,090,CTKA
    
```

Data Sets:

DDname	Data Set or Path Name
STEPLIB	TSS09.ADLAB.LOAD

Event-Related Application Programs:

The following list of event-related application programs is sorted by module link-edit date/time and program compilation date/time in reverse chronological order.

Module Name	Link-Edit Date	Link-Edit Time	Program Name	Compilation Date	Compilation Time
SAM2	2009/09/30	08:24:36	SAM2	2009/09/30	08:24:36
SAM1	2009/09/30	08:24:35	SAM1	2009/09/30	08:24:35

Main Report | Event Summary | **Abend Job Information** | System Wide Information | Misc Information

Default | Lookup

Search: #007*

click

System Wide Information View

Open Files

LE Heap Analysis

Perspective - FA/F6/IDI.HIST/F04916/F04916.far - IBM Rational Developer for System z

Project Run Window Help

F04916.far

Open Files

OPEN FILES

Non-Event-Related Open Files

File Name : CEEDUMP
Data Set Name : TSS09.TSS09A.JOB02382.D0000113.?
File Attributes : ORGANIZATION=SEQUENTIAL, ACCESS MODE=n/a,
RECFM=FIXED BLOCKED ASA
Last I/O Function : WRITE
Open Status : OUTPUT

Current Record. : Record data length 133

Address	Offset	Hex	EBCDIC
13B8BC08		40404040 40404040 40404040 40404040	*
Lines 13B8BC18-13B8BC78 same as above			
13B8BC88	+80	40404040 40	*

File Name : SYSOUT
Data Set Name : TSS09.TSS09A.JOB02382.D0000109.?
File Attributes : ORGANIZATION=SEQUENTIAL, ACCESS MODE=n/a,
RECFM=FIXED BLOCKED ASA
Last I/O Function : WRITE
Open Status : OUTPUT

Current Record. : Record data length 121

Address	Offset	Hex	EBCDIC
13C480B8		40404040 40404040 40404040 40404040	*
Lines 13C480C8-13C48118 same as above			
13C48128	+70	40404040 40404040 40	*

Language Environment Heap Analysis

Main Report | Event Summary | Abend Job Information | System Wide Information | Misc Information

Default | Lookup

click



Misc Information View

Options in effect

Perspective - FA/F6/IDI.HIST/F04916/F04916.far - IBM Rational Developer for System z

Search Project Run Window Help

F04916.far

[Browse Dump](#)

Options in effect

```
IBM FAULT ANALYZER OPTIONS
```

IBM Fault Analyzer Options in Effect:

```
Detail (Medium)
NoErrorHandler
FaultID (F04916)
Language (ENU)
NoLocale
NoPermitLangx
PreferredFormattingWidth (80)
NoPrintInactiveCOBOL
StoragePrintLimit (256K) - not exceeded
SystemWidePreferred (StorageAreas (Hex))
```

Data Sets:

The following Fault Analyzer data set or path names were either preallocated, specified via DataSets options, or provided as defaults.

DDname	Data Set or Path Name
IDIBOOKS	ADTOOLS.FAA10.SIDIBOOK
IDIDOC	ADTOOLS.FAA10.SIDIDOC1
IDIEEXEC	ADTOOLS.STLABF6.SYSEEXEC
IDIHIST	IDI.HIST
IDILANGX	TSS09.ADLAB.EQALANGX
	ADTOOLS.MNA.U6F6.LANGX.PLI
	ADTOOLS.MNA.S2U1F6.LANGX.PLI
IDILCOB	CHABERT.TRADER.COBLIST
IDIMAPS	ADTOOLS.FAA10.SIDIMAPS
IDIVSENU	IDI.VAR1M0.IDIVSENU

Exits:

Main Report | Event Summary | Abend Job Information | System Wide Information | Misc Information

Default | Lookup

Exits



The Fault Analyzer TSO Interface



Using Interactive reanalysis to analyze an abend

```

File Options View Services Help
IBM Fault Analyzer - Fault Entry List          Col 1 80
Command ==> _____ ==> PAGE

Fault History File or View : 'FAULTANL.V10R1.HIST'

{The following line commands are available: ? (Query), V or S (View saved
report), I (Interactive reanalysis), B (Batch reanalysis), D (Delete), H
(Duplicate history), C (Copy fault entry), M (Move fault entry), X (XMIT fault
entry).}

Fault_ID Job/Tran Job_ID Program Offset Dups User_ID Sys/Job Abend
i F00905 DNET845X JOB15885 SAM2 39A DNET845 DEMOMVS S0C7
_ F00882 DNET845X JOB15573 SAM2 39A 4 DNET845 DEMOMVS S0C7
_ F00881 DNET845X JOB15572 SAM2 39A DNET845 DEMOMVS S0C7
_ F00880 DNET845X JOB15571 SAM2 39A DNET845 DEMOMVS S0C7
_ F00878 DNET845X JOB15535 SAM2 39A DNET845 DEMOMVS S0C7
_ F00872 DNET845Y JOB15410 PSAM2 3DA DNET845 DEMOMVS S0C7
_ F00871 DNET845P JOB15408 PSAMM2 27A DNET845 DEMOMVS S0C7
_ F00869 DNET845X JOB15387 SAM2 39A DNET845 DEMOMVS S0C7

** Bottom of data.

```

The I line command starts an interactive reanalysis session

Enter



Analyze an abend

File View Services Help

Interactive Reanalysis Report

Command ==>

JOBNAME: DNET845X SYSTEM ABEND:

Fault Summary:

Module SAM2, program SAM2, source line # 89 : Abend S0C7 (Data Ex

Select one of the following options to access further fault information:

1. Synopsis
2. Event Summary
3. Open Files
4. Storage Areas
5. Messages
6. Language Environment Heap Analysis
7. Abend Job Information
8. Fault Analyzer Options

{Fault Analyzer maximum storage allocated: 1.68 megabytes.}

*** Bottom of data.

“Point and shoot” fields are highlighted.

Use **tab** and **Enter** to navigate.

Debug Clues:

✓ Abended in program SAM2 because of a data exception

select Synopsis

What is information is in the Synopsis?

Enter



The Debug Tool Interface



Debug Tool – Debugging enterprise applications to isolate code problems

IBM 2010 Offerings

Debug Tool
for z/OS

File Manager
for z/OS

Fault Analyzer
for z/OS

Application
Performance
Analyzer for
z/OS

Workload Simulator
for z/OS & OS/390

Rational Functional Tester Ext
Rational Performance Tester z/OS

Optim Move
for DB2

Hourglass

ISPF
Productivity Tool

www.ibm.com/software/awdtools/deployment

Debug Tool for z/OS Highlights

- Interactive program debugging
- Easy setup – debug your program quickly
- Multiple languages:
 - COBOL
 - PL/I
 - C/C++
 - Assembler
- Multiple z/OS environments
 - TSO
 - CICS
 - IMS/TM
 - DB2 stored procedures
 - Batch
 - Websphere application server
 - Unix system services
- Interactive statement playback feature
- Statement frequency counter
- Customizable displays and commands
- Code coverage reporting
- COBOL modernization
- GUI Eclipse plug-in for CICS Explorer **at no additional cost!**



IBM Debug Tool

3270 and GUI based interfaces

New in DT V11.1

- Plug-in for CICS Explorer
- Explicit debug mode
- New UI for Terminal Interface Manager
- IBM zEnterprise 196 support
- Numerous customer requirements

```

Session B - [24 x 80]
File Edit View Communication Actions Window Help
COBOL LOCATION: SAM1 initialization
Command ==> Scroll ==> CSR
MONITOR +-----1-----2-----3-----4-----5-----6- LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE: SAM1 +-----1-----2-----3-----4-----
1 *****
2 * PROGRAM: SAM1
3 * Sample program for the ENT
4 *
5 * AUTHOR : Doug Stout
6 * IBM PD TOOLS

LOG 0 +-----1-----2-----3-----4-----
0009
0010 EQA1872E An error occurred while opening file: I
0011 exist, or is not accessible.
***** BOTTOM OF LOG *****
PF 1: ? 2: STEP 3: QUIT 4: LIST
PF 7: UP 8: DOWN 9: GO 10: ZOOM

```

Name	Value
CURRENT-TIME	
CURRENT-HOUR	rr
CURRENT-MINUTE	rr
CURRENT-SECOND	rr
CURRENT-HNDSEC	rr

```

Line 252 Column 1 Insert Browse
251 ACCEPT CURRENT-DATE FROM DATE.
252 ACCEPT CURRENT-TIME FROM TIME.
253 DISPLAY 'SAM1 STARTED DATE = ' CURRENT-MONTH '/'
254 CURRENT-DAY '/' CURRENT-YEAR '(mm/dd/yy)'.
255 DISPLAY ' TIME = ' CURRENT-HOUR ':'
256 CURRENT-MINUTE ':' CURRENT-SECOND.
257
258 PERFORM 900-OPEN-TRAN-AND-RPT-FILES.
259 PERFORM 800-INIT-REPORT .
260

```

Sample Features

- 64-bit register support Assembler
- Dynamic patching
- Save and restore sessions settings
- Object level disassembly debugging



Debug Tool: What's new in version 11?

- A new mode of operation, explicit debug mode, is now supported. In this mode, the user identifies the compile units to debug, then Debug Tool loads debug data only for those compile units. This mode can significantly improve debugger performance when it is debugging very large and complex programs. This new mode is an alternative to the standard Debug Tool mode of operation where debug data is automatically loaded for all compile units. It is intended to be used only when debugging large, complex applications that don't perform as well in the standard Debug Tool mode.
- A new user interface is added to the Terminal Interface Manager (TIM) that helps you create and manage the TEST runtime options data set.
- The TIM has been enhanced to remove the need for a site to set up a separate TN3270E port or to customize a set of terminal LUs.
- A GUI interface is added that helps you create and manage the TEST runtime options data set from the workstation.
- The Debug Tool Language Environment user exit for DB2 (EQADDCXT) now supports debugging of DB2 stored procedures of type SUB invoked using the call_sub function.
- EQAOPTS commands can now be specified at runtime in addition to the use of a user-generated EQAOPTS load module. This allows individual users to enter EQAOPTS commands at runtime by supplying a data set containing EQAOPTS commands.
- Support is added for debugging of assembler programs that exploit the latest IBM zEnterprise 196 architecture.
- Enhanced performance while debugging C and C++ applications.



Debug Tool: What's new in version 11?

- A Popup window, which displays the result of the LIST expression command when the Log window, is not visible.
- Support for the Enterprise PL/I ADDRDATA built-in function.
- Support for the Enterprise PL/I V4.1 compiler and its new GONUMBER(SEPARATE) option.
- For programs compiled with any level of Enterprise PL/I, you can now list a single element of an array of structures. For programs compiled with Enterprise PL/I V4.1, you can list a single element of an array of structures in automonitor or use the L prefix command in the Source window to list a single element of an array of structures.
- For programs compiled with any level of Enterprise PL/I, you can now change the format in which Debug Tool displays an array. By using the SET LIST BY SUBSCRIPT ON command, you can have Debug Tool display the array as it is stored in memory.
- A new keyword LABELS is added to the LIST NAMES command where you can list the names of all section and paragraph names in a COBOL program, and the names of all instruction labels in an assembler program.



Debug Tool: What's new in version 11?

- The following breakpoints are enhanced:
 - AT CHANGE and AT LABEL breakpoints are enhanced to allow a user to limit the scope of the breakpoint to a specific compile unit.
 - AT GLOBAL is enhanced to provide an OCCURRENCE option or wild card (*) to stop for any condition raised in the application.
 - The QUERY LOCATION command is enhanced to provide more information when Debug Tool stops for an AT CHANGE breakpoint.
- Automonitor enhancements:
 - You can change the subscripts of an array directly in the Monitor window.
 - You can delete multiple items from Monitor window at one time.
 - You can use the cursor (in combination with the CLEAR MONITOR command) to indicate which variable to remove from the Monitor window.
- Automated allocation of the commands, log, preferences, save settings and save breakpoints and monitor specifications files.
- New functions are included in Debug Tool Utilities to help an application programmer more easily start debugging IMS applications running in BTS.
- A CICS transaction, DTNP, is provided which issues NEWCOPY or PHASEIN of application programs.
- Documentation is provided to assist debugging of Language Environment C/C++, COBOL, and PLI programs in the Java JNI environment in z/OS.



The Debug Tool GUI Interface



The Debug Tool Perspective

The screenshot displays the IBM CICS Explorer interface in the debug perspective. The main window is titled 'IBM CICS Explorer' and shows a 'Debug Demo' session. The interface is divided into several panes:

- Program Stack:** Located in the top-left pane, it shows the current execution context: SAM1 [Incoming Remote Debug Session], Platform: zOS 390X, Connection: 9.30.128.24:7328, Thread: 1 (Runnable), and Process: 328254224. A callout box labeled 'Program Stack' points to this pane.
- Monitors and Listings:** Located in the top-right pane, it displays a tree view of active monitors and listings. A callout box labeled 'Monitors and Listings' points to this pane. The tree includes:
 - CUST-RECORD-TYPE = 'C'
 - CUST-REC
 - CUSTOMER-BALANCE-STATS
 - CUST-ID = '01001'
 - CUST-NAME = 'Lynn, Amanda'
 - WS-PROGRAM-STATUS = 'CALCULATING BALANCE STATS'
 - BALANCE-COUNT = +00000000.00
- Active Source Code:** Located in the middle-left pane, it shows the source code for 'ADTOOLS.ADLAB.SYSDEBUG(SAM2)'. Line 87, 'ADD +1 TO BALANCE-COUNT', is highlighted in blue. A callout box labeled 'Active Source Code' points to this pane.
- Variables Display:** Located in the middle-right pane, it shows a table of variables. A callout box labeled 'Variables Display' points to this pane.

Name	Value
BALANCE-COUNT	+00000000.00
WS-FIELDS	
WS-PROGRAM-STATUS	'CALCULATING BALANCE STATS'
WS-FIRST-TIME-SW	'Y'
WS-WORK-NUM-1	+00000000
- Debug Console:** Located at the bottom, it shows system messages such as 'EQA2268I *** User preferences file commands end ***' and 'EQA2383I The environment is not yet fully initialized. Use Step or Run.' A callout box labeled 'The Debug perspective when a program is being debugged' points to this pane.

The Debug view

See your currently running programs in the Debug view

Program call chain (bottom to top)

- Click a program to see it in the source view
- Right-click a program to run or see program properties

ADTOOLS.ADLAB.SYSDEBUG(SAM2)

Line 87 Column 1 Insert Browse

82 GOBACK.



Action bar buttons perform program actions....

The screenshot displays the IBM CICS Explorer interface. The top menu bar includes Explorer, Edit, Run, Window, and Help. Below the menu is a toolbar with various icons. The main window shows a debug session for a program named SAM1, with a thread ID of 1 (Runnable). The action bar contains several buttons, each with a callout box explaining its function:

- Resume:** Run the program to the next breakpoint or to the end
- Terminate:** End the program
- Disconnect:** Disconnect from the debug engine
- Animated Step:** Steps into the program automatically at a rate you specify
- Step:** run one statement
- Step Over:** run one statement, but step over a CALL
- Step Return:** run until return from subprogram



The Program Source view

ADTOOLS.ADLAB.SYSDEBUG(SAM1) ☒

Line	Column	Insert	Browse
314		MOVE CUST-ID	TO RPT-CUST-ID
315		MOVE CUST-NAME	TO RPT-CUST-NAME
316		MOVE CUST-OCCUPATION	TO RPT-CUST-OCCUPATION
317		MOVE CUST-ACCT-BALANCE	TO RPT-CUST-ACCT-BALANCE
318		MOVE CUST-ORDERS-YTD	TO RPT-CUST-ORDERS-YTD
319		WRITE REPORT-RECORD FROM RPT-DETAIL	AFTER 1
320		ADD +1 TO NUM-DETAIL-LINES	
321		END-IF	
322		IF CUST-RECORD-TYPE = 'P'	
323	*	SUBROUTINE SAM3 WILL COLLECT PRODUCT STATISTICS	
324		CALL 'SAM3' USING CUST-REC,	
325		PRODUCT-STATS	
326		ADD +1 TO NUM-DETAIL-LINES	
327		ADD +1 TO NUM-DETAIL-LINES	
328		ADD +1 TO NUM-DETAIL-LINES	
329		ADD +1 TO NUM-DETAIL-LINES	
330		ADD +1 TO NUM-DETAIL-LINES	
331		ADD +1 TO NUM-DETAIL-LINES	
332		ADD +1 TO NUM-DETAIL-LINES	
333		WRITE REPORT-RECORD FROM RPT-SPACES	AFTER 1.
334		WRITE REPORT-RECORD FROM RPT-TOTALS-HDR1.	
335		WRITE REPORT-RECORD FROM RPT-TOTALS-HDR2.	
336		IF NUM-PRINT-COMPLETED > 0	
337		MOVE SPACES	TO RPT-TOTALS-DETAIL
338		MOVE 'Acct Balance: '	TO RPT-TOTALS-TYPE

Outline (x)= Va

Name

- SYSTEM-D
- WS-FIELD
- WORK-VA
- TOTALS-V
- CUSTOME
- PRODUCT
- RPT-HEAD

Debug Console ☒ Memory

The highlighted line is the current statement

Set a statement breakpoint by double-clicking in the gray area next to a statement

Right click a statement to:

- find text
- create a stmt breakpoint
- jump or run to a stmt
- see other options

Right click a variable to:

- add it to the monitor view
- create a watch breakpoint
- see other options

The Variables View

View and change variables for the program displayed in the source view.

Name	Value
RPT-DETAIL	
RPT-CUST-ID	'01001'
FILLER	''
RPT-CUST-NAME	'Lynn, Amanda '
FILLER	''
RPT-CUST-OCCUPATIO	'Musician'
FILLER	''
RPT-CUST-ACCT-BALAN	'67.68'
FILLER	''
RPT-CUST-ORDERS-YTD	'rrrrrrrrrr'
FILLER	'...'
RPT-TRAN-DETAIL	
ERR-MSG-BAD-TRAN	

- Right click a variable to:
- display in hex
 - add to the memory view
 - change the value
 - see other options

Expand and collapse group level data elements

Overtyping a value to change it

Click on a variable to display it in the expanded area

Look at all working storage (show, change screen)



The Monitors View

The screenshot displays the 'Monitors' view in IBM PD Tools. The main pane shows a tree of variables with their current values:

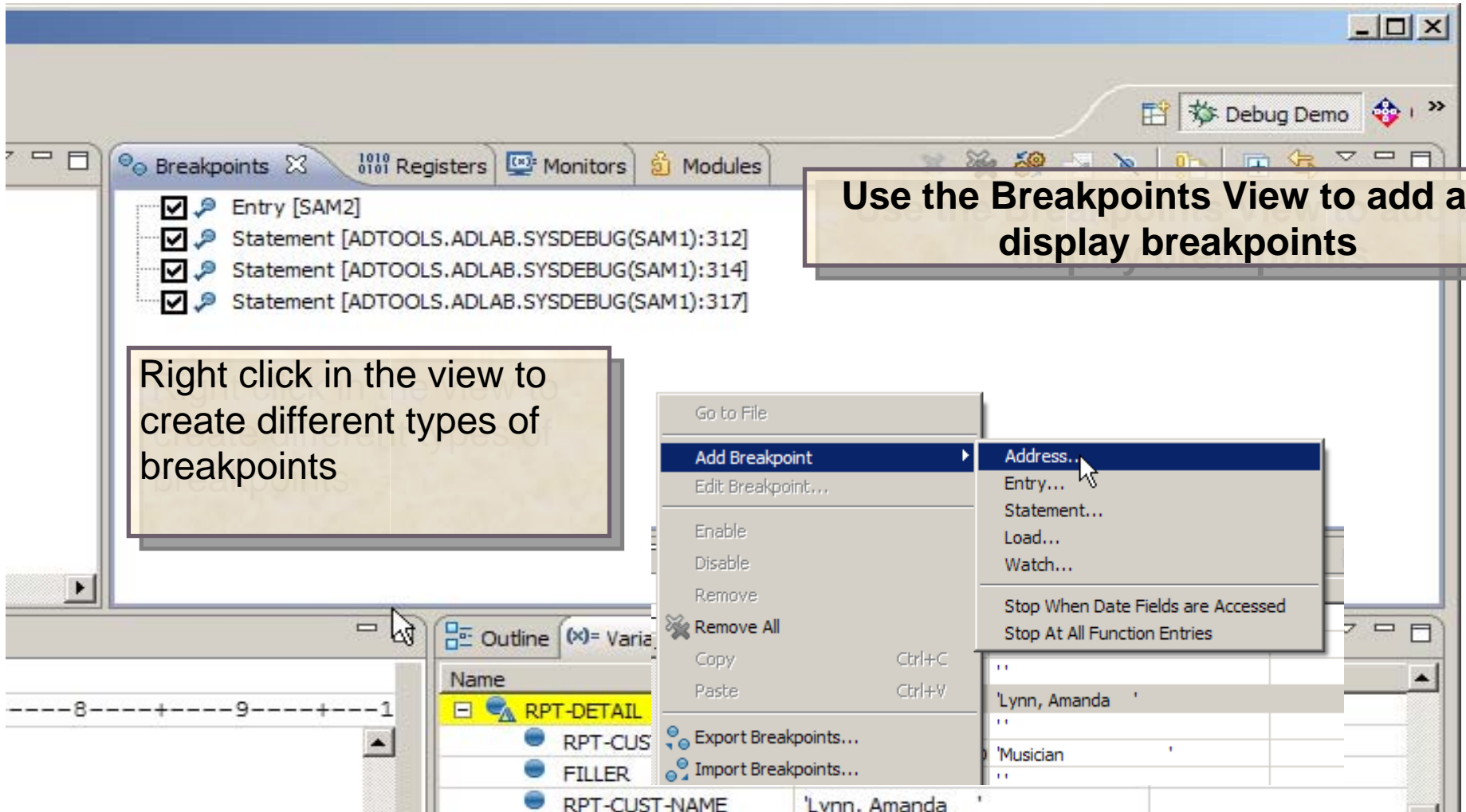
- CUST-RECORD-TYPE = 'C'
- CUST-REC
- CUSTOMER-BALANCE-STATS
- CUST-ID = '01001'
- CUST-NAME = 'Lynn, Amanda '
- CUST-ACCT-BALANCE = +0000067.68
- RPT-CUST-ACCT-BALANCE = ' 67.68'
- CUST-ORDERS-YTD = +00009
- RPT-CUST-ORDERS-YTD = ' rrrrrrrrrr'

A callout box points to the 'RPT-CUST-ACCT-BALANCE' value with the text: "Overtyp e a value to change it".

Below the main pane, the 'Variables' view shows a table of variables and their values:

Name	Value
RPT-DETAIL	
RPT-CUST-ID	'01001'
FILLER	''
RPT-CUST-NAME	'Lynn, Amanda '
FILLER	''
RPT-CUST-OCCUPATIO	'Musician'
FILLER	''

The Breakpoints View



Use the Breakpoints View to add and display breakpoints

Right click in the view to create different types of breakpoints

The memory view

IBM CICS Explorer

Explorer Edit Run Window Help

Debug SAM1 [Remote Compiled Application]
Platform: [Team] zOS 390X Connection: 9.39.68.147:6942
Thread: 1 (Runnable)
SAM1: 01
Process: 544260880 Program: SAM1

Breakpoints 1010 Registers Monitors Modules

CUST-RECORD-TYPE = 'C'
CUST-REC
CUSTOMER-BALANCE-STATS

DNET074.ADLAB.SYSDEBUG(SAM1)

Line 315 Column 40 Insert

```
309 IF CUST-RECORD-TYPE = 'C'  
310 ADD +1 TO NUM-CUSTOMER-RECS  
311 * SUBROUTINE SAM2 WILL COLLECT CUSTOMER-BALANCE-STATS  
312 CALL 'SAM2' USING CUST-REC  
313 CUSTOMER-BALANCE-STATS  
314 MOVE CUST-ID TO RPT-CUST-ID  
315 MOVE CUST-NAME TO RPT-CUST-NAME  
316 MOVE CUST-OCCUPATION TO RPT-CUST-OCCUPATION  
317 MOVE CUST-ACCT-BALANCE TO RPT-CUST-ACCT-BALANCE
```

Highlight a variable or register, <right click> and select "Monitor Memory"

Variables

Variable	Value
CUST-RECORD-TYPE	'C'
CUST-REC	
CUSTOMER-BALANCE-STATS	
SYSTEM-DATE-AND-TIME	
WS-FIELDS	
WORK-VARIABLES	
TOTALS-VARS	
NUM-TRANSFER-RECS	+00000003

Debug Console Memory

Monitors

CUST-NAME : 0x38D25 <Hex> + New Renderings...

Address	0 - 3	4 - 7	8 - B	C - F
00038D20	40404040	40D3A895	956B40C1	94819584
00038D30	81404040	40400000	06768C00	09E29789
00038D40	9989A340	D3819285	40404040	D4A4A289
00038D50	83898195	40404040	40404040	40404040
00038D60	40404040	40404040	FOF2F2F0	F0C34040
00038D70	40404040	40C79981	8881946B	40C19595
00038D80	81404040	40400000	61005C00	0AC1A3A6
00038D90	96954040	40404040	40404040	C39996A2
00038DA0	73888600	81408584	00888600	40404040

The registers view

The screenshot displays the IBM CICS Explorer interface with the following components:

- Debug Explorer (Left):** Shows the application structure for SAM1 [Remote Compiled Application], including Platform: [Team] zOS 390X, Thread: 1 (Runnable), and Process: 544260880 Program: SAM1.
- Registers View (Right):** A table with columns 'Name' and 'Value'. A red arrow points to the 'Registers' tab. The table lists:

Name	Value
General Purpose	
64-Bit General Purpose	
Special Purpose	
Floating Point	
Double Floating Point	
Extended Floating Point	
- Source Code Editor (Bottom):** Shows assembly code for subroutine SAM2. Line 312 is highlighted:


```

311 * SUBROUTINE SAM2 WILL COLLECT CUSTOMER STATISTICS
312 CALL 'SAM2' USING CUST-REC,
313     CUSTOMER-BALANCE-STATS
314     MOVE CUST-ID          TO RPT-CUST-ID
315     MOVE CUST-NAME       TO RPT-CUST-NAME
316     MOVE CUST-OCCUPATION TO RPT-CUST-OCCUPATION
317     MOVE CUST-ACCT-BALANCE TO RPT-CUST-ACCT-BALANCE
318     MOVE CUST-ORDERS-YTD TO RPT-CUST-ORDERS-YTD
319     WRITE REPORT-RECORD FROM RPT-DETAIL AFTER 1
320     ADD +1 TO NUM-DETAIL-LINES
321     END-IF
322     IF CUST-RECORD-TYPE = 'P'
            
```
- Debug Console (Bottom):** Shows the message: "EQA2388I The environment is not yet fully initialized. Use Step or Run." Below it is a "Debug Engine Command:" input field with a "Enter Commands..." button.

The Debug Tool 3270 Interface



Three windows in initial display

Header: Shows:
 - the name of program
 - current statement number

Monitor Window: Add and watch variables here

Source Window: Program source statements are displayed here

Log Window: Commands and messages are logged

```

COBOL      LOCATION: SAM1 :> 251.1
Command ==> step 15
MONITOR  -+---1---+---2---+---3---+---4---+---5---+---6- LINE: 1 OF 7
***** TOP OF MONITOR *****
0001 ***** AUTOMONITOR SAM1 ::> SAM1 :> 251.1 *****
0002 02 CURRENT-DATE
0003 03 CURRENT-YEAR
0004 03 CURRENT-MONTH
0005 03 CURRENT-DAY
0006 ***** AUTOMONITOR - PREVIOUS *****
0007 There are no variables in the statement to display.
SOURCE: SAM1 +---1---+---2---+---3---+---4---+---5--- LINE: 249 OF 467
249
250      000-MAIN.
251      ACCEPT CURRENT-DATE FROM DATE.
252      ACCEPT CURRENT-TIME FROM TIME.
253      DISPLAY 'SAM1 STARTED DATE = ' CURRENT-DATE
254             CURRENT-DAY '/' CURRENT-YEAR
255      DISPLAY '                TIME = ' CURRENT-HOUR ':'
256             CURRENT-MINUTE ':' CURRENT-SECOND.
257
LOG 0 ---+---1---+---2---+---3---+---4---+---5---+---6- LINE: 18 OF 24
0018 There are no breakpoints set.
0019 PLAYBACK ENABLE ;
0020 SET FREQUENCY ON ;
0021 SET AUTOMONITOR ON BOTH ;
0022 *** User preferences file commands end ***
0023 STEP ;
0024 STEP ;
PF 1:?      2:STEP      3:QUIT      4:LIST      5:FIND      6:AT/CLEAR
PF 7:UP     8:DOWN      9:GO       10:ZOOM     11:ZOOM LOG 12:RETRIEVE
    
```


The Application Performance Analyzer Interfaces



Application Performance Analyzer – Find the performance bottlenecks in source code

IBM Problem Determination Tools

IBM 2010 Offerings

Debug Tool
for z/OS

File Manager
for z/OS

Fault Analyzer
for z/OS

Application
Performance
Analyzer for
z/OS

Workload Simulator
for z/OS & OS/390

Rational Functional Tester Ext
Rational Performance Tester z/OS

Optim Move
for DB2

Hourglass

ISPF
Productivity Tool

www.ibm.com/software/awdtools/deployment

Application Performance Analyzer for z/OS Highlights

- Identify performance and response time problems in production
- Reduce batch application turnaround time
- Multiple languages:
 - COBOL
 - PL/I
 - C/C++
 - Assembler
 - JAVA
- Multiple z/OS environments
 - Batch
 - CICS
 - IMS
 - DB2
 - Websphere MQ
 - Websphere application server
- Performance Reports for analysis
- Can be integrated with Fault Analyzer with source mapping side files
- Workstation GUI, available as standalone or plug-in



Application Performance Analyzer

3270 or multiple GUI interfaces

New in APA V11.1

- Plug-in for CICS Explorer
- Source code drill down
- JAVA/WAS Enhancements
- 64-bit Java support
- Enhanced CICS, DB2, and IMS support
- NATURAL and ADABAS support

Session A - [24 x 80]

File Edit View Communication Actions Window Help

File View Navigate Help

R01: IBM APA for z/OS Performance Reports (6852/MACHIND) Row 00001 of 00007
Command ==> Scroll ==> PAGE

Select a category from the list to the right to view the available reports in the selection list below.

- A Admin/Miscellaneous
- S **Statistics/Storage**
- C CPU Usage Analysis
- D DASD I/O Analysis
- W CPU WAIT Analysis
- H HFS Analysis
- V Variance Reports
- I IMS Measurement
- E **CICS Measurement**
- F **DB2 Measurement**

Enter S to make a selection or enter the report code or

- S01 Measurement Profile
- S02 Load Module Attributes
- S03 Load Module Summary
- S04 TCB Summary
- S05 Memory Usage Timeline
- S06 Data Space Usage Timeline

F1=Help F2=Split F3=End
F9=Swap F10=Left F11=Right F12=Cancel

Connected to remote server/host 9.30.128.24 using lu/pool TCP00006 and port 23

IBM CICS Explorer

Explorer Edit Window Help

STC View

APA Observations List (CAZA) - Local

ReqN...	Owned By	Description	Job Name	Date/Time	Samples	Status
6263	MACHIN2	v10ref	PLITEST	May-04 09:40	5,282	Ended
6259	MACHIN2	v10ref-uc29-F7	JAVATST1	May-04 09:38	9,999	USS
		v9	MQPUT	May-04 09:37	774	Ended
		Jeremys performance capture of SA...	TSS09APA	May-03 17:39	10,000	Steps
0001	IKJEFT01	CUSTKSDDS CH...		May-03 17:46	5	Ended
0002	IEFBR14	CUSTKSDDS ALL...		May-03 17:46	1	Failed
0003	IDCAMS	CUSTKSDDS CO...		May-03 17:46	1	Failed
0004	IKJEFT01	CUSTKSDDS CH...		May-03 17:46	3	Ended
0005	IEFBR14	CUSTKSDDS ALL...		May-03 17:46	1	Failed
0006	IDCAMS	CUSTKSDDS CO...		May-03 17:46	1	Failed
0007	IDCAMS	VERIFY		May-03 17:46	18	Ended
0008	SAM1V	RUNSAM		May-03 17:48	10,000	Ended
		Downs performance capture of SAM	TSS16APA	May-03 13:36	10,000	Steps

STC Properties

Property Value

DSNHLQ ADTOOLS.APA10

Job CAZA

Started 2010-05-25 11:53:3

Sysplex CAZAPLEX

Version 10.10F

S - Statistics/Storage

- S01 - Measurement Profile
- S02 - Load Module Attributes
- S03 - Load Module Summary
- S04 - TCB Summary
- S05 - Memory Usage Timeline
- S06 - Data Space Usage Timeline
- S07 - TCB Execution Summary
- S08 - Processor Utilization Summary
- S09 - Measurement Analysis

C - CPU Usage Analysis

- C01 - CPU Usage by Category
- C02 - CPU Usage by Module
- C03 - CPU Usage by Code Slice

S01: Measurement Profile

Overall

CPU Active

Application

System

DB2 SQL 0

Data Mgmt 12

Unresolved 714

IMS DLI call 0 0.0%

Source-level support for:

- C/C++
- Assembler
- COBOL
- PL1
- JAVA

Types of Observation Sessions

- Real-Time
- Scheduled
- Via batch submission

FREE!!

Eclipse Based GUI

Application Performance Analyzer: What's new in version 11?

- The IBM Application Performance Analyzer Plug-in for Eclipse, when integrated with Application Performance Analyzer for z/OS and CICS Explorer, encompasses both the Observation Request and Reporting functions, including the R02 screens list, detail views, edit functions, and reports for the observation. The plug-in GUI can be used for submitting new observation requests and for navigating the performance analysis reports generated from observation requests. The plugin GUI can display and provide functions to multiple components of Application Performance Analyzer at the same time. The major views include:
 - STC View, which lists all active started tasks
 - Observations List View, which lists all observations
 - Observation Detail View, which provides details of an observation
 - Reports List View, which lists all reports for an observation
 - Report View, which displays an individual report
- The Application Performance Analyzer Plug-in is enhanced to support IMS Multiple Address Space measurements, source program mapping, and to display windows for details of the sample file and the module information, to make it consistent with the ISPF panels.
- 64-bit support for xplink.
- 64-bit Java support



Application Performance Analyzer: What's new in version 11?

- CICS+ new CICS intercept extractor.
- New CICS reports are added to report mean and total service times by user, and to report CPU/service time by CICS transaction.
- New Java reports are added to report the Java heap usage timeline and Java CPU usage by thread.
- The "Variance Report" feature is improved by providing three new variance reports highlighting the main difference between the CICS, DB2, and IMS "summary reports." Up to 20 measurements can be selected for variance reporting, providing the ability to evaluate the performance of specific jobs over an extended time period.
- The DB2 CPU/service time reports are enhanced to allow the developer to display the percentage used in place of the mean fields.
- Support for the natural language and ADATABASE from Software AG.
- Recommendation to the developer that a VSAM reorganization be done when CI and CA splits are present. This is shown in the Application Performance Analyzer S09 report.
- Support for large block size (greater than 262K).



Application Performance Analyzer: What's new in version 11?

- A memory tracking exit that can include data about modules managed via directed load.
- Permit use of system symbols in SampleHLQ, and allow complete control of sample file naming convention via SampleDSN and DuplicateDSN configuration settings.
- C/C++ mapping time stamp interval is reduced.
- An option to load source and then map it to the module (the inverse of usual C/C ++).
- IMS Multiple Address Space Support that groups all IMS MPP region observations under a single parent observation in R02.
- IMS Multiple Address Space Support for IMSplex.
- Support a shared source program mapping dataset list, called the Common Data Store.
- Support measuring Java jobs running in WebSphere V7.
- Currency support for DB2 V10.



The Application Performance Analyzer GUI Interface



The Observations List View

APA/GUI

File Window Help

APA Observations List (CAZA) - Remote

ReqNum	Owned By	Description	Job Name	Date/Time	Samples	Status
5513	#845409	5/3 SAMPLE	T263RAFT	Mar-23 12:37	2,000	Ended
5511	MACHIN2	v10ref4-uc13	DONDRVRN	Mar-23 08:53	28,617	Ended
5510	MACHIN2	v10ref4-uc30v2	-	Mar-23 08:34	68	Ended
5509	MACHIN2	v10ref4-uc30-v2	-	Mar-23 08:31	77	Ended
5506	MACHIN2	v10ref4-uc29v1	DSNTEJ6U	Mar-23 08:28	214	Ended
5505	MACHIN2	v10ref4-uc29v1	DSNTEJ6R	Mar-23 08:23	1,257	Ended
5502	MACHIN2	v10ref4-uc17,27	CICSC32G	Mar-23 07:59	44,444	Ended
5501	MACHIN2	v10ref4-uc17,27	CICSC32F	Mar-23 07:59	44,444	Ended
5498	MACHIN2	v10ref4-uc10	IMBFMP%	Mar-23 07:07	44,444	MultiJob
5497	MACHIN2	v10ref4-uc1	MACHIND	Mar-23 06:48	44,444	Ended

Details (5513) Observation Reports

General

Request Number: **5513**
 Request Description: 5/3 SAMPLE
 Request Status: Ended
 Owner Id: #845409
 Time of Request: Tuesday Mar 23 2010 12:37:58.79
 Session Start Time: Wednesday Mar 03 2010 14:18:33.91
 Session End Time: Wednesday Mar 03 2010 14:19:33.88
 Session Duration: 0 minutes, 59.97 seconds
 Session Delete Date: Monday Jun 21 2010 12:37:58.79

Measurement Criteria

Select by Job Name: T263RAFT
 Select by Sys Name: DEV2
 Sample Interval: 30,000 microseconds
 Duration: 60 seconds

Measurement Information

Sample File DSN: ADTOOLS.LEAKE.T263RAFT.R5513.SF
 Samples Requested: 2,000
 Samples Done: 2,000
 009F

Data Extractors
 No Extractors

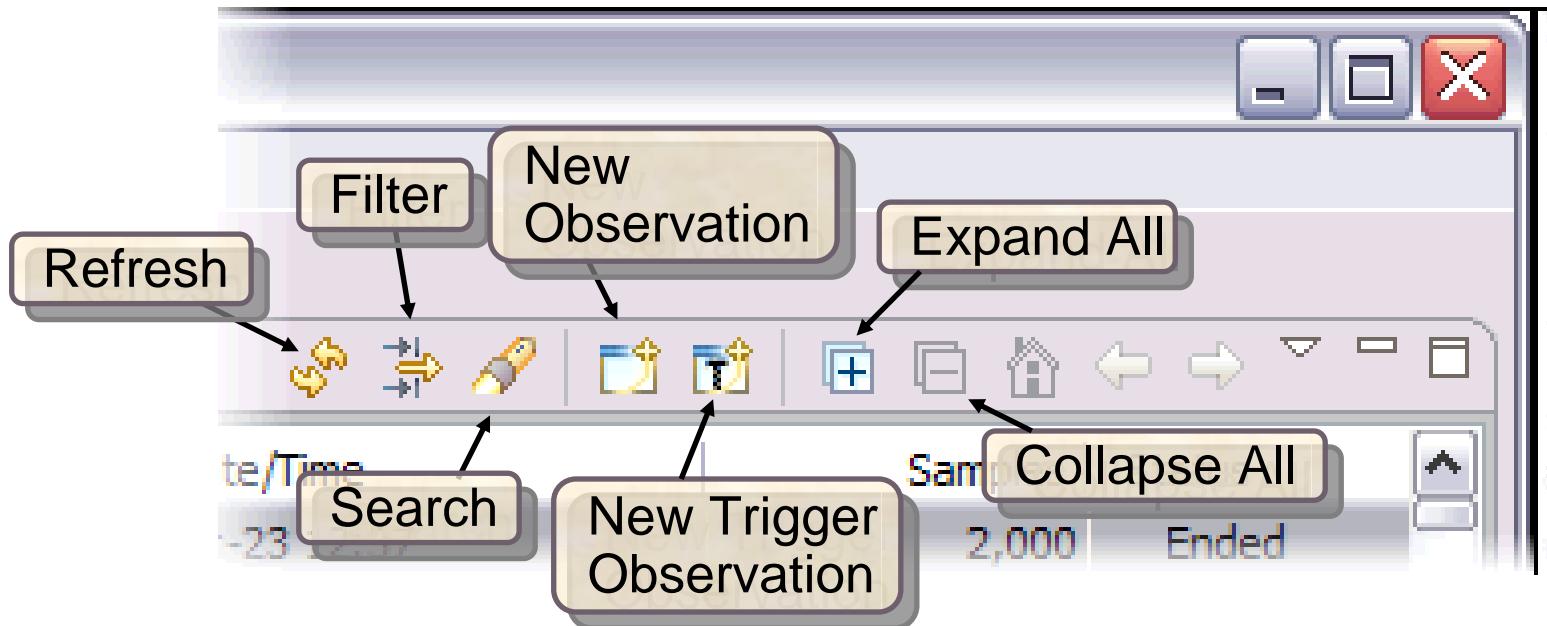
filter (*) - 904 observations

Remote (TSS09)

Indicates Local or Remote connection

Observations List View Toolbar

- **Observations List toolbar**
 - Refresh Observations List
 - Filter Observations List
 - Search Observations
 - New Observation
 - New Trigger Observation
 - Expand All (expand all observations)
 - Collapse All (collapse all observations)



Click on new observation button Create a new observation

The screenshot shows the IBM CICS Explorer interface. A 'New Observation' dialog box is open, titled 'Schedule New Measurement'. The dialog has several tabs: Job Information, Options, Multi Steps, Active Jobs, Subsystems, Schedule, and Sched Options. The 'Job Information' tab is active, showing 'Job Name/Pattern' as TSS13B and 'System' as STLABF6. Below this, there is a 'Step Specification' section with fields for Step Number (*), Program Name, Step Name, and Proc Step Name. A description field contains 'GUI test'. Other fields include Number of Samples (5000), Duration (1:00), and Retain file for (days) (90). At the bottom of the dialog are 'Submit', 'Cancel', and 'Preview' buttons.

In the background, a table of 'Samples' is visible. A callout box with the text 'New Observation' points to a button in the toolbar above the table.

Samples	Status
88,888	Ended
88,888	Ended
41,940	Ended
99,999	Multib
99,999	Multib
77,777	Multib
77,777	Multib
5,000	Ended
811	Ended



Observation is scheduled

APA Observations List (CAZA) - Remote

Req...	Owned By	Description	Job Name	Date/Time	Samples	Status
7552	TSS13	GUI test job	TSS13B	Jul-27 10:33	5,000	Steps
7551	MACHIN2	v10H-uc26	DB2V9TEP	Jul-27 10:33	22,222	Sched
+ 7533	MACHIN2	v10H-cst6	CIC%	Jul-27 09:45	99,999	MultJb
+ 7532	MACHIN2	v10H-cst6	CIC%	Jul-27 09:45	99,999	MultJb
+ 7527	MACHIN2	v10H-cst6	CIC%	Jul-27 09:09	77,777	MultJb
+ 7522	MACHIN2	v10H-cst6	CIC%	Jul-27 08:47	77,777	MultJb
7521	VNDBKNT	Natural pause II	VNDBKNT1	Jul-27 07:50	5,000	Ended
7520	VNDBKNT	Natural pause	VNDBKNT1	Jul-27 07:33	811	Ended
+ 7511	TSS13	New measurement sampling	TSS13A	Jul-27 07:04	5,000	Steps
7510	MACHIN2	v10H-uc26	DB2V9TEP	Jul-27 07:00	50,000	Ended

Details (7562) Reports (7562) X



Right click on report and select Download Reports

The screenshot shows the 'APA Observations List (CAZA) - Remote' window with a table of observations. A 'Downloading Reports' dialog box is overlaid on the table, indicating the download progress for observation #7564.

Req...	Owned By	Description	Job Name	Date/Time	Samples	Status
7563	TSS13	GUI test	TSS13B	Jul-27 12:11	5,000	Steps
756		0001 IKJEFT01 CUSTKSDS ...		Jul-27 12:15	3	Ended
756		0002 IEFBR14 CUSTKSDS ...		Jul-27 12:15	2	Ended
756					15	Ended
756					7	Ended
756					1	Failed
756					1	Failed
757					30	Ended
757					00	Ended
7563					00	Ended

Downloading Reports

Downloading 1 of 1. Reports for Observation #7564 ...

Step 3 of 3 : Extracting 28 of 28 G03: Coupling Facility Total Service Times

Always run in background

Run in Background Cancel Details >>



Report list is displayed

S01 Measurement Profile report shows high CPU activity

The screenshot displays the 'APA Observations List (CAZA) - Remote' window. The main table lists various requests with columns for Request ID, Owner, Description, Job Name, Date/Time, Samples, and Status. Request 757 is highlighted, showing 5,000 samples and an 'Ended' status.

Below the list, the 'S01: Measurement Profile (7571/TSS13B)' report is open. A callout box points to the 'Overall CPU Activity' section, which is circled in black. This section shows high CPU activity with 4,636 samples (92.7%) and a bar chart. Below it, the 'CPU Usage Distribution' section shows that 'Application' is the most active component (48.6%).

On the right side of the report, there are two 'Reports:' sections, each containing a list of report identifiers (C01, C02, C03, C05, C07, W01, W02 and C01, C05, C08, W01) that can be selected for further analysis.

Req...	Owned By	Description	Job Name	Date/Time	Samples	Status
7563	TSS13	GUI test	TSS13B	Jul-27 12:11	5,000	Steps
756		0001 IKJEFT01 CUSTKSDS ...		Jul-27 12:15	3	Ended
756		0002 IEFBR14 CUSTKSDS ...		Jul-27 12:15	2	Ended
756		0003 IDCAMS CUSTKSDS ...		Jul-27 12:15	15	Ended
756		0004 IKJEFT01 CUSTKSDS ...		Jul-27 12:15	7	Ended
756		0005 IEFBR14 CUSTKSDS ...		Jul-27 12:15	1	Failed
756		0006 IDCAMS CUSTKSDS ...		Jul-27 12:15	1	Failed
757		0007 IDCAMS VERIFY		Jul-27 12:15	30	Ended
757		0008 SAM1V RUNSAM		Jul-27 12:16	5,000	Ended

Overall CPU Activity

Samples	5,000	100.0%
CPU Active	4,636	92.7%
WAIT	317	6.3%
Queued	47	0.9%

CPU Usage Distribution

CPU Active	4,636	100.0%
Application	2,255	48.6%
System	1,997	43.0%
DB2 SQL	0	0.0%
Data Mgmt	17	0.3%
Unresolved	367	7.9%
IMS DLI Call	0	0.0%

Reports: C01 C02 C03 C05 C07 W01 W02

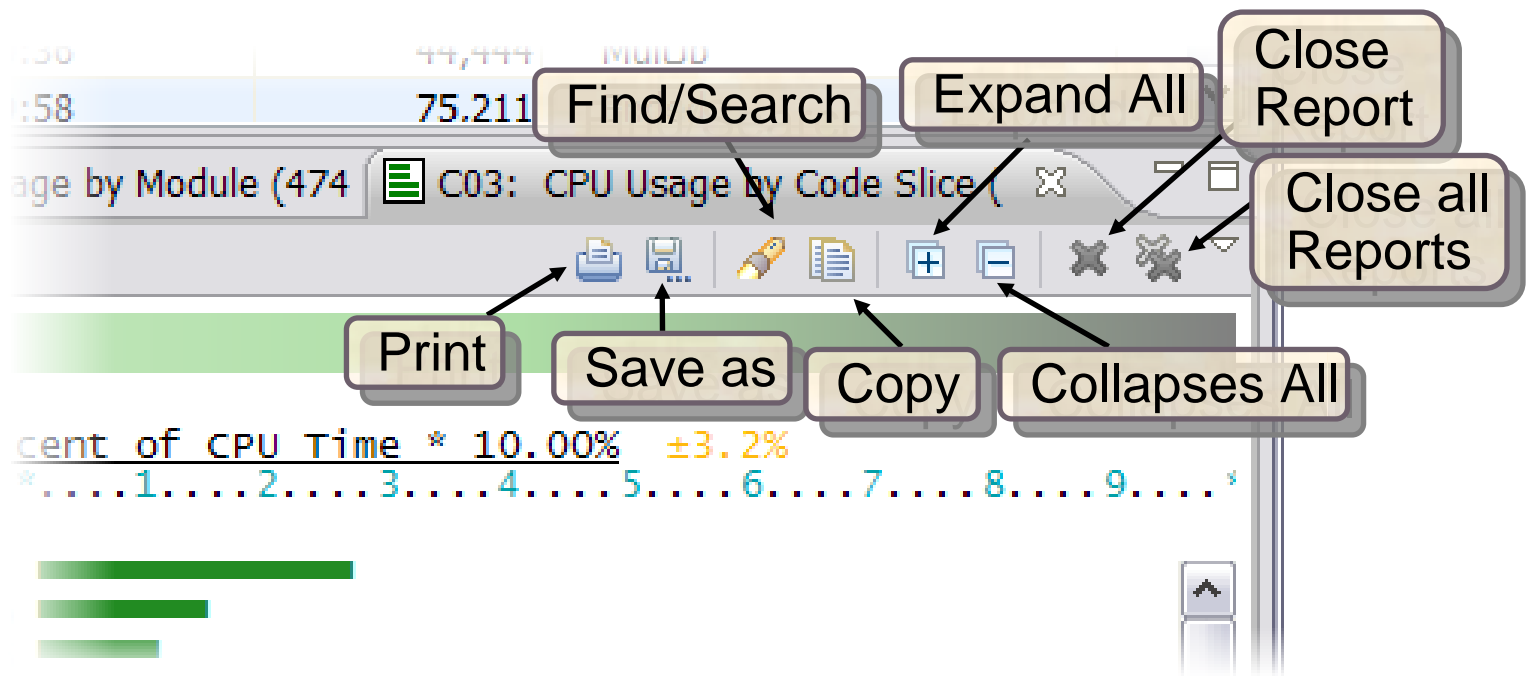
Reports: C01 C05 C08 W01

Report View

▪ Toolbar

– Provides buttons for report-level actions which include:

- Print
- Save As
- Find
- Copy
- Close Report
- Close All Reports
- Expand All
- Collapse All



S09 Measurement Analysis report displays possible performance improvement

The screenshot displays the IBM PD Tools interface. The left pane shows a tree view of reports, with 'S09 - Measurement Analysis' selected. The main pane shows the 'S09: Measurement Analysis (7571/TSS13B)' report. The report contains three numbered items, each with a title and a description, and a 'see reports:' section with links to other reports.

S09: Measurement Analysis (7571/TSS13B)

2. High CPU usage in one module
A high percentage of CPU activity was observed in a single load module.
see reports: [s01](#) [c01](#) [c02](#)

3. High CPU usage in one CSECT
A high percentage of CPU activity was observed in a single CSECT (control section).
see reports: [s01](#) [c01](#) [c02](#)

4. Execution CPU intensive
The measured job was observed to be CPU intensive.

The Application Performance Analyzer 3270 Interface



Each step generates reports, select the appropriate report

<u>ReqNum</u>	<u>Owned By</u>	<u>Description</u>	<u>Job Name</u>	<u>Date/Time</u>	<u>Samples</u>	<u>Status</u>
R02: IBM APA for z/OS Observation List (CAZA) Row 00001 of 00177						
Command ==> _____ Scroll ==> PAGE						
<u>7511</u> +	TSS13	New measurement	TSS13A	Jul-27 7:04	5,000	STEPS
→ <u>7512</u>	0001	IKJEFT01	CUSTKSDS CHECKV	Jul-27 7:06	63	Ended
→ <u>7513</u>	0002	IEFBR14	CUSTKSDS ALLOCV	Jul-27 7:06	2	Ended
→ <u>7514</u>	0003	IDCAMS	CUSTKSDS COPYV	Jul-27 7:06	50	Ended
→ <u>7515</u>	0004	IKJEFT01	CUSTKSDS CHECKV	Jul-27 7:06	4	Ended
→ <u>7516</u>	0005	IEFBR14	CUSTKSDS ALLOCV	Jul-27 7:06	2	Ended
→ <u>7517</u>	0006	IDCAMS	CUSTKSDS COPYV	Jul-27 7:06	51	Ended
→ <u>7518</u>	0007	IDCAMS	VERIFY	Jul-27 7:06	13	Ended
→ <u>7519</u>	0008	SAM1V	RUNSAM	Jul-27 7:07	5,000	Ended
<u>7510</u>	MACHIND	v10H- uc8	VSAMJOB	Jul-27 6:37	78,787	Sched
<u>7509</u>	MACHIND	v10H-uc20	CICSC31G	Jul-27 6:36	11	Active
<u>7508</u>	MACHIND	v10H- uc5	VSAMREAD	Jul-27 6:25	59,218	En
<u>7498</u>	MACHIN2	v10H-uc10	PLITEST	Jul-26 16:58	2,088	En
<u>7496</u> +	MACHIN2	v10H-uc23v2	COBOLPLI	Jul-26 16:14	34,567	TI


 Enter

R01 Performance Report index is displayed

Select S01 Measurement Report

```

File View Navigate Help
R01: IBM APA for z/OS Performance Reports (7519/TSS13A) Row 00001 of 00007
Command ==> _____ Scroll ==> PAGE

Select a category from the list to the right to view the available reports in the selection list below.
  _ A Admin/Miscellaneous      _ I IMS Measurement
  _ S Statistics/Storage    _ E CICS Measurement
  _ C CPU Usage Analysis      _ F DB2 Measurement
  _ D DASD I/O Analysis       _ Q MQ Measurement
  _ W CPU WAIT Analysis       _ G Coupling Facility
  _ H HFS Analysis            _ J Java Measurement
  _ V Variance Reports        _ X Multi Address Space

More: +
Enter S to make a selection or enter the report code on the command line

S S01 Measurement Profile      _ S07 TCB Execution Summary
  _ S02 Load Module Attributes  _ S08 Processor Utilization Summary
  _ S03 Load Module Summary     _ S09 Measurement Analysis
  _ S04 TCB Summary
  _ S05 Memory Usage Timeline
  _ S06 Data Space Usage Timeline
  
```

Enter



Measurement Profile report

Cursor select the C01 report

```

File  View  Navigate  Help

S01: Measurement Profile (7519/TSS13A)          Row 00001 of 00099
Command ==> _____           Scroll ==> PAGE

Overall CPU Activity
Samples          5,000      100.0%  ' ' ' ' ' ' ' ' ' ' ' ' ' '
CPU Active       4,636      92.7%  ████████████████████████████████████
WAIT            336         6.7%  ■
Queued           28         0.5%  ■

Reports:
C01  C02  C03  C05
C07  W01  W02

CPU Usage Distribution
CPU Active       4,636      100.0%  ' ' ' ' ' ' ' ' ' ' ' ' ' '
Application      2,256      48.6%  ████████████████████████████
System           2,029      43.7%  ████████████████████████████
DB2 SQL           0         0.0%
Data Mgmt         4         0.0%  ■
Unresolved       347         7.4%  ■
IMS DLI Call      0         0.0%

Reports:
C01  C05  C08  W01

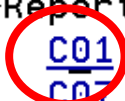
Much of the CPU time
is in application code.

Most CPU Active Modules
CPU Active       4,636      100.0%  ' ' ' ' ' ' ' ' ' ' ' ' ' '

Reports:
C02

Enter
    
```








This job is CPU intensive.



Much of the CPU time is in application code.



Use the 'p' line command to display program source for the SAM2V csect

<u>File</u> <u>V</u> iew <u>N</u> avigate <u>H</u> elp			
C01: CPU Usage by Category (7519/TSS13A)		Row 00001 of 00081	
Command ==>		Scroll ==> PAGE	
<u>Name</u>	<u>Description</u>	<u>Percent of CPU Time * 10.00%</u>	<u>+1.4%</u>
*.....1.....2.....3.....4.....5.....6.....7.....8			
<u>APPLCN</u>	Application Code	48.66	
→ <u>SAM2V</u>	Application Program	48.66	
→ <u>p</u> <u>SAM2V</u>	CSECT in SAM2V	48.66	
<u>SYSTEM</u>	System/OS Services	43.76	
→ <u>LERUNLIB</u>	Language	43.29	
	Environment Runtime		
→ <u>IGZCPAC</u>	COBPACK	43.24	
→ <u>IGZCXDI</u>	Double precision division	43.24	
→ <u>IGZEINI</u>	Environment initialization	0.02	
→ <u>IGZEINI</u>	CSECT in IGZEINI	0.02	
→ <u>IGZCPCO</u>	COBPACK	0.02	
→ <u>IGZEVIO</u>	VSAM input/output	0.02	



The program statements that used the most CPU time are displayed
 Bar charts indicate statements using the most resources

<u>File</u>	<u>View</u>	<u>Navigate</u>	<u>Help</u>
P01: Source Program Attribution (7519/TSS13A)			Row 00010 of 00039
Command ==> _____			Scroll ==> HALF
<u>LineNo</u>	<u>Offset</u>	<u>Prcnt</u>	<u>Source Statement</u>
<u>000097</u>			
<u>000098</u>			100-CRUNCH-LOOP.
<u>000099</u>	0003C2	.90	MOVE 'CALCULATING BALANCE STATS' TO WS-PROGRAM-
<u>000100</u>			* *** Increment Record Count ***
<u>000101</u>	0003D2	5.24	ADD +1 TO BALANCE-COUNT
<u>000102</u>			* *** Add this customer's BALANCE to the grand tot
<u>000103</u>	0003EA	11.32	COMPUTE BALANCE-TOTAL =
<u>000104</u>			BALANCE-TOTAL + CUST-ACCT-BALANCE
<u>000105</u>			* *** Calculate Average ***
<u>000106</u>	000412	13.97	COMPUTE BALANCE-AVERAGE =
		46.09	<- CPU time attributed to above statement
<u>000107</u>			BALANCE-TOTAL / BALANCE-COUNT
<u>000108</u>			* *** Calculate Minimum ***
<u>000109</u>	00045A	2.41	IF WS-FIRST-TIME-SW = 'Y'
<u>000110</u>	00046A		MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
<u>000111</u>	000474	1.61	IF CUST-ACCT-BALANCE < BALANCE-MIN
<u>000112</u>	000486		MOVE CUST-ACCT-BALANCE TO BALANCE-M
<u>000113</u>			* *** Calculate Maximum ***

PF3



The File Manager Interface



File Manager - Manage a variety of enterprise data

IBM 2010 Offerings

Debug Tool
for z/OS

File Manager
for z/OS

Fault Analyzer
for z/OS

Application
Performance
Analyzer for
z/OS

Workload Simulator
for z/OS & OS/390

Rational Functional Tester Ext
Rational Performance Tester z/OS

Optim Move
for DB2

Hourglass

ISPF
Productivity Tool

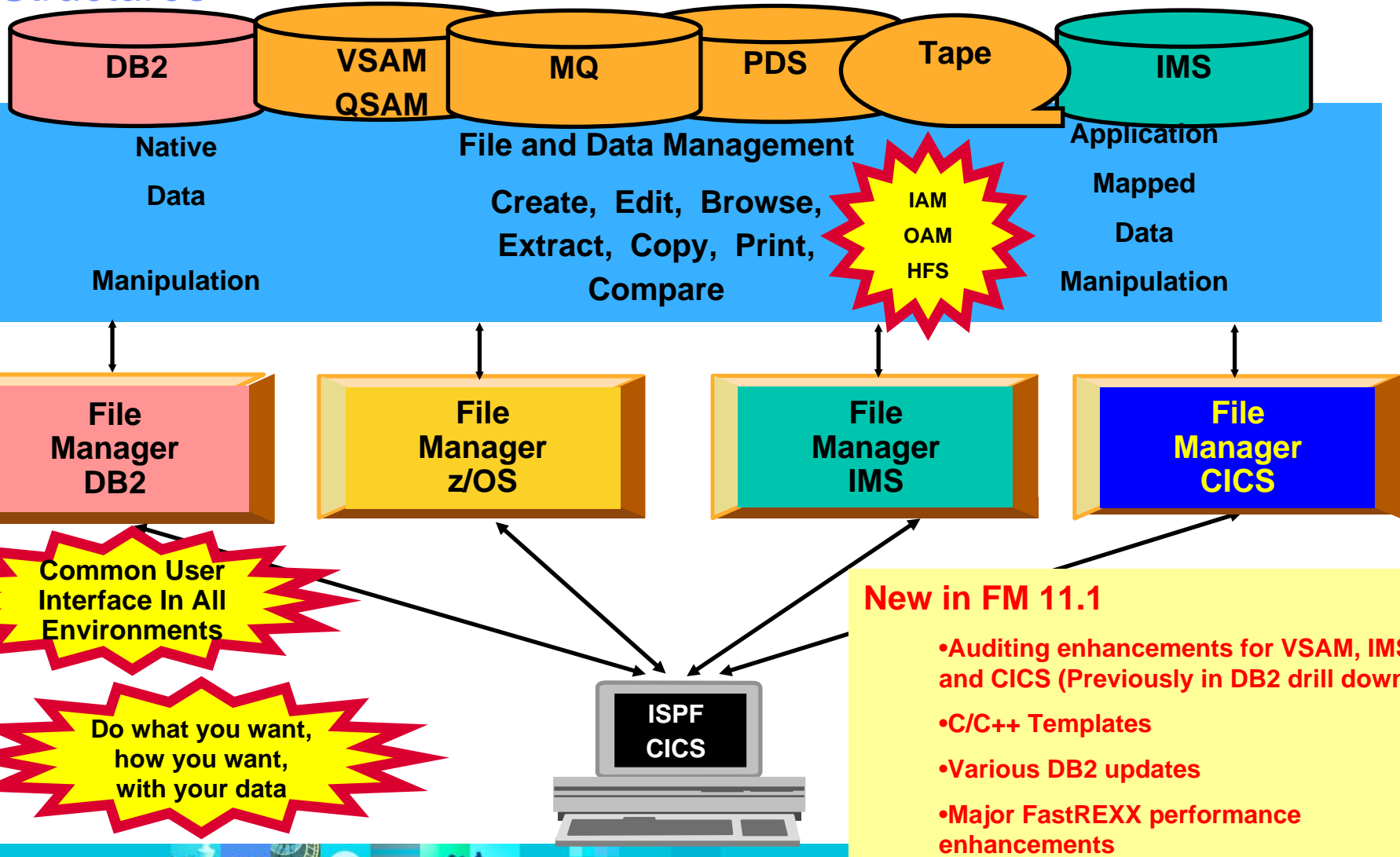
www.ibm.com/software/awdtools/deployment

File Manager for z/OS Highlights

- Edit entire files regardless of size
- Manipulate data using COBOL, Assembler and PL/I record layouts interactively or in batch
- Comprehensive, user-friendly, batch and interactive utilities extends standard ISPF
- Scrambling sensitive data to ensure data privacy across all environments
- Identify fields that contain invalid values
- Find and change data within specific fields
- Websphere MQ support
- Test data generation based on record layouts
- Compare data/load modules between datasets using field level mapping
- Date aging capability is included to help with date-sensitive testing
- Enhanced audit capabilities to assist with governance compliance
- And much more...



File Manager for z/OS (FM) – Manage a variety of Enterprise Data Structures



File Manager: What's new in version 11?

- File Manager Editor and Batch performance is improved with enhanced expression processing which includes:
 - Improved performance for the File Manager Base Editor with REXXTM template expressions
 - Improved performance for the File Manager Base Utility functions with REXX procedures
 - Additional programming constructs supported in FASTREXX
 - Ability to access files in read only mode for Data Set Edit Batch (DSEB) and to run DSEB procedures using FASTREXX
 - Improved expression capability for segmented data
- The File Manager Base is enhanced to work with Rational® Developer for System z V7.6.2 to enable compiler option processing.
- Auditing enhancements for the File Manager Base, CICS, and IMS components. The enhancements are built on the facility provided in the File Manager DB2 V10 component.
- Support for DB2 export to produce column names in CSV format as well as supporting DBCS characters.
- Support for creating and updating the DB2 template in batch.
- Support for setting commit conditions for FM DB2 edit and import.
- Usability enhancements:
 - Member list panel enhancements to support COPY, DELETE, MOVE, PRINT, RESET, and SUBMIT commands
 - Allocation of template data sets when the specified data set does not exist



Formatted Data Editor

Display and edit PDS members, sequential datasets, and VSAM datasets using the Formatted Data editor

Associated template

Template Associated: TSS09.ADLAB.COPYLIB(CUST1)

Table Format

Switch to unformatted

Single Format

CUST-ID	NAME	ACCT-BALANCE	ORDERS-YTD	ADDR
01001	Lynn, Amanda	67.68	9	119 North Lake Road
02200	Graham, Anna	610.05	10	89 Clay Springs Rd
02202	Major, Art	1234.56	5	517 Pine Bluff
03003	Prentice, Anna	0.00	7	649 Brown Street
03390	Deeds, Darren	74.00	3	3039 Manning St.
05570	Parker, Ford	233.27	12	

Single Mode

Field	Picture	Type	Start	Length	Data
CUST-ID	X(5)	AN	1	5	01001
NAME	X(17)	AN	6	17	Lynn, Amanda
ACCT-BALANCE			23	5	67.68
ORDERS-YTD			28	2	9
ADDR			30	20	119 North Lake Road
CITY	X(14)	AN	50	14	Spirit Lake

Formatted Character

Formatted Data Editor Actions

The screenshot shows the Formatted Data Editor interface with several callout boxes pointing to specific features:

- Hex mode**: Points to the hex icon (010 01) in the toolbar.
- Page Up / Down**: Points to the page navigation icons in the toolbar.
- Select show setting**: Points to the show settings icon in the toolbar.
- Switch between record layouts**: Points to the 'Layout: CUST-REC' dropdown menu.
- Navigate to "Top", "Bottom", or line number**: Points to the 'Jump To: TOP' dropdown menu.
- Collapse / Expand Single mode**: Points to the collapse/expand icon in the toolbar.

The main data area displays a table with columns for account balance, order number, and address:

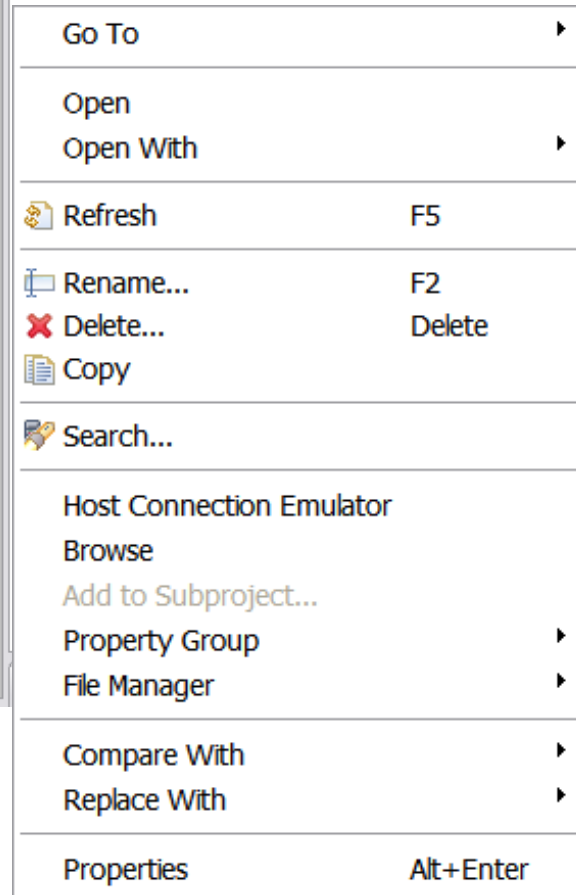
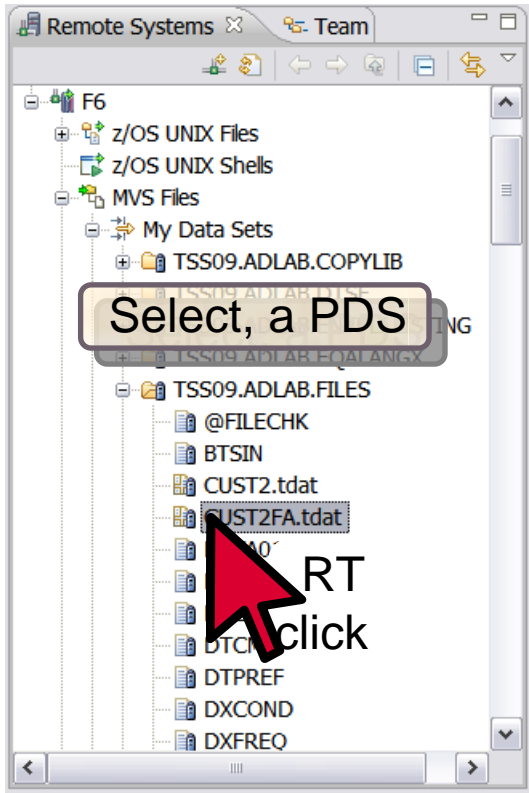
ACCT-BALANCE	OR	Address
1234.56	9	North Lake Road
0.00	10	Clay Springs Rd
	5	1512 Pine Bluff
	7	33 Renshaw

A dropdown menu for 'Select show setting' is open, showing the following options:

- Not selected records
- Suppressed records
- Excluded records
- All records



Copy Utility



Copy Utility (continued)

The image displays three overlapping screenshots of the IBM Copy Utility interface, each with a callout box and a red arrow pointing to a specific element:

- Top-left screenshot:** Titled "Advanced Copy" with "TSS09.ADLAB.FILES" as the source. A callout box says "Skip / copy records" pointing to the "Number of Records to Skip:" field (containing "100") and the "Number of Records to Copy:" field. Another callout box says "Select members to work with" pointing to the "Select Source Members" section, which lists members like @FILECHK, BTSIN, CUST2.tdat, CUST2FA.tdat, DATA01, DFSVSAMP, DTCMD, and DTCMD2. A red arrow points to the "Next >" button with the text "click".
- Middle screenshot:** Also titled "Advanced Copy" with "TSS09.ADLAB.FILES" as the source. A callout box says "Indicate target dataset" pointing to the "Target:" field (containing "TSS09.ADLAB.CUST12"). Another callout box says "Choose disposition" pointing to the "Disposition:" dropdown menu (showing "MOD" selected). A red arrow points to the "Next >" button with the text "click".
- Bottom-right screenshot:** Titled "Advanced Copy" with "Map Template" as the section. A callout box says "Associate 'From' and 'To' templates (optional)" pointing to the "From:" and "To:" fields (both containing "TSS09.ADLAB.TEMPLATE(TEST12)" and "TSS09.ADLAB.TEMPLATE(TEST13)" respectively). A red arrow points to the "Finish" button with the text "click".

File Manager for z/OS (FM)

IBM File Manager for z/OS

Base Feature



File Manager

Inclusive of all environments

The image displays four overlapping screenshots of the File Manager interface, illustrating the navigation path from the main menu to a specific DB2 environment.

- Top Screenshot (File Manager):** Shows the main menu with "File Manager" circled in red. The command line shows "Command ==> 2".
- Second Screenshot (FM/CICS):** Shows the "Primary Option Menu" for CICS with "FM/CICS" circled in red. The command line shows "Command ==> 2".
- Third Screenshot (FM/IMS):** Shows the "Primary Option Menu" for IMS with "FM/IMS" circled in red. The command line shows "Command ==> 2".
- Bottom Screenshot (FM/DB2 (DB1F)):** Shows the "Primary Option Menu" for DB2 with "FM/DB2 (DB1F)" circled in red. The command line shows "Command ==> 2".

The bottom screenshot also displays detailed system information:

```

User ID . . : TSS05
System ID : STLABF6
Appl ID . . : FMN2
Version . . : 10.1.0
Terminal . . : 3278A
Screen . . . : 1
Date . . . . : 2009/12/10
Time . . . . : 09:00

DB2 SSID . . DB1F
SQL ID . . . TSS05 +
    
```

- Use a copybook or template to format the display
- A COBOL or PL/I copybook, or an assembler DSECT can be used

```

EDIT          TSS12.ADLAB.COPYLIB(CUST1) - 01.00
Command ==>
=COLS> ----1-----2-----3-----4-----5-----
***** ***** Top of Data *****
000100 * -----
000200 * Sample COBOL Copybook for IBM PD Tools Workshops
000300 * Describes file <userid>.ADLAB.CUST1
000400 * -----
000500 01  CUST-REC.
000600     05  CUSTOMER-KEY.
000700         10  CUST-ID                PIC X(5).
000800     05  NAME                        PIC X(17).
000900     05  ACCT-BALANCE                 PIC S9(7)V99  COMP-3.
001000     05  ORDERS-YTD                   PIC S9(4)   COMP.

```

```

EDIT          TSS12.ADLAB.COPYLIB(PLCU1) - 01.00          Columns 000
Command ==>          Scroll =
=COLS> ----+----1-----2-----3-----4-----5-----6-----
***** ***** Top of Data *****
000001 /* ----- */
000002 /* SAMPLE PLI COPYBOOK FOR IBM PD TOOLS WORKSHOPS */
000003 /* DESCRIBES FILE <USERID>.ADLAB.CUST1 */
000004 /* ----- */
000005 DCL 1 CUST_REC,
000006     2 CUSTOMER_KEY,
000007     3 CUST_ID          CHAR(5),
000008     2 NAME            CHAR(17),
000009     2 ACCT_BALANCE    FIXED DEC (9,2) UNALIGNED,
000010     2 ORDERS_YTD      FIXED BINARY(15,0) SIGNED UNALIGNED,

```

```

EDIT          TSS12.ADLAB.COPYLIB(ASCU1)
Command ==>
=COLS> ----+----1-----2-----3-----
***** *****
000001 *-----
000002 * SAMPLE ASSEMBLER DSECT FOR
000003 * DESCRIBES FILE <USERID>.AD
000004 *-----
000005 CUST_REC    DSECT
000006 CUST_ID     DS CL5
000007 NAME        DS CL17
000008 ACCT_BAL    DS 5D
000009 ORDS_YTD    DS 4H

```




Option 1 displays the view entry panel

```
Process  Options  Help
-----
File Manager Primary Option Menu
Command ==> 1

0  Settings      Set processing options      User ID . . : TSS12
1  View          View data                   System ID  : STLABF6
2  Edit          Edit data                   Appl ID   : FMN
3  Utilities     Perform utility functions   Version . . : 10.1.0
4  Tapes        Tape specific functions     Terminal. : 3278A
5  Disk/VSAM    Disk track and VSAM CI functions
6  OAM          Work with OAM objects       Screen. . : 1
7  Templates    Template and copybook utilities
8  HFS          Access Hierarchical File System
9  WebSphere MQ List, view and edit MQ data  Date. . . : 2010/05/19
X  Exit          Terminate File Manager      Time. . . : 03:15

F1=Help      F2=Split      F3=Exit      F4=CRetriev  F7=Backward  F8
F9=Swap      F10=Actions   F12=Cancel
```



Enter the name of the copybook, and specify the 1 (above) option

```

Process  Options  Help
-----
File Manager                               View Entry Panel
Command ==> _____

Input Partitioned, Sequential or VSAM Data Set, or HFS file:
  Data set/path name ADLAB.CUST1.KSDS +
  Member . . . . . _____ (Blank or pattern for member list)
  Volume serial . . _____ (If not cataloged)
  Start position . . _____ +
  Record limit . . . _____ Record sampling _

Copybook or Template:
  Data set name . . ADLAB.COPYLIB
  Member . . . . . CUST1 (Blank or pattern for member list)

Processing Options:
  Copybook/template  Start position type  Enter "/" to select option
  1 1. Above         _ 1. Key                _ Edit template _ Type (1,2,S)
    2. Previous       _ 2. RBA                _ Include only selected records
    3. None           _ 3. Record number     _ Binary mode, reclen 80
    4. Create dynamic

F1=Help    F2=Split    F3=Exit    F4=Expand    F7=Backward  F8=
F9=Swap    F10=Left   F11=Right  F12=Cancel
  
```



Records are formatted showing fields defined in the copybook

Process Options Help

Reference number

Field name

Format Indicator

```

View          TSS12.ADLAB.CUST
Command ==>
Key          Type KSDS      RBA
CUST-ID NAME ACCT-BALANCE ORDERS-YTD ADDR
#3          #4          #5          #6 #7
AN 1:5     AN 6:17     PD 23:5     BI 28:2 AN 30:20
<--->     <-----1-----> <-----1>   <---+> <-----1----->

***** **** Top of data ****
000001 01001  Lynn, Amanda          610.05          10 89 Clay Springs Rd
000002 02200  Graham, Anne          67.68           9 11
000003 02202  Major, Art            1234.56         5 15
000004 03003  Prentice, Anna        0.00            7 33
000005 03390  Deeds, Darren         74.00           3 64
000006 05570  Parker, Ford          233.27          12 30
000007 06101  Early, Brighton      311.08          10 96
000008 06106  Lander, Annette       489.84           7 61
000009 06711  Dubree, Dustin        192.98          11 92
000010 06900  Bacon, Chris P.      1001.01          0 1134 Rosetta
000011 07008  Houston, Roger        296.97          10 4411 Northside Pkway
000012 07044  Schauer, April        88.83           7 7331 Gulf Shore Dr.

F1=Help      F2=Zoom      F3=Exit      F4=CRetriev  F5=RFind     F6=RChange
F7=Up        F8=Down      F9=Swap      F10=Left     F11=Right    F12=Cancel
    
```

Field type and start : length
AN=alphanumeric
PD=packed dec.
BI=binary
and others



Some commands can use the field reference number

Command ==> f mann #4 **Enter**

This find command searches only field #4

```
View TSS12.ADLAB/COST11.KSDS
```

Command ==> _____ Scroll CSR
Key 01001 Type KSDS RBA 0 Format TABL

CUST-ID	NAME	ACCT-BALANCE	ORDERS-YTD	ADDR
#3	#4	#5	#6	#7
AN 1:5	AN 6:17	PD 23:5	BI 28:2	AN 30:20
<--->	<---+----1----+>	<---+----1>	<---+>	<---+----1----+>
000001	01001 Lynn, Amanda	610.05	10	89 Clay Springs Rd
000002	02200 Graham, Anne	67.68	9	119 North Lake Road
000003	02202 Major, Art	1234.56	5	1512 Pine Bluff
000004	03003 Prentice, Anna	0.00	7	33 Renshaw
000005	03390 Deeds, Darren	74.00	3	649 Brown Street
000006	05570 Parker, Ford	233.27	12	3039 Manning St.
000007	06101 Early, Brighton	311.08	10	9662 Summit Road
000008	06106 Lander, Annette	489.84	7	6127 Cedar Street
000009	06711 Dubree, Dustin	192.98	11	9229 Delegate's Row
000010	06900 Bacon, Chris P.	1001.01	0	1134 Rosetta
000011	07008 Houston, Roger	296.97	10	4411 Northside Pkway
000012	07044 Schauer, April	88.83	7	7331 Gulf Shore Dr.
000013	07077 Mann, Mr. E.	621.05	1	24 Valentine Rd

F1=Help F2=Zoom F3=Exit F4=CRetrieve F5=RFind F6=RChange
F7=Up F8=Down F10=Left F12=Cancel

match found

Out of scope

Utilities

- Test data generation
 - Generate new data based on existing copybooks
- Copy data
 - Reformat and generate data while copying
 - Field values can be “**scrambled**” to protect sensitive data
 - Copy data into XML format
- Global Find/Change
 - Search for/change data across members in a PDS(E)
 - Perform a new search based on the results of a previous search
- Compare
 - Compare records/fields between files
 - Use field level mapping for comparison criteria
 - Special options for load module comparisons
- Websphere MQ support



Summary

- The PD Tools GUIs reduce the effort needed to learn and perform tasks
 - Interfaces for Fault Analyzer, Debug Tool and Application Performance Analyzer
 - Add flexibility, while retaining the proven functionality of the PD Tools
 - Navigate quickly between multiple product's functionality
 - Perform complex tasks with the aid of menus and toolbars
 - Reduce the learning curve - gain maximum leverage of IT staff with minimal training expense
- z/OS Problem Determination and Deployment Tools that:
 - Exploits IBM's latest software and processor technology
 - Offer wide array of key features and functions
 - Provide opportunity for increased user productivity
 - Are affordably priced
 - Have flexible terms and conditions
 - Various training options (Class, Web/online - free, etc...)
- PD Tools interfaces are available no charge with CICS Explorer, or integrated with RDz
- The traditional 3270 interfaces are also available to leverage traditional application development and maintenance skills
- Integrated Application Development, System/Sub System Environments



Get more information about these tools at:

www.ibm.com/software/awdtools/deployment

Software > Software Development >

z/OS Problem Determination Tools

z/OS® Problem Determination Tools have powerful functions and features. Organizations that choose to use them improve the health of their application portfolios. To help you to transform your System z environment into a service-oriented architecture (SOA) hub, the IBM Problem Determination Tools deliver support right across the life cycle whether you are building new or reusing existing applications. These tools can help you to modernize and transform existing System z applications whether your goal is to develop and deploy new workloads to leverage the unique performance, availability, security, and cost benefits of System z, increase your responsiveness to business requirements by modernizing your mainframe platform, or optimize management of your IT environment, reducing cost and complexity while improving governance and compliance. These latest versions of the IBM Problem Determination Tools continue the trend of cost-effectively protecting tool investments and maximizing IT productivity.

Select a product

- [z/OS Problem Determination Tools](#)
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Related software

- Application Performance Analyzer for z/OS
- DebugTool for z/OS
- Fault Analyzer for z/OS
- Optim Move for DB2
- File Manager for z/OS
- Workload Simulator for z/OS and OS/390

Related hardware

- System z servers

Related services

- Application Time Facility for z/OS

- Warranties and

Products

• Application Performance Analyzer for z/OS

A non-intrusive application performance analyzer that aids developers in the design, development and maintenance cycles. Its key function is to measure and report how resources are used by applications running in virtually any z/OS address space.

Solutions

• Safari of IBM PD Tools: A Live Exploration

Join us in this complimentary seminar for hands-on labs that will build your understanding of IBM problem determination tool capabilities, so you can develop applications more efficiently.

• System z Enterprise Development Tools and Compilers information

We're here to help



Easy ways to get the answers you need.

-
-
-

or call us at
877-426-3774
Priority code:
104CBW67

IBM PD Tools win top spot in Software Strategies analyst report



Highlights



IBM Education Assistant

<http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp>

The screenshot shows the IBM Education Assistant website in a Mozilla Firefox browser. The browser's address bar displays the URL: <http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp>. The website header includes the IBM logo and the text "Education Assistant". Below the header is a navigation menu with options: Home, Business solutions, IT services, Products, Support & downloads, and My IBM. A search bar is located on the right side of the header.

The main content area is titled "IBM Education Assistant" and "IBM systems and servers (and related software)". It features a "Description" section with the text: "IBM Education Assistant is a collection of multimedia educational modules designed to help you gain a better understanding of IBM products and use them more effectively to meet your business requirements." Below this description are links to "Take a tour of IBM Education Assistant" and "Follow IBM Education Assistant on Twitter".

On the right side of the main content area, there is a section titled "Educational content for other IBM products" which lists several software products: Lotus software, Rational software, Tivoli software, and WebSphere software. Below this list is a section titled "Systems and servers (and related software)" which contains a list of links to various IBM products, including: AIX 5L, Application Performance Analyzer for z/OS, Cell Broadband Engine, CICS Configuration Manager for z/OS, CICS Performance Analyzer for z/OS, CICS Transaction Gateway, CICS Transaction Server for z/OS, Communication Controller for Linux on System z, Distributed Communications Servers, z/OS Communications Server, Debug Tool for z/OS, Fault Analyzer for z/OS, File Manager for z/OS, TPF Toolkit, Tivoli Performance Modeler, z/OS Management Facility, z/OS Operating System, z/Transaction Processing Facility, and ibm.com: About IBM - Privacy - Contact.

The left sidebar contains a "Contents" section with a list of links to various IBM products, including: IBM Education Assistant, AIX 5L, Application Performance Analyzer for z/OS, Cell Broadband Engine, CICS Configuration Manager for z/OS, CICS Performance Analyzer for z/OS, CICS Transaction Gateway, CICS Transaction Server for z/OS, Communication Controller for Linux on System z, Distributed Communications Servers, z/OS Communications Server, Debug Tool for z/OS, Fault Analyzer for z/OS, File Manager for z/OS, TPF Toolkit, Tivoli Performance Modeler, z/OS Management Facility, z/OS Operating System, z/Transaction Processing Facility, and ibm.com: About IBM - Privacy - Contact.



IBM Education Assistant A Drill Down

The screenshot shows the IBM Education Assistant website in a Mozilla Firefox browser. The browser's address bar shows the URL: <http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp>. The page title is "IBM Education Assistant - Systems and servers (and related software) - Mozilla Firefox".

The website header includes the IBM logo and the text "Education Assistant". Below the header is a navigation menu with links for Home, Business solutions, IT services, Products, Support & downloads, and My IBM. A search bar is located on the right side of the header.

The main content area is divided into two sections. On the left is a "Contents" navigation pane with a tree view of topics. On the right is the main content area for the selected topic, "Debug Tool for z/OS".

Contents Navigation Pane:

- IBM Education Assistant
- AIX 5L
- Application Performance Analyzer for z/OS
- Cell Broadband Engine
- CICS Configuration Manager for z/OS
- CICS Performance Analyzer for z/OS
- CICS Transaction Gateway
- CICS Transaction Server for z/OS
- Communication Controller for Linux on System z
- Distributed Communications Servers
- z/OS Communications Server
 - Debug Tool for z/OS
 - Web-based training
 - Classroom-based training
 - Problem determination
 - Maintenance
 - Additional resources
- Fault Analyzer for z/OS
- File Manager for z/OS
- TPF Toolkit
- Tivoli Performance Modeler
- z/OS Management Facility
- z/OS Operating System
- z/Transaction Processing Facility
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Main Content Area: Debug Tool for z/OS

IBM Education Assistant

Debug Tool for z/OS

Description

Debug Tool for z/OS you examine, monitor, and control the execution of programs written in Language Environment assembler, C, C++, COBOL, or PL/I on z/OS and OS/390. Allows you to debug Enterprise COBOL applications that have been compiled with OPTIMIZE or OPTIMIZE(FULL) compiler options.

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Additional resources

- [Debug Tool for z/OS product information](#)
- [Debug Tool for z/OS information center](#)
- [Debug Tool for z/OS support](#)

Educational content for other IBM products

- Information Management**
- Lotus** software
- Rational** software
- Tivoli** software
- WebSphere** software

Systems and servers

Navigation pane to access available materials (Web-based training, Classroom-based training, Maintenance, and Additional Resources)

The Education Assistant More Information

IBM Education Assistant - Systems and servers (and related software) - Mozilla Firefox

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Debug Tool for z/OS

IBM Education Assistant

Debug Tool for z/OS®
Platform: z/OS
Web-based training

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Before you begin

- [About this training](#) 2 min 512K

Debug Tool for z/OS Version 10 tutorials (also beneficial for V9, V8, and V7 users)

- [Introduction](#) 18 min 1.5M
- [Preparing programs for use with the debugger: an overview](#) 12 min 512K

Starting the debugger for batch applications

- [Selecting a method for debugging batch LE applications](#) 7 min 571K
- [Use a GUI interface and debug in batch using an LE TEST option in JCL](#) 11 min 971K
- [Use a GUI interface and debug in batch using the 'User exit data set' facility](#) 16 min 1.1M
- [Use a dedicated TIM \(terminal interface manager\) terminal and](#)

Multimedia content including voiced-over tutorials



CICS Explorer

- An Eclipse rich-client platform
- An integration point for CICS Transaction Server, CICS Tools, CICS Transaction Gateway, **Problem Determination Tools plug-ins**, and Rational Tools
- Provides extensive GUI CICS capabilities, for example:
 - See a list of CICS regions, transactions, resources, and resource definitions
 - Manage CICS resource, regions, and plexes
- With the PD Tools plug-ins, CICS Explorer is not only for CICS applications

- **CICS Explorer is free to download and run**
- **The PD Tools plug-ins are free to download and run in CICS Explorer**
 - they access PD Tools products running on z/OS systems



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Q&A



Thank
YOU



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