Eclipse-based Application Development for z/OS Developers

Benjamin Ho

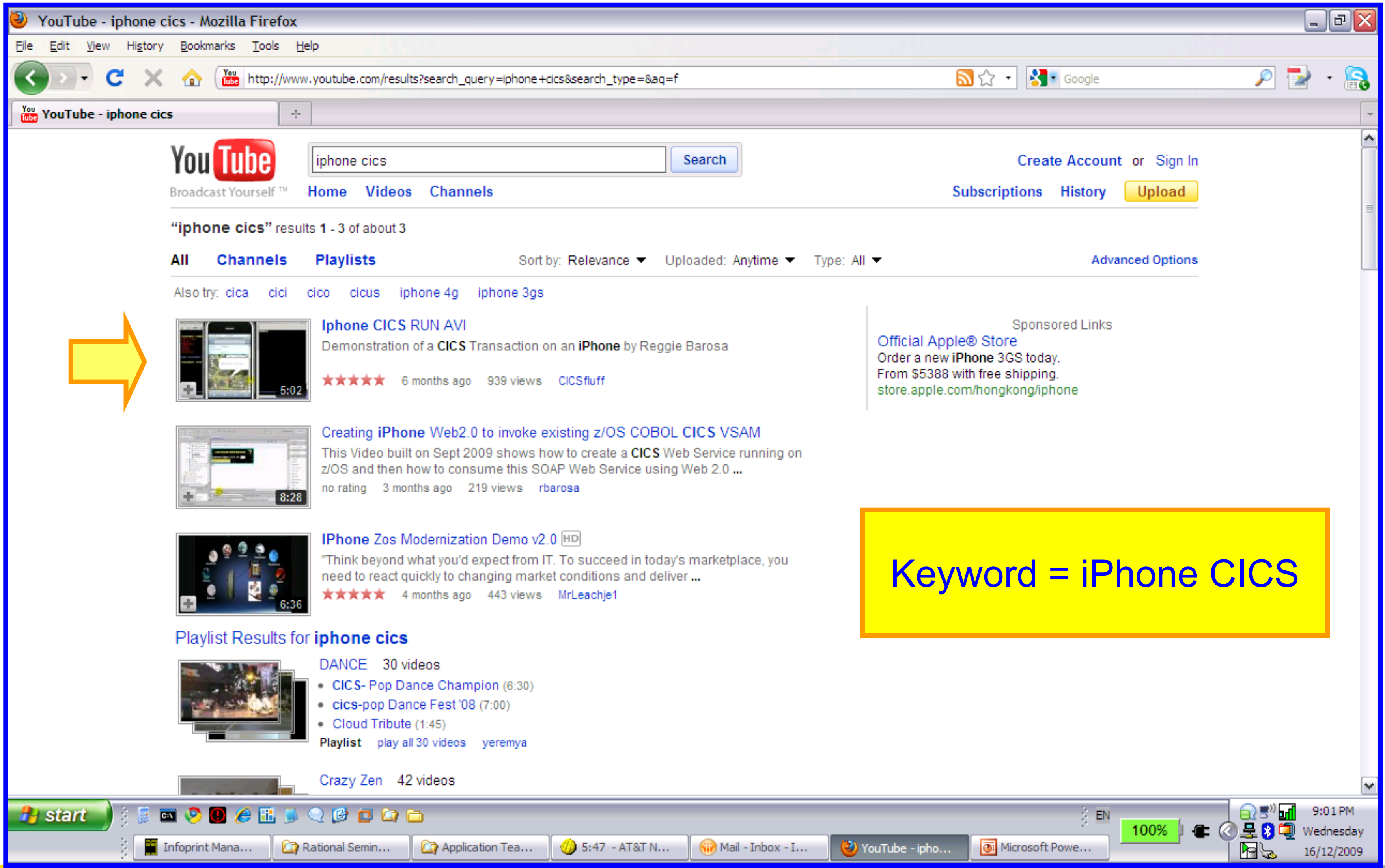
IBM Software Group

(18-Dec-2009)

Movie .....

Using iPhone to access CICS information

Movie ….. Using iPhone to access CICS information



YouTube - iphone cics - Mozilla Firefox

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http://www.youtube.com/results?search_query=iphone+cics&search_type=&aq=f

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"iphone cics" results 1 - 3 of about 3

All Channels Playlists Sort by: Relevance Uploaded: Anytime Type: All Advanced Options

Also try: cica cici cico cicus iphone 4g iphone 3gs

Iphone CICS RUN AVI (5:02)
Demonstration of a **CICS** Transaction on an **iPhone** by Reggie Barosa
★★★★★ 6 months ago 939 views CICSfluff

Creating iPhone Web2.0 to invoke existing z/OS COBOL CICS VSAM (8:28)
This Video built on Sept 2009 shows how to create a **CICS** Web Service running on z/OS and then how to consume this SOAP Web Service using Web 2.0 ...
no rating 3 months ago 219 views rbarosa

IPhone Zos Modernization Demo v2.0 HD (6:36)
"Think beyond what you'd expect from IT. To succeed in today's marketplace, you need to react quickly to changing market conditions and deliver ...
★★★★★ 4 months ago 443 views MrLeachje1

Playlist Results for **iphone cics**

DANCE 30 videos
- CICS- Pop Dance Champion (6:30)
- cics-pop Dance Fest '08 (7:00)
- Cloud Tribute (1:45)

Playlist play all 30 videos yeremya

Crazy Zen 42 videos

Sponsored Links
Official Apple® Store
Order a new **iPhone** 3GS today.
From $5388 with free shipping.
store.apple.com/hongkong/iphone

Keyword = iPhone CICS

Mainframes…40+ years of growth

30 sq ft (smaller than a Queen size bed)

- **The 3033, circa 1977 – yes, it filled a room**
  - 4.7 MIPS
  - 4, 6 or 8 MB central storage
  - 12 channels (up to 3MB/sec transfer rate)

- **The z10**
  - >30,000 MIPS
  - Up to 1,520 GB central storage
  - Around 1,024 channels (each up to 6GBps transfer rate)

- **And customers can run most of the same apps on the z990 as they could in 1977 on the 3033!**

Hardware have been improved.. How about our Software?

In September 1956, IBM launched the 305 RAMAC, the first computer with a hard disk drive (HDD).

Th
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Ma
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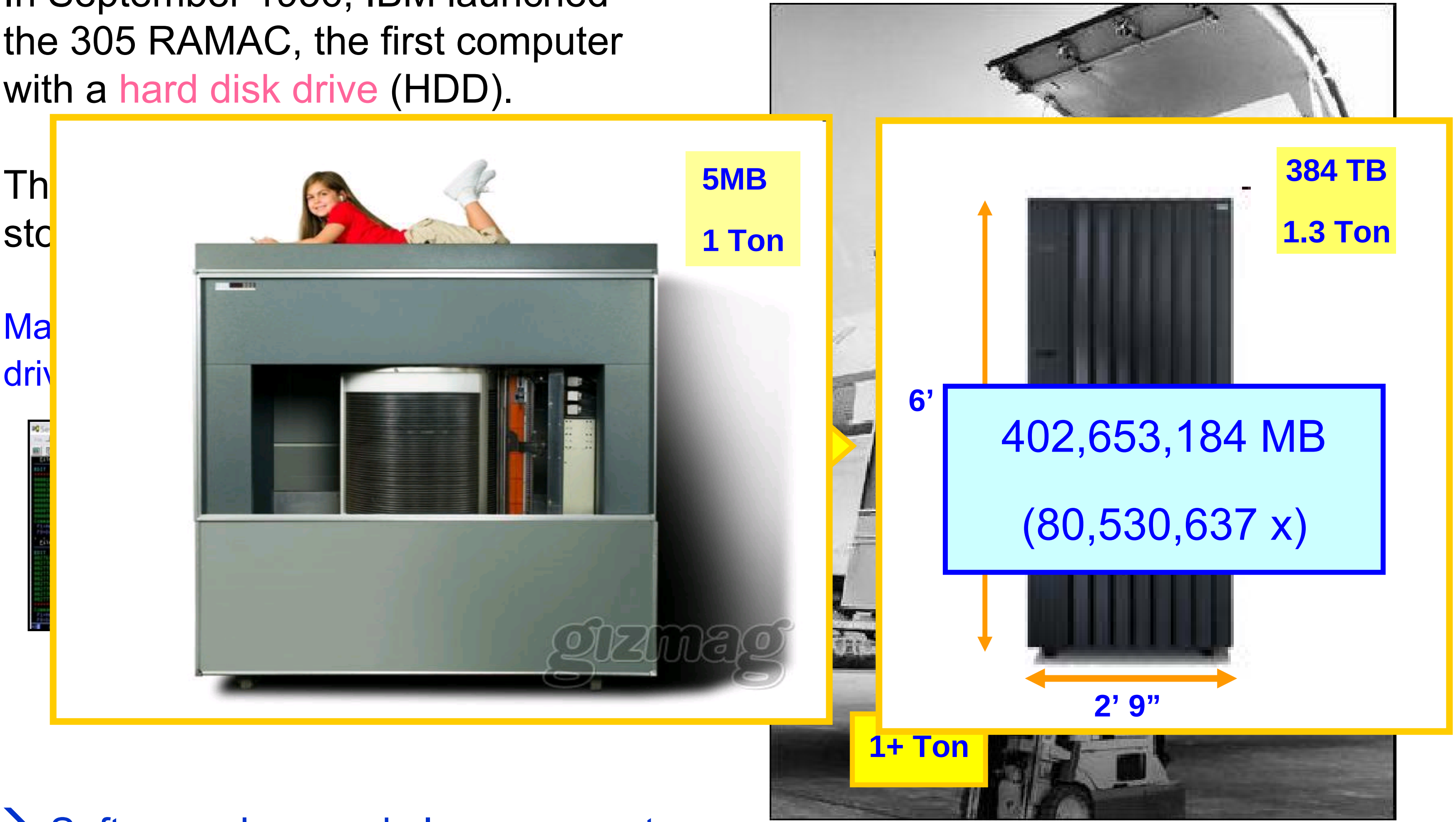
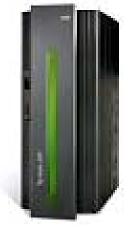
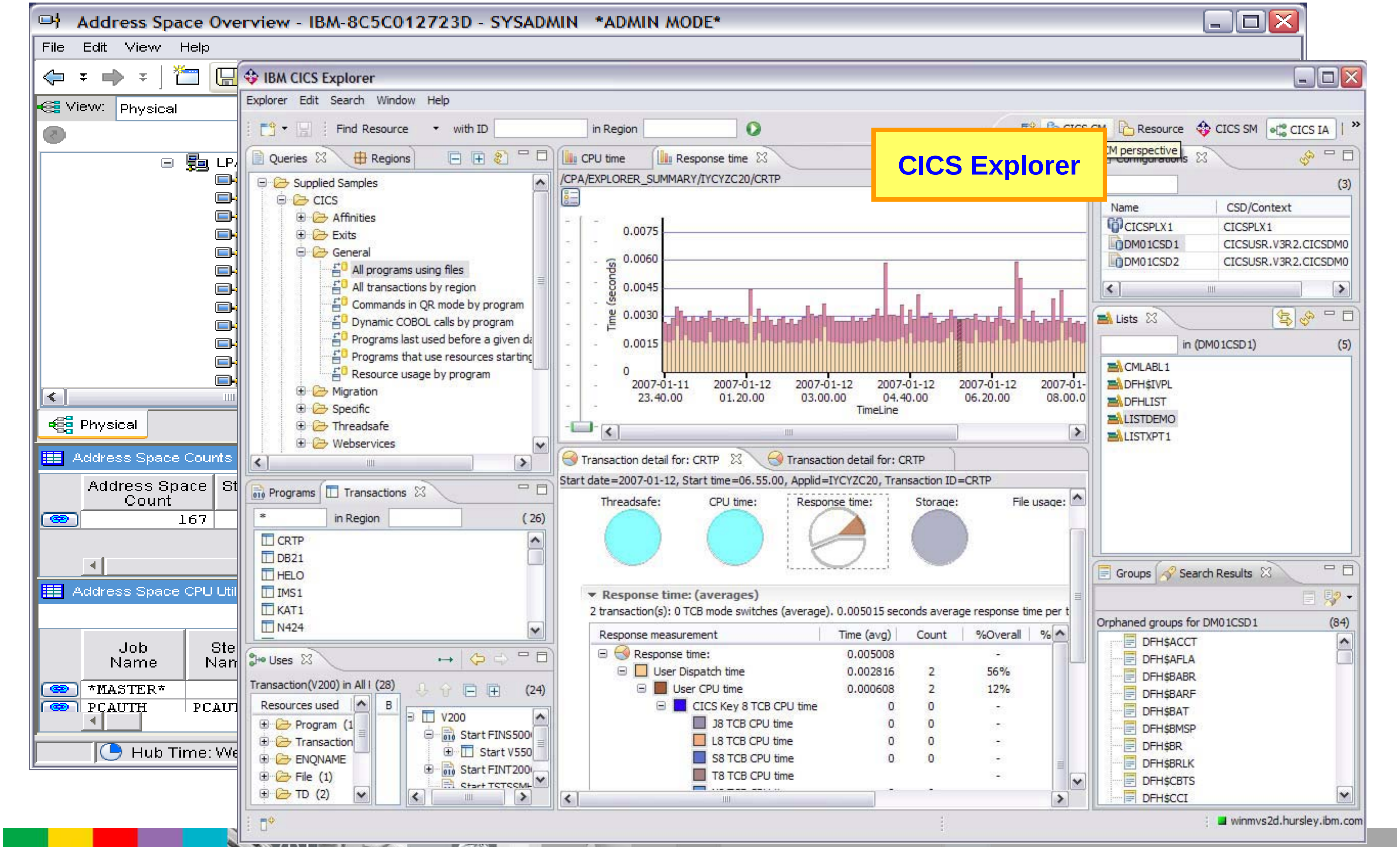


→ Software also needs Improvements….

Evolution

70's	80's	90's	2000's	2008
3033	4381/3090	ES/9000	z9	z10
	 		 	
OS/MVS	MVS/XA	MVS/ESA & OS/390	OS/390 & z/OS	z/OS
CICS/VS 1.2	CICS/VS 1.7	CICS/MVS & ESA	CICS/TS	CICS/TS
ISPF	ISPF	ISPF	ISPF	ISPF

New Systems Management Interface



CICS Explorer

Address Space Count	St
167	

Job Name	Ste Nan
MASTER	
PCAUTH	PCAUT

- Supplied Samples
  - CICS
    - Affinities
    - Exits
    - General
      - All programs using files
      - All transactions by region
      - Commands in QR mode by program
      - Dynamic COBOL calls by program
      - Programs last used before a given da
      - Programs that use resources starting
      - Resource usage by program
    - Migration
    - Specific
    - Threadsafe
    - Webservices

* in Region (26)

CRTP, DB21, HELO, IMS1, KAT1, N424

Transaction(V200) in All I (28) (24)

Resources used: Program (1, Transaction, ENQNAME, File (1), TD (2)

V200: Start FINS500, Start V550, Start FINT200, Start TSTSSMF

/CPA/EXPLORER_SUMMARY/IYCYZC20/CRTP

Start date=2007-01-12, Start time=06.55.00, Applid=IYCYZC20, Transaction ID=CRTP

Threadsafe: CPU time: Response time: Storage: File usage:

Response time: (averages)

2 transaction(s): 0 TCB mode switches (average). 0.005015 seconds average response time per t

Response measurement	Time (avg)	Count	%Overall	%
Response time:	0.005008		-	
User Dispatch time	0.002816	2	56%	
User CPU time	0.000608	2	12%	
CICS Key 8 TCB CPU time	0	0	-	
J8 TCB CPU time	0	0	-	
L8 TCB CPU time	0	0	-	
S8 TCB CPU time	0	0	-	
T8 TCB CPU time			-	

M perspective — Configurations (3)

Name	CSD/Context
CICSPLX1	CICSPLX1
DM01CSD1	CICSUSR.V3R2.CICSDM0
DM01CSD2	CICSUSR.V3R2.CICSDM0

in (DM01CSD1) (5)

CMLABL1, DFH$IVPL, DFHLIST, LISTDEMO, LISTXPT1

Orphaned groups for DM01CSD1 (84)

DFH$ACCT, DFH$AFLA, DFH$BABR, DFH$BARF, DFHBAT, DFHBMSP, DFHBR, DFHBRLK, DFH$CBTS, DFH$CCI

CICS Explorer

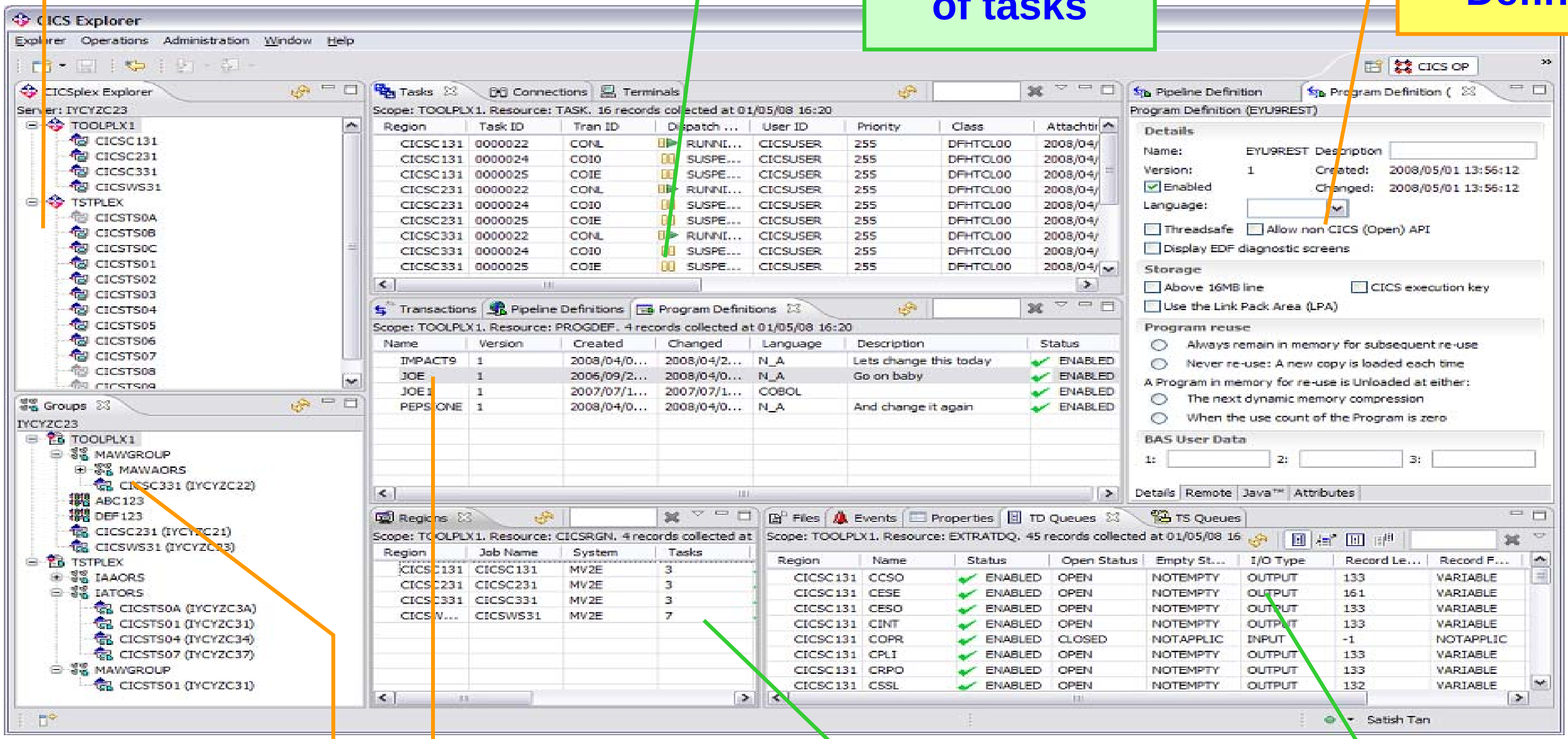
🟩 CEMT Information

🟨 CEDA Information

View CICS Regions

View status of tasks

Edit Resource Definitions



Server: IYCYZC23

- TOOLPLX1
  - CICSC131
  - CICSC231
  - CICSC331
  - CICSWS31
- TSTPLEX
  - CICSTS0A
  - CICSTS0B
  - CICSTS0C
  - CICSTS01
  - CICSTS02
  - CICSTS03
  - CICSTS04
  - CICSTS05
  - CICSTS06
  - CICSTS07
  - CICSTS08
  - CICSTS09

IYCYZC23

- TOOLPLX1
  - MAWGROUP
    - MAWAORS
    - CICSC331 (IYCYZC22)
  - ABC123
  - DEF123
  - CICSC231 (IYCYZC21)
  - CICSWS31 (IYCYZC23)
- TSTPLEX
  - IAAORS
  - IATORS
    - CICSTS0A (IYCYZC3A)
    - CICSTS01 (IYCYZC31)
    - CICSTS04 (IYCYZC34)
    - CICSTS07 (IYCYZC37)
  - MAWGROUP
    - CICSTS01 (IYCYZC31)

Scope: TOOLPLX1. Resource: TASK. 16 records collected at 01/05/08 16:20

Region	Task ID	Tran ID	Dispatch ...	User ID	Priority	Class	Attachti
CICSC131	0000022	CONL	RUNNI...	CICSUSER	255	DFHTCL00	2008/04/
CICSC131	0000024	COI0	SUSPE...	CICSUSER	255	DFHTCL00	2008/04/
CICSC131	0000025	COIE	SUSPE...	CICSUSER	255	DFHTCL00	2008/04/
CICSC231	0000022	CONL	RUNNI...	CICSUSER	255	DFHTCL00	2008/04/
CICSC231	0000024	COI0	SUSPE...	CICSUSER	255	DFHTCL00	2008/04/
CICSC231	0000025	COIE	SUSPE...	CICSUSER	255	DFHTCL00	2008/04/
CICSC331	0000022	CONL	RUNNI...	CICSUSER	255	DFHTCL00	2008/04/
CICSC331	0000024	COI0	SUSPE...	CICSUSER	255	DFHTCL00	2008/04/
CICSC331	0000025	COIE	SUSPE...	CICSUSER	255	DFHTCL00	2008/04/

Scope: TOOLPLX1. Resource: PROGDEF. 4 records collected at 01/05/08 16:20

Name	Version	Created	Changed	Language	Description	Status
IMPACT9	1	2008/04/0...	2008/04/2...	N_A	Lets change this today	✓ ENABLED
JOE	1	2006/09/2...	2008/04/0...	N_A	Go on baby	✓ ENABLED
JOE1	1	2007/07/1...	2007/07/1...	COBOL		✓ ENABLED
PEPSIONE	1	2008/04/0...	2008/04/0...	N_A	And change it again	✓ ENABLED

Program Definition (EYU9REST)

Details

Name: EYU9REST Description:

Version: 1 Created: 2008/05/01 13:56:12

☑ Enabled Changed: 2008/05/01 13:56:12

Language:

□ Threadsafe □ Allow non CICS (Open) API

□ Display EDF diagnostic screens

Storage

□ Above 16MB line □ CICS execution key

□ Use the Link Pack Area (LPA)

Program reuse

○ Always remain in memory for subsequent re-use

○ Never re-use: A new copy is loaded each time

A Program in memory for re-use is Unloaded at either:

○ The next dynamic memory compression

○ When the use count of the Program is zero

BAS User Data

1: 2: 3:

Scope: TOOLPLX1. Resource: CICSRGN. 4 records collected at

Region	Job Name	System	Tasks
CICSC131	CICSC131	MV2E	3
CICSC231	CICSC231	MV2E	3
CICSC331	CICSC331	MV2E	3
CICSW...	CICSWS31	MV2E	7

Scope: TOOLPLX1. Resource: EXTRATDQ. 45 records collected at 01/05/08 16

Region	Name	Status	Open Status	Empty St...	I/O Type	Record Le...	Record F...
CICSC131	CCSO	✓ ENABLED	OPEN	NOTEMPTY	OUTPUT	133	VARIABLE
CICSC131	CESE	✓ ENABLED	OPEN	NOTEMPTY	OUTPUT	161	VARIABLE
CICSC131	CESO	✓ ENABLED	OPEN	NOTEMPTY	OUTPUT	133	VARIABLE
CICSC131	CINT	✓ ENABLED	OPEN	NOTEMPTY	OUTPUT	133	VARIABLE
CICSC131	COPR	✓ ENABLED	CLOSED	NOTAPPLIC	INPUT	-1	NOTAPPLIC
CICSC131	CPLI	✓ ENABLED	OPEN	NOTEMPTY	OUTPUT	133	VARIABLE
CICSC131	CRPO	✓ ENABLED	OPEN	NOTEMPTY	OUTPUT	133	VARIABLE
CICSC131	CSSL	✓ ENABLED	OPEN	NOTEMPTY	OUTPUT	132	VARIABLE

Resource and System Groups

Views Program Definitions

Active CICS Systems in the selected PLEX

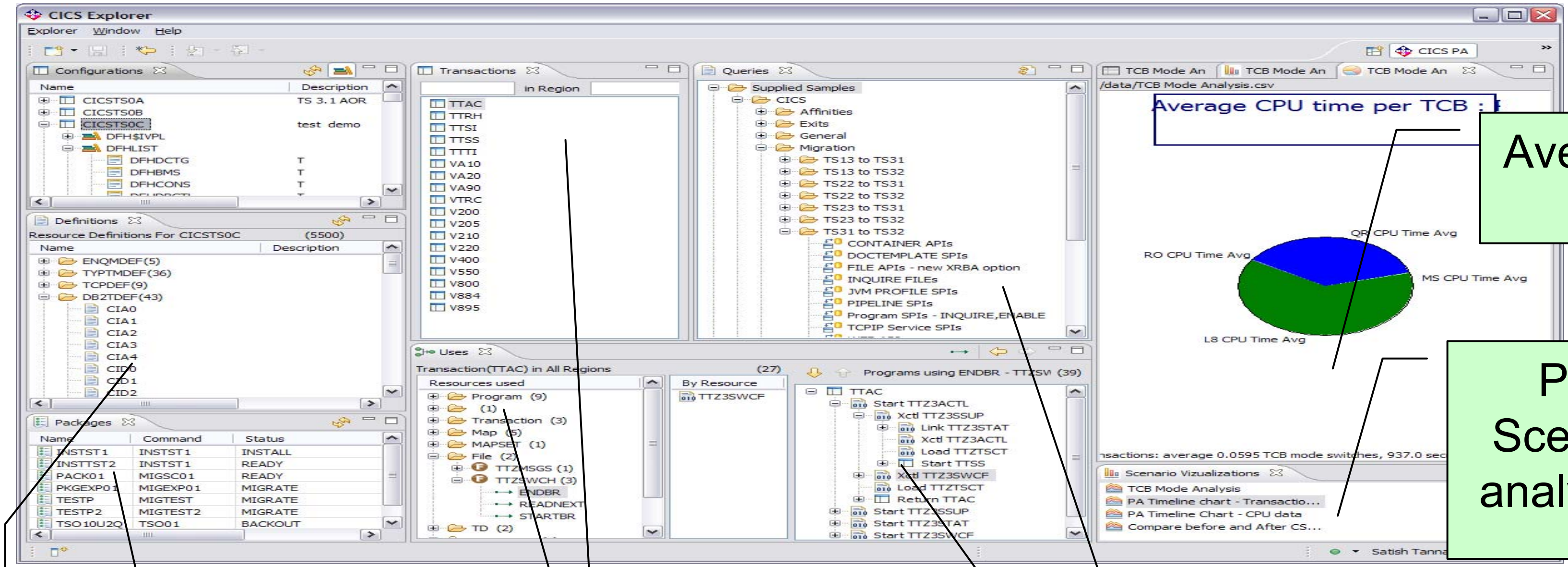
View TD Queue Information

CICS Tools Integrated within CICS Explorer Framework

Configuration Manager

Interdependency Analyzer

Performance Analyzer



Name	Description
CICSTS0A	TS 3.1 AOR
CICSTS0B	
CICSTS0C	test demo
DFH$IVPL	
DFHLIST	
DFHDCTG	T
DFHBMS	T
DFHCONS	T

Name	Description
ENQMDEF(5)	
TYPTMDEF(36)	
TCPDEF(9)	
DB2TDEF(43)	
CIA0	
CIA1	
CIA2	
CIA3	
CIA4	
CID0	
CID1	
CID2	

Packages

Name	Command	Status
INSTST1	INSTST1	INSTALL
INSTTST2	INSTST1	READY
PACK01	MIGSC01	READY
PKGEXP01	MIGEXP01	MIGRATE
TESTP	MIGTEST	MIGRATE
TESTP2	MIGTEST2	MIGRATE
TSO10U2Q	TSO01	BACKOUT

…nsactions: average 0.0595 TCB mode switches, 937.0 sec

Average CPU Time

Provides Scenarios for analysing data

Change Packages

Transactions Captured

Shipped Sampled Queries

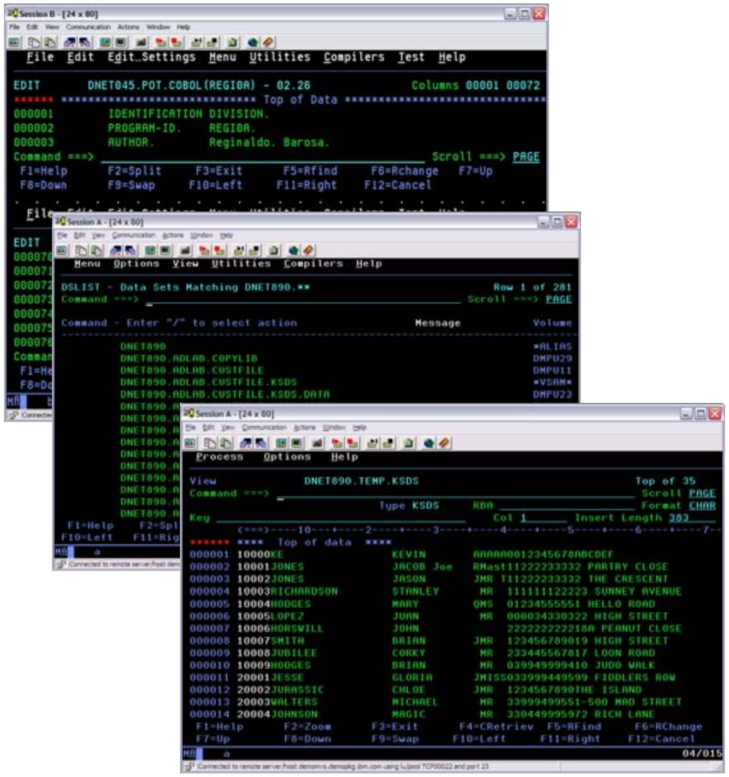
Resource Definitions for the CSD

View Resources used by a transaction

View tree of resources used

The Application Solution

ISPF-based



Session B - [24 x 80]
File Edit View Communication Actions Window Help

```
  File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help

EDIT       DNET045.POT.COBOL(REGIOA) - 02.26              Columns 00001 00072
****** ***************************** Top of Data ******************************
000001        IDENTIFICATION DIVISION.
000002        PROGRAM-ID.    REGIOA.
000003        AUTHOR.        Reginaldo. Barosa.
Command ===> ________________________________________________ Scroll ===> PAGE
 F1=Help      F2=Split     F3=Exit      F5=Rfind     F6=Rchange   F7=Up
 F8=Down      F9=Swap     F10=Left     F11=Right    F12=Cancel
```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

```
   Menu  Options  View  Utilities  Compilers  Help

DSLIST - Data Sets Matching DNET890.**                            Row 1 of 281
Command ===> _____________________________________________________ Scroll ===> PAGE

Command - Enter "/" to select action                  Message           Volume
-------------------------------------------------------------------------------
         DNET890                                                         *ALIAS
         DNET890.ADLAB.COPYLIB                                           DMPU29
         DNET890.ADLAB.CUSTFILE                                          DMPU11
         DNET890.ADLAB.CUSTFILE.KSDS                                     *VSAM*
         DNET890.ADLAB.CUSTFILE.KSDS.DATA                                DMPU23
```

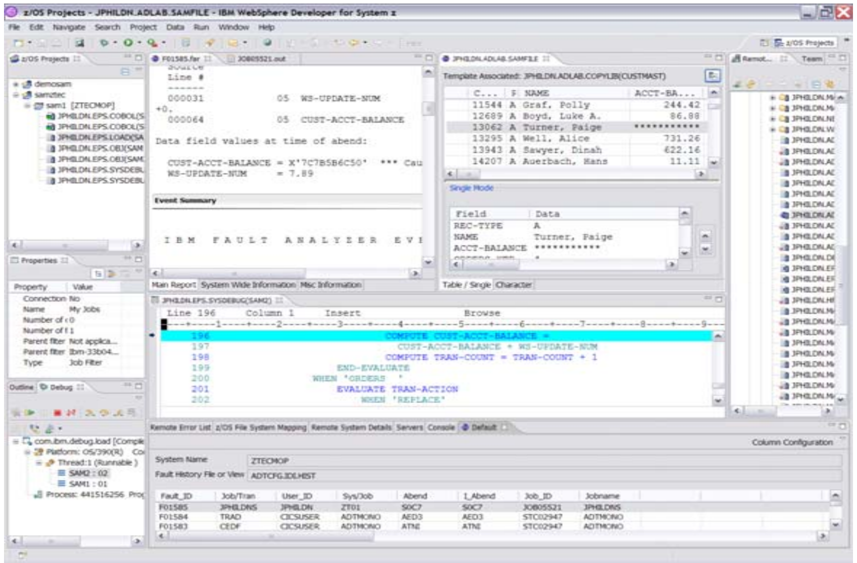
```
  Process   Options   Help

View              DNET890.TEMP.KSDS                                  Top of 35
Command ===> _________________________________________________ Scroll PAGE
                        Type KSDS     RBA ______________________ Format CHAR
Key ______________________________       Col 1______   Insert Length 383____
       <===>----10---+----2----+----3----+----4----+----5----+----6----+----7--
****** ****  Top of data  ****
000001 10000KE                 KEVIN        AAAAA00012345678ABCDEF
000002 10001JONES              JACOB Joe    RMast11222233332 PARTRY CLOSE
000003 10002JONES              JASON        JMR T11222233332 THE CRESCENT
000004 10003RICHARDSON         STANLEY       MR  11111122223 SUNNEY AVENUE
000005 10004HODGES             MARY         QMS  01234555551 HELLO ROAD
000006 10005LOPEZ              JUAN          MR  000034330322 HIGH STREET
000007 10006HORSWILL           JOHN              22222222218A PEANUT CLOSE
000008 10007SMITH              BRIAN        JMR  123456789019 HIGH STREET
000009 10008JUBILEE            CORKY         MR  23344556781 7 LOON ROAD
000010 10009HODGES             BRIAN         MR  039949999410 JUDO WALK
000011 20001JESSE              GLORIA       JMISS033999449599 FIDDLERS ROW
000012 20002JURASSIC           CHLOE        JMR  1234567890THE ISLAND
000013 20003WALTERS            MICHAEL       MR  33999499551-500 MAD STREET
000014 20004JOHNSON            MAGIC         MR  330449995972 RICH LANE
 F1=Help       F2=Zoom       F3=Exit       F4=CRetriev  F5=RFind      F6=RChange
 F7=Up         F8=Down       F9=Swap      F10=Left     F11=Right     F12=Cancel
MA    a                                                                  04/015
```

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00022 and port 23

Multiple switch & swap to navigate

for program source, JCL, data … etc

Eclipse-based



```
  Line #
  ------
  000031              05  WS-UPDATE-NUM
+0.
  000064              05  CUST-ACCT-BALANCE

Data field values at time of abend:

  CUST-ACCT-BALANCE = X'7C7B5B6C50'  *** Cau
  WS-UPDATE-NUM     = 7.89
```

Event Summary

I B M   F A U L T   A N A L Y Z E R   E V

Template Associated: JPHILDN.ADLAB.COPYLIB(CUSTMAST)

C...	F	NAME	ACCT-BA...
11544	A	Graf, Polly	244.42
12689	A	Boyd, Luke A.	86.88
13062	A	Turner, Paige	***********
13295	A	Well, Alice	731.26
13943	A	Sawyer, Dinah	622.16
14207	A	Auerbach, Hans	11.11

Field	Data
REC-TYPE	A
NAME	Turner, Paige
ACCT-BALANCE	***********

Property	Value
Connection	No
Name	My Jobs
Number of c	0
Number of f	1
Parent filter	Not applica...
Parent filter	ibm-33b04...
Type	Job Filter

JPHILDN.EPS.SYSDEBUG(SAM2)

```
 Line 196      Column 1      Insert                    Browse
----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9---
      196                             COMPUTE CUST-ACCT-BALANCE =
      197                                CUST-ACCT-BALANCE + WS-UPDATE-NUM
      198                             COMPUTE TRAN-COUNT = TRAN-COUNT + 1
      199                       END-EVALUATE
      200                   WHEN 'ORDERS  '
      201                       EVALUATE TRAN-ACTION
      202                           WHEN 'REPLACE'
```

```
com.ibm.debug.load [Compile
  Platform: OS/390(R)   Co
    Thread:1 (Runnable )
      SAM2 : 02
      SAM1 : 01
  Process: 441516256  Proc
```

System Name: ZTECMOP

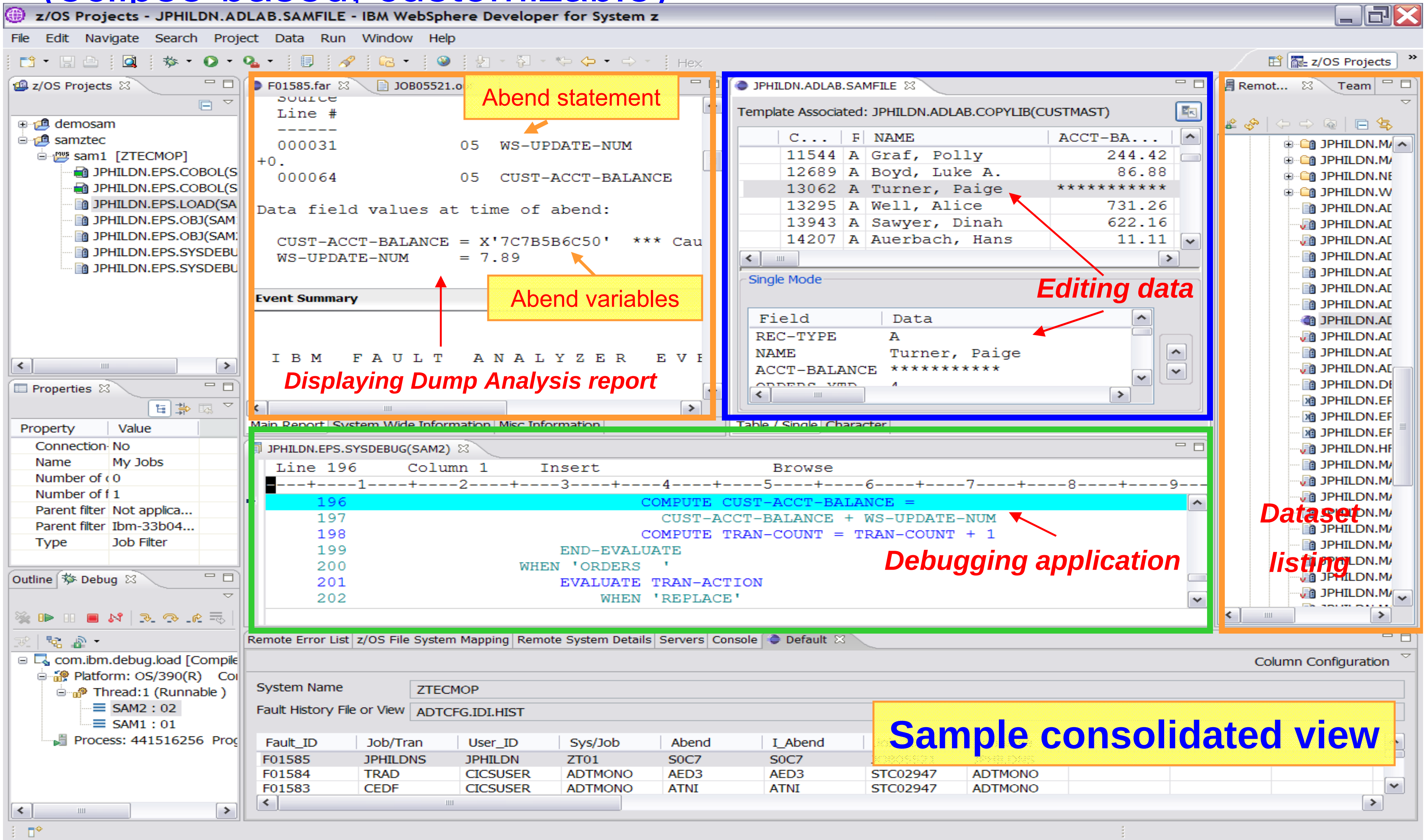
Fault History File or View: ADTCFG.IDI.HIST

Fault_ID	Job/Tran	User_ID	Sys/Job	Abend	I_Abend	Job_ID	Jobname
F01585	JPHILDNS	JPHILDN	ZT01	S0C7	S0C7	JOB05521	JPHILDNS
F01584	TRAD	CICSUSER	ADTMONO	AED3	AED3	STC02947	ADTMONO
F01583	CEDF	CICSUSER	ADTMONO	ATNI	ATNI	STC02947	ADTMONO

Consolidated view

Double-click, Drap & drop

Rational Developer for System z (eclipse-based, customizable)



z/OS Projects - JPHILDN.ADLAB.SAMFILE - IBM WebSphere Developer for System z

z/OS Projects

- demosam
- samztec
  - sam1 [ZTECMOP]
    - JPHILDN.EPS.COBOL(S
    - JPHILDN.EPS.COBOL(S
    - JPHILDN.EPS.LOAD(SA
    - JPHILDN.EPS.OBJ(SAM
    - JPHILDN.EPS.OBJ(SAM
    - JPHILDN.EPS.SYSDEBU
    - JPHILDN.EPS.SYSDEBU

Properties

Property	Value
Connection	No
Name	My Jobs
Number of (	0
Number of f	1
Parent filter	Not applica...
Parent filter	Ibm-33b04...
Type	Job Filter

Outline | Debug

- com.ibm.debug.load [Compile
  - Platform: OS/390(R) Co
    - Thread:1 (Runnable)
      - SAM2 : 02
      - SAM1 : 01
  - Process: 441516256 Prog

F01585.far | JOB05521.o

Abend statement

```
  Source
  Line #
  ------
  000031                05   WS-UPDATE-NUM
+0.
  000064                05   CUST-ACCT-BALANCE

Data field values at time of abend:

  CUST-ACCT-BALANCE = X'7C7B5B6C50'   *** Cau
  WS-UPDATE-NUM     = 7.89
```

Abend variables

Event Summary

```
  I B M   F A U L T   A N A L Y Z E R   E V E
```

Displaying Dump Analysis report

Main Report | System Wide Information | Misc Information

JPHILDN.ADLAB.SAMFILE

Template Associated: JPHILDN.ADLAB.COPYLIB(CUSTMAST)

C...	F	NAME	ACCT-BA...
11544	A	Graf, Polly	244.42
12689	A	Boyd, Luke A.	86.88
13062	A	Turner, Paige	***********
13295	A	Well, Alice	731.26
13943	A	Sawyer, Dinah	622.16
14207	A	Auerbach, Hans	11.11

Editing data

Single Mode

Field	Data
REC-TYPE	A
NAME	Turner, Paige
ACCT-BALANCE	***********
ORDERS-YTD	4

Table / Single | Character

Remot... | Team

- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.NE
- JPHILDN.W
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.AD
- JPHILDN.DE
- JPHILDN.EF
- JPHILDN.EF
- JPHILDN.EF
- JPHILDN.HF
- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.MA
- JPHILDN.MA

Dataset listing

JPHILDN.EPS.SYSDEBUG(SAM2)

```
Line 196      Column 1      Insert                  Browse
----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9---
  196                                 COMPUTE CUST-ACCT-BALANCE =
  197                                   CUST-ACCT-BALANCE + WS-UPDATE-NUM
  198                                 COMPUTE TRAN-COUNT = TRAN-COUNT + 1
  199                            END-EVALUATE
  200                        WHEN 'ORDERS   '
  201                            EVALUATE TRAN-ACTION
  202                                WHEN 'REPLACE'
```

Debugging application

Remote Error List | z/OS File System Mapping | Remote System Details | Servers | Console | Default

Column Configuration

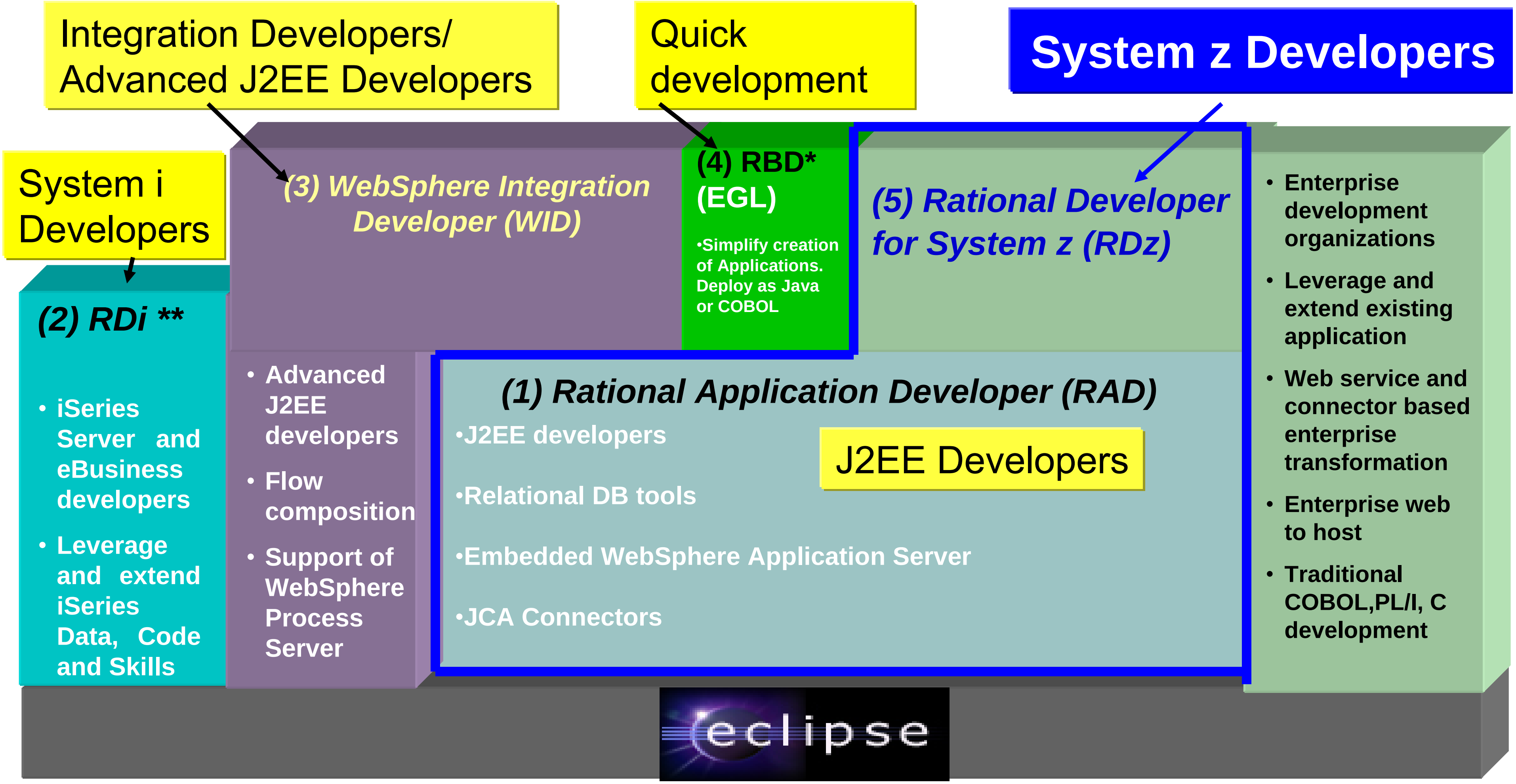
System Name: ZTECMOP

Fault History File or View: ADTCFG.IDI.HIST

Fault_ID	Job/Tran	User_ID	Sys/Job	Abend	I_Abend		
F01585	JPHILDNS	JPHILDN	ZT01	S0C7	S0C7		
F01584	TRAD	CICSUSER	ADTMONO	AED3	AED3	STC02947	ADTMONO
F01583	CEDF	CICSUSER	ADTMONO	ATNI	ATNI	STC02947	ADTMONO

Sample consolidated view

Rational development family



Integration Developers/
Advanced J2EE Developers

Quick
development

System z Developers

System i
Developers

(2) RDi **

- iSeries Server and eBusiness developers
- Leverage and extend iSeries Data, Code and Skills

(3) WebSphere Integration Developer (WID)

- Advanced J2EE developers
- Flow composition
- Support of WebSphere Process Server

(4) RBD*
(EGL)

•Simplify creation of Applications. Deploy as Java or COBOL

(5) Rational Developer for System z (RDz)

(1) Rational Application Developer (RAD)

•J2EE developers

•Relational DB tools

•Embedded WebSphere Application Server

•JCA Connectors

J2EE Developers

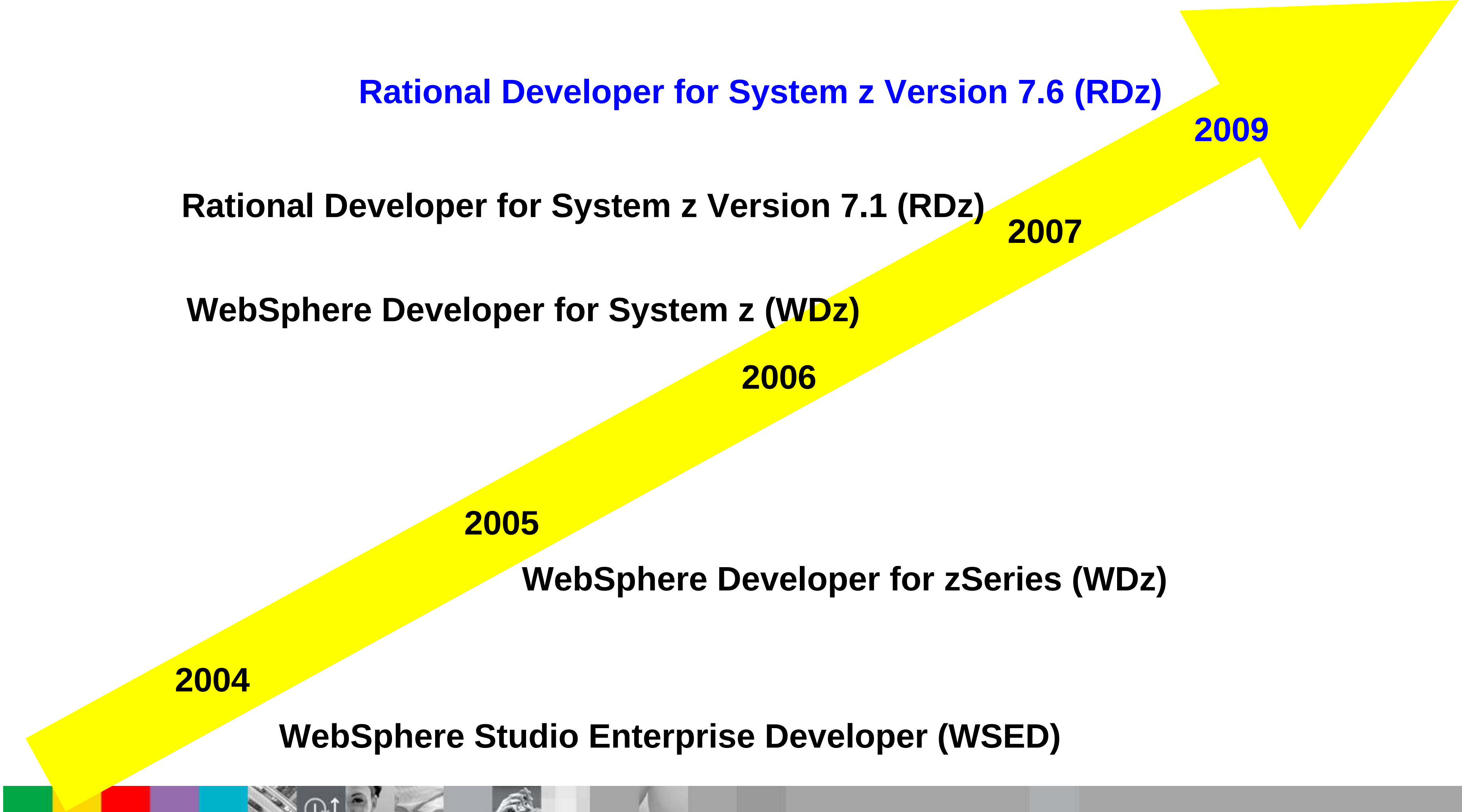
- Enterprise development organizations
- Leverage and extend existing application
- Web service and connector based enterprise transformation
- Enterprise web to host
- Traditional COBOL,PL/I, C development

eclipse

* **RBD** = Rational Business Developer

** **RDi** = Rational Developer for System i

History of Rational Developer for System z



Rational Developer for System z Version 7.6 (RDz)

2009

Rational Developer for System z Version 7.1 (RDz)

2007

WebSphere Developer for System z (WDz)

2006

2005

WebSphere Developer for zSeries (WDz)

2004

WebSphere Studio Enterprise Developer (WSED)

IBM Rational Developer for System z

XML Services for the Enterprise

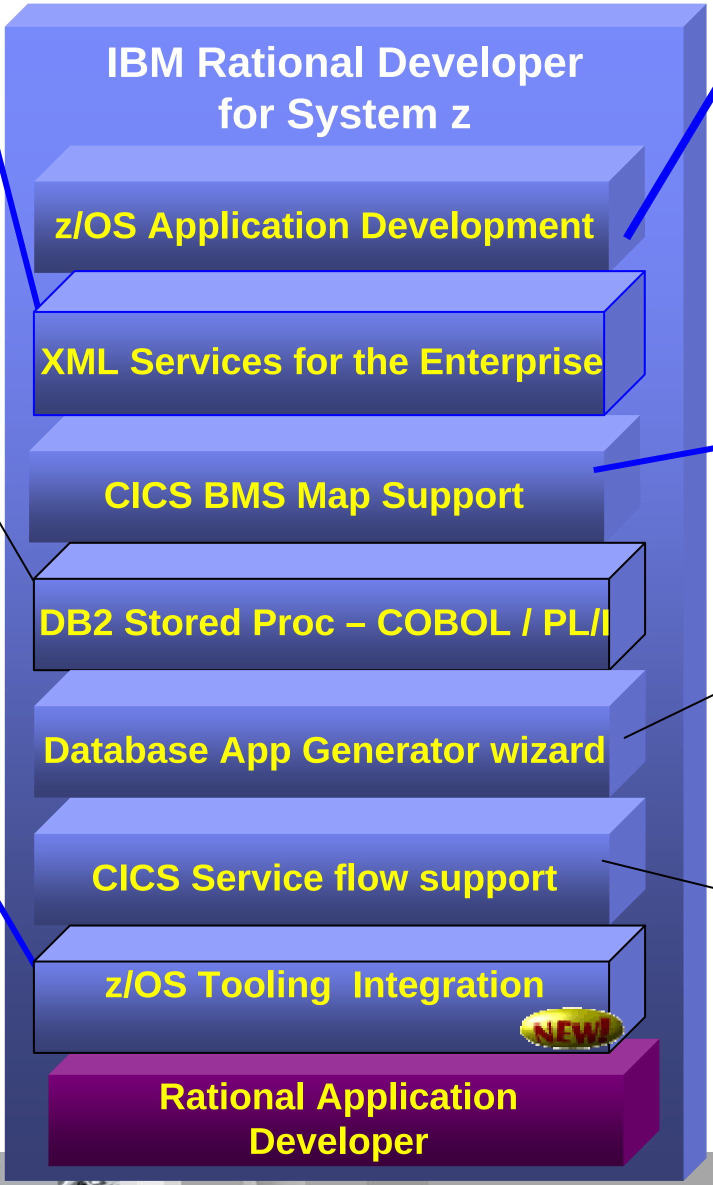
- **SOA access to CICS V3.x** and IMS V9 or V10 COBOL/PLI applications
- Bottom-up/Top-down or meet-in-the-middle COBOL/PLI to XML mapping support
- meet-in-the-middle development scenario tooling wizards. for CICS, IMS, and batch applications

DB2 Stored Procedure for COBOL and PL/I

- **Create DB2 stored procedures** on z/OS in either COBOL or PL/I
- Build and catalog support for the DB2 stored procedure
- Debug z/OS based stored procedures from workstation

z/OS PD Tools Integration

- **Read/Write/Update VSAM datasets** via integration with IBM File Manager
- Access IBM Fault analyzer reports for **analyzing ABENDS** and associating back to source code



IBM Rational Developer for System z

z/OS Application Development

XML Services for the Enterprise

CICS BMS Map Support

DB2 Stored Proc – COBOL / PL/I

Database App Generator wizard

CICS Service flow support

z/OS Tooling Integration

Rational Application Developer

z/OS Application Development

- Connect to z/OS remote systems
- Work with z/OS resources like COBOL, PL/I , C, C++, JCL, etc.
- Interact with the Job Entry Subsystem (JES) to submit jobs, monitor jobs, and review job output
- Perform dataset management actions like allocating datasets and migrating datasets
- **Perform typical edit, compile, and debug tasks on remote z/OS resources from the workstation**

CICS BMS/ IMS MFS Map Support

- **Visually** create and modify BMS Map sets or IMS/MFS
- Generates JCL
- Work with local or remote maps

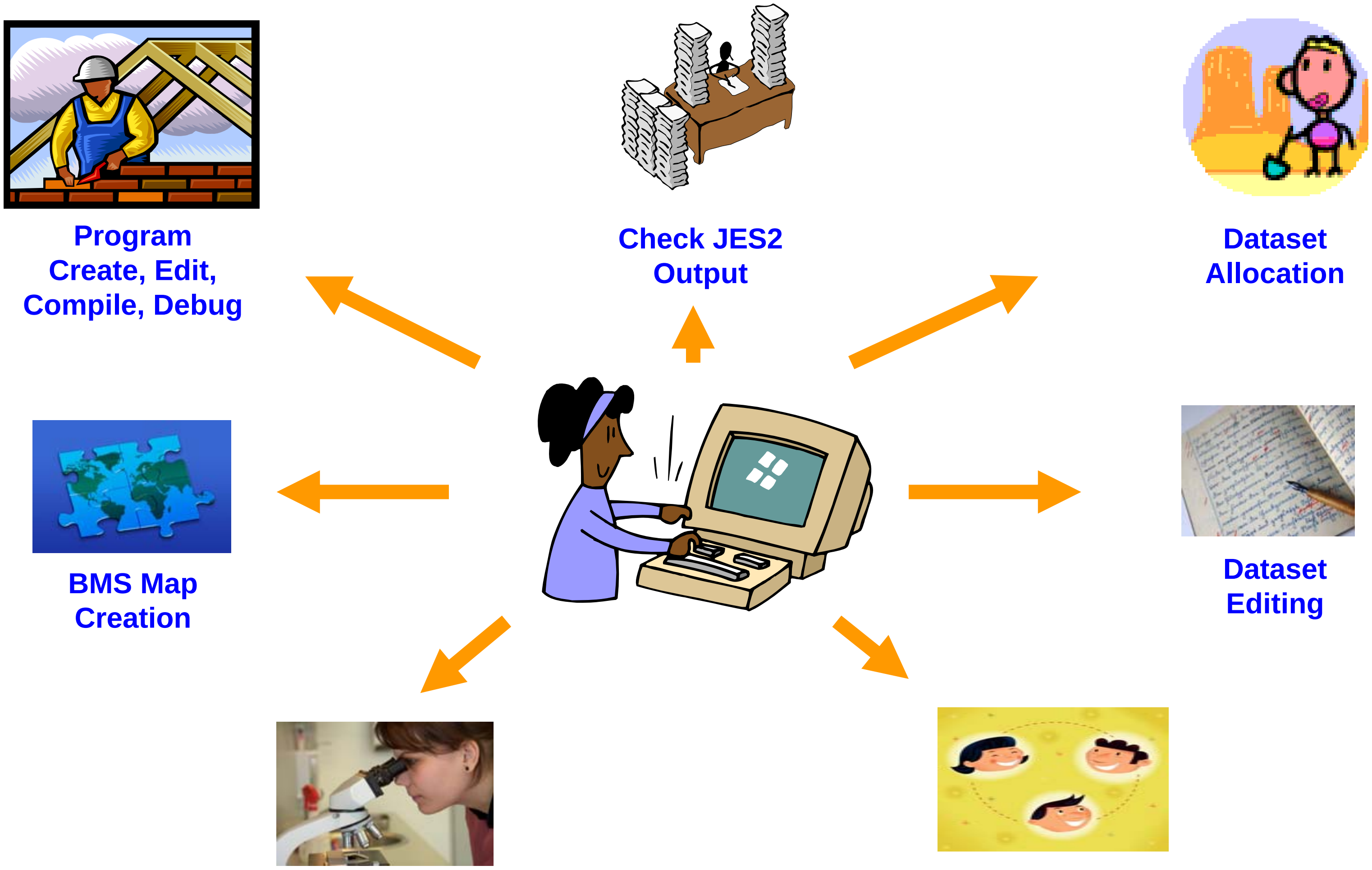
Database App Generator wizard

- Ability to generate WSDL and CICS COBOL program to **access DB2**
- Generate CRUD DB2 program code from UML, which can also be integrated into web service applications

CICS Service Flow Feature

- Implements SOA and Web Services
- Service Flow is **a tool to build service flows out of your existing COMMAREA and Terminal based CICS applications**.

Program Development Life-cycle



Program Create, Edit, Compile, Debug

Check JES2 Output

Dataset Allocation

BMS Map Creation

Dataset Editing

Abend Analysis

Program Impact Analysis

ISPF based Development

2^{st} screen

Edit JCL

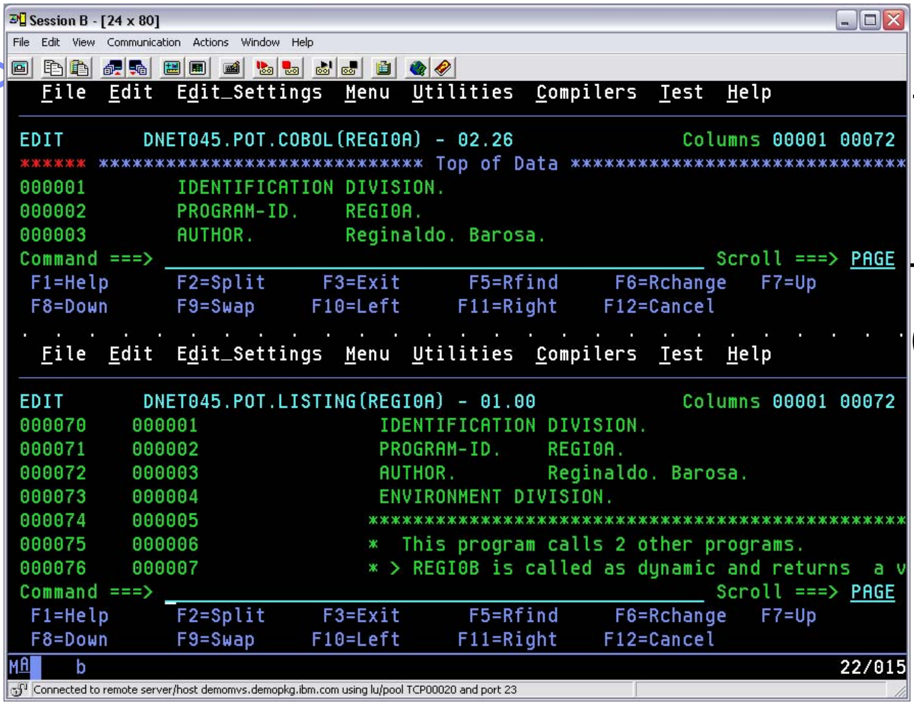
3^{st} screen

SDSF

1^{st} screen

Edit source

edit JCL → submit compile job → swap to SDSF → select job → find error msg → find code line (remember error) → swap to edit session → exit JCL → edit source → find code line → change code → exit source → edit JCL



```
  File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help

EDIT       DNET045.POT.COBOL(REGI0A) - 02.26               Columns 00001 00072
****** ***************************** Top of Data ******************************
000001        IDENTIFICATION DIVISION.
000002        PROGRAM-ID.    REGI0A.
000003        AUTHOR.        Reginaldo. Barosa.
Command ===> ________________________________________________ Scroll ===> PAGE
 F1=Help      F2=Split     F3=Exit      F5=Rfind     F6=Rchange   F7=Up
 F8=Down      F9=Swap     F10=Left     F11=Right    F12=Cancel
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
  File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help

EDIT       DNET045.POT.LISTING(REGI0A) - 01.00             Columns 00001 00072
000070    000001                 IDENTIFICATION DIVISION.
000071    000002                 PROGRAM-ID.    REGI0A.
000072    000003                 AUTHOR.        Reginaldo. Barosa.
000073    000004                 ENVIRONMENT DIVISION.
000074    000005                ****************************************
000075    000006                *  This program calls 2 other programs.
000076    000007                * > REGI0B is called as dynamic and returns  a v
Command ===> ________________________________________________ Scroll ===> PAGE
 F1=Help      F2=Split     F3=Exit      F5=Rfind     F6=Rchange   F7=Up
 F8=Down      F9=Swap     F10=Left     F11=Right    F12=Cancel
MA     b                                                              22/015
```

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00020 and port 23

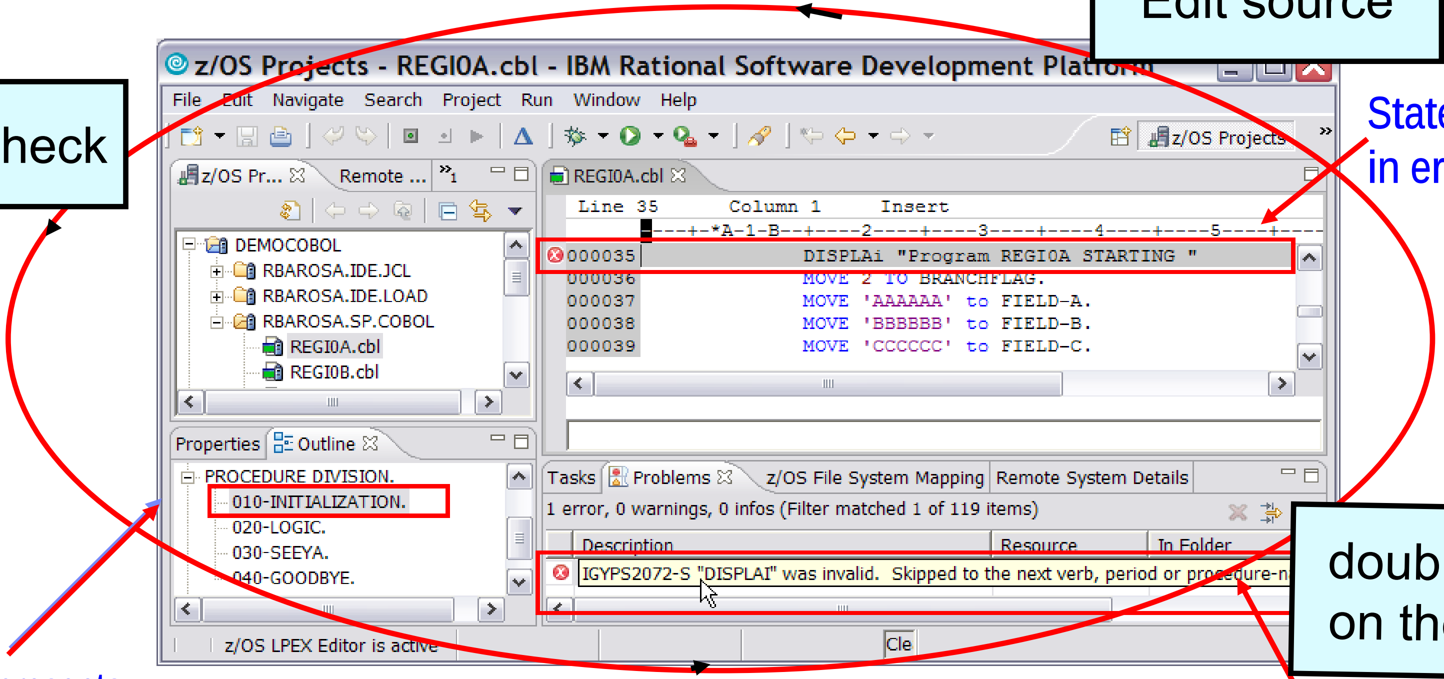
Multiple screens & multiple sessions

24 x 80 characters of content

Eclipse based development

All in the same screen,

No more F2 (split) & F9 (swap) screen



Edit source

Syntax Check

Statement in error

```
 Line 35        Column 1        Insert
----+-*A-1-B--+----2----+----3----+----4----+----5----+----
000035             DISPLAi "Program REGIOA STARTING "
000036             MOVE 2 TO BRANCHFLAG.
000037             MOVE 'AAAAAA' to FIELD-A.
000038             MOVE 'BBBBBB' to FIELD-B.
000039             MOVE 'CCCCCC' to FIELD-C.
```

1 error, 0 warnings, 0 infos (Filter matched 1 of 119 items)

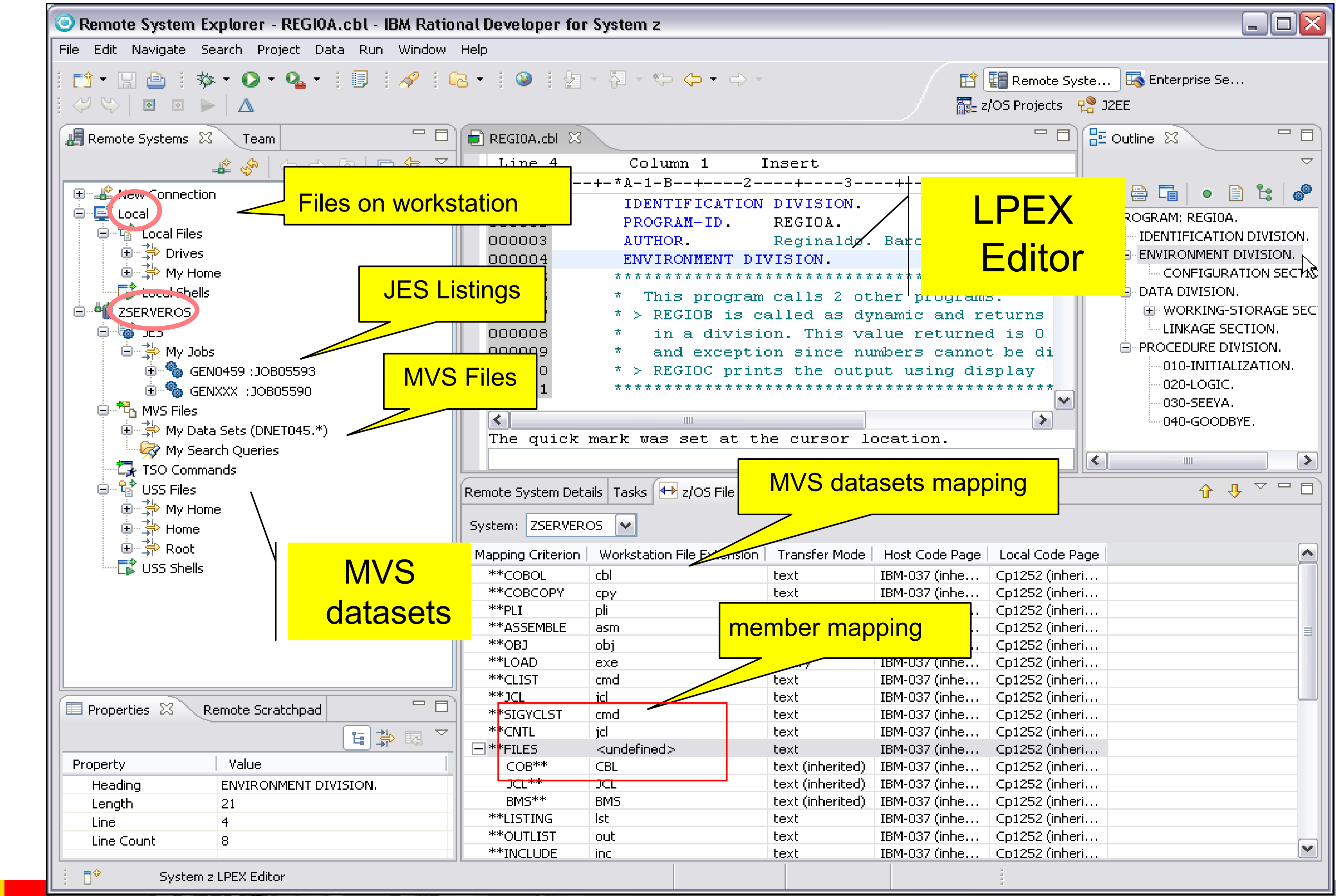
Description	Resource	In Folder
IGYPS2072-S "DISPLAI" was invalid. Skipped to the next verb, period or procedure-n		

double click on the error

Outline view presents COBOL structure

Benefit: Simplified development for COBOL, PL/I, C and C++ on a common development environment

Interactive access to z/OS (local + remote resources)



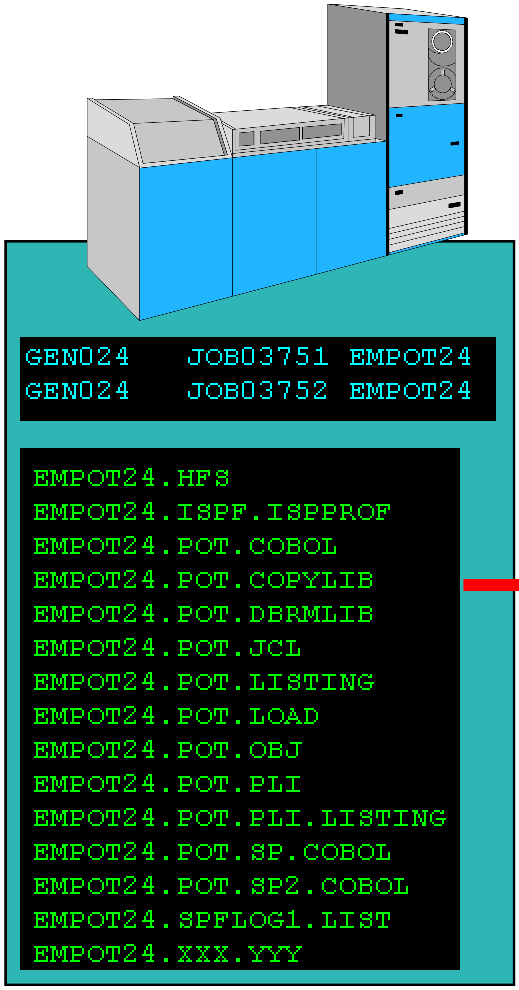
```
 Line 4        Column 1      Insert
      ----+-*A-1-B--+----2----+----3----+-
              IDENTIFICATION DIVISION.
              PROGRAM-ID.    REGIOA.
000003        AUTHOR.        Reginaldo. Barc
000004        ENVIRONMENT DIVISION.
             *****************************
             *  This program calls 2 other programs.
             * > REGIOB is called as dynamic and returns
000008       *   in a division. This value returned is 0
000009       *   and exception since numbers cannot be di
             * > REGIOC prints the output using display
             ******************************************
The quick mark was set at the cursor location.
```

System: ZSERVEROS

Mapping Criterion	Workstation File Extension	Transfer Mode	Host Code Page	Local Code Page
**COBOL	cbl	text	IBM-037 (inhe…	Cp1252 (inheri…
**COBCOPY	cpy	text	IBM-037 (inhe…	Cp1252 (inheri…
**PLI	pli	[illegible]	[illegible]	Cp1252 (inheri…
**ASSEMBLE	asm	[illegible]	[illegible]	Cp1252 (inheri…
**OBJ	obj	[illegible]	[illegible]	Cp1252 (inheri…
**LOAD	exe	[illegible]	IBM-037 (inhe…	Cp1252 (inheri…
**CLIST	cmd	text	IBM-037 (inhe…	Cp1252 (inheri…
**JCL	jcl	text	IBM-037 (inhe…	Cp1252 (inheri…
**SIGYCLST	cmd	text	IBM-037 (inhe…	Cp1252 (inheri…
**CNTL	jcl	text	IBM-037 (inhe…	Cp1252 (inheri…
**FILES	<undefined>	text	IBM-037 (inhe…	Cp1252 (inheri…
COB**	CBL	text (inherited)	IBM-037 (inhe…	Cp1252 (inheri…
JCL**	JCL	text (inherited)	IBM-037 (inhe…	Cp1252 (inheri…
BMS**	BMS	text (inherited)	IBM-037 (inhe…	Cp1252 (inheri…
**LISTING	lst	text	IBM-037 (inhe…	Cp1252 (inheri…
**OUTLIST	out	text	IBM-037 (inhe…	Cp1252 (inheri…
**INCLUDE	inc	text	IBM-037 (inhe…	Cp1252 (inheri…

Property	Value
Heading	ENVIRONMENT DIVISION.
Length	21
Line	4
Line Count	8

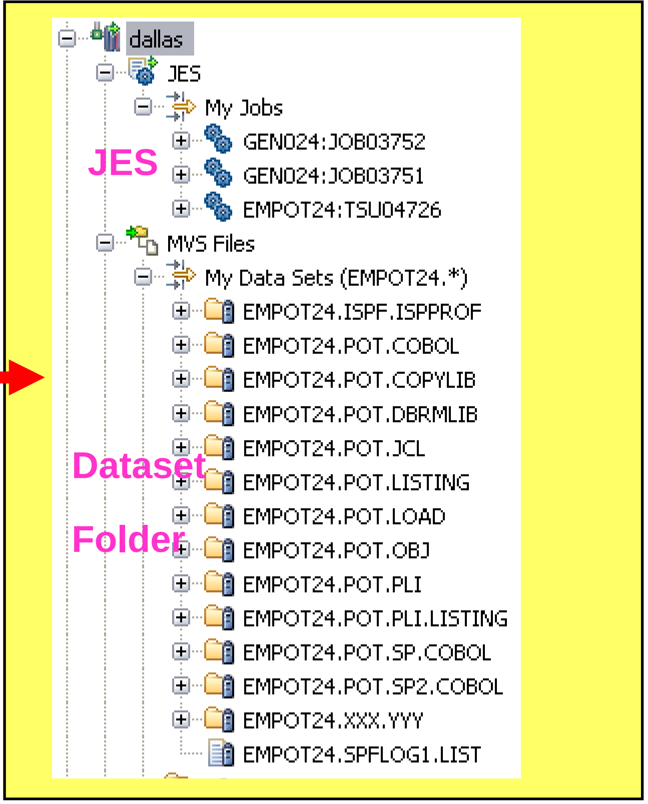
Host → Workstation Overview



```
GEN024    JOB03751 EMPOT24
GEN024    JOB03752 EMPOT24
```

```
EMPOT24.HFS
EMPOT24.ISPF.ISPPROF
EMPOT24.POT.COBOL
EMPOT24.POT.COPYLIB
EMPOT24.POT.DBRMLIB
EMPOT24.POT.JCL
EMPOT24.POT.LISTING
EMPOT24.POT.LOAD
EMPOT24.POT.OBJ
EMPOT24.POT.PLI
EMPOT24.POT.PLI.LISTING
EMPOT24.POT.SP.COBOL
EMPOT24.POT.SP2.COBOL
EMPOT24.SPFLOG1.LIST
EMPOT24.XXX.YYY
```

'Magic'

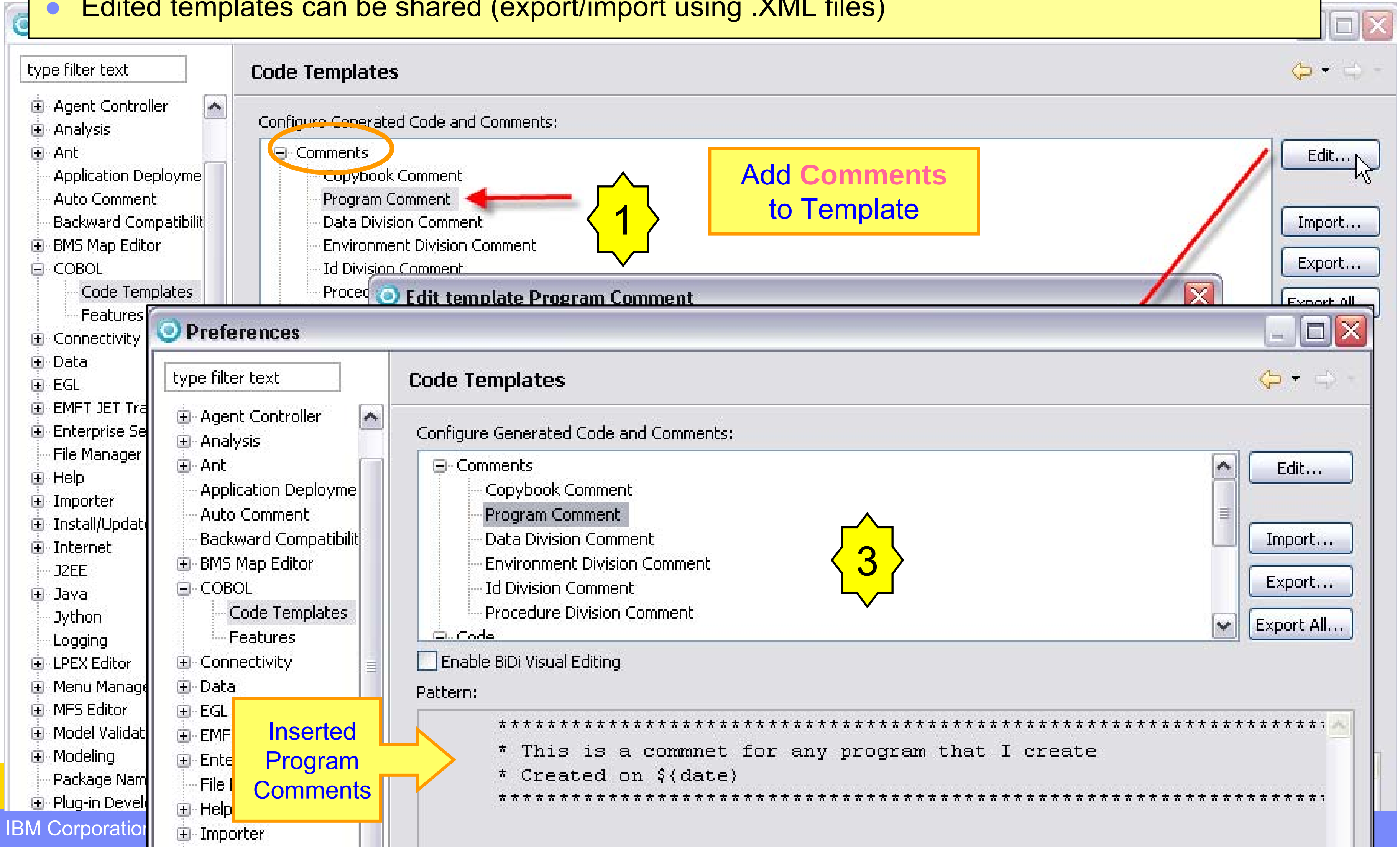


- dallas
  - JES
    - My Jobs
      - GEN024:JOB03752
      - GEN024:JOB03751
      - EMPOT24:TSU04726
  - MVS Files
    - My Data Sets (EMPOT24.*)
      - EMPOT24.ISPF.ISPPROF
      - EMPOT24.POT.COBOL
      - EMPOT24.POT.COPYLIB
      - EMPOT24.POT.DBRMLIB
      - EMPOT24.POT.JCL
      - EMPOT24.POT.LISTING
      - EMPOT24.POT.LOAD
      - EMPOT24.POT.OBJ
      - EMPOT24.POT.PLI
      - EMPOT24.POT.PLI.LISTING
      - EMPOT24.POT.SP.COBOL
      - EMPOT24.POT.SP2.COBOL
      - EMPOT24.XXX.YYY
      - EMPOT24.SPFLOG1.LIST

Files on the host look as though they are workstation files

COBOL Program Wizard – templates 1 of 2

- New program will be created using **code templates** that are stored in Preferences page
- Code templates can be edited by developer
- Edited templates can be shared (export/import using .XML files)

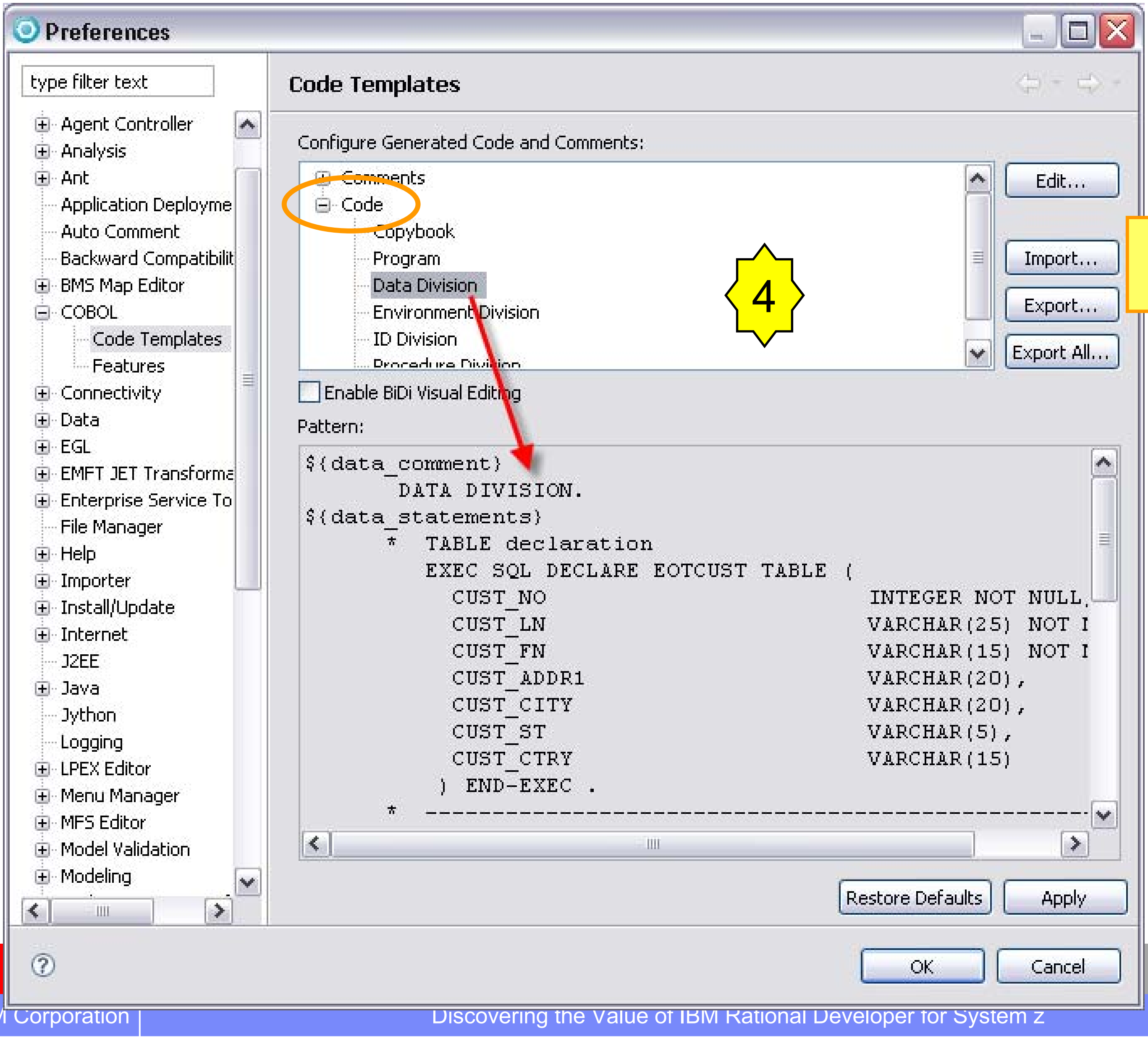


Add Comments to Template

Inserted Program Comments

```
*********************************************************************
* This is a commnet for any program that I create
* Created on ${date}
*********************************************************************
```

COBOL Program Wizard – templates 2 of 2

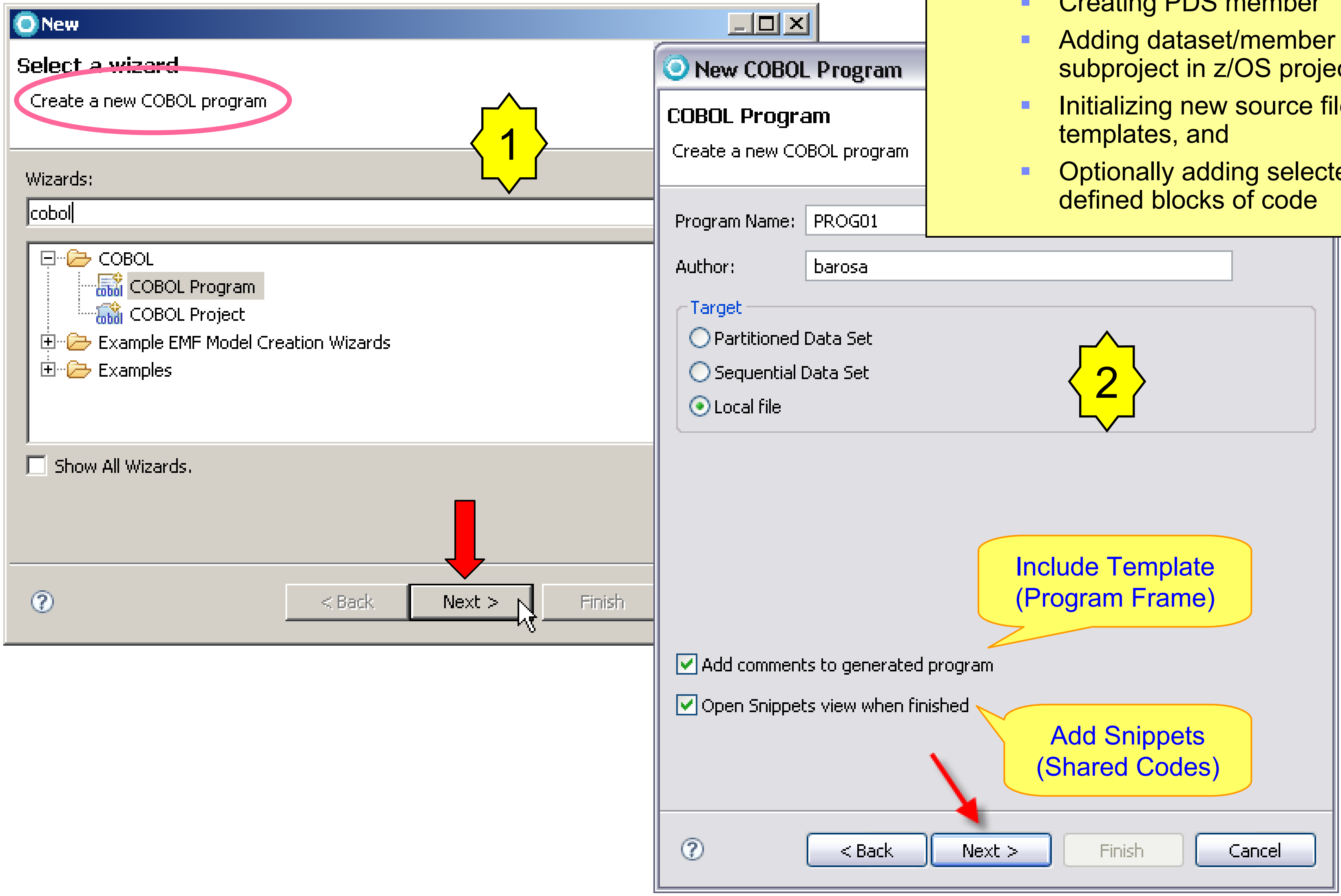


```
${data_comment}
       DATA DIVISION.
${data_statements}
      *  TABLE declaration
         EXEC SQL DECLARE EOTCUST TABLE (
           CUST_NO                         INTEGER NOT NULL,
           CUST_LN                         VARCHAR(25) NOT I
           CUST_FN                         VARCHAR(15) NOT I
           CUST_ADDR1                      VARCHAR(20),
           CUST_CITY                       VARCHAR(20),
           CUST_ST                         VARCHAR(5),
           CUST_CTRY                       VARCHAR(15)
          ) END-EXEC .
      *  ------------------------------------------------
```

Add Codes to Template

COBOL Program Wizard

- Combines several operations:
  - Allocating data set
  - Creating PDS member
  - Adding dataset/member to a subproject in z/OS project
  - Initializing new source file with templates, and
  - Optionally adding selected user-defined blocks of code



1

New

Select a wizard

Create a new COBOL program

Wizards: cobol

- COBOL
  - COBOL Program
  - COBOL Project
- Example EMF Model Creation Wizards
- Examples

□ Show All Wizards.

2

New COBOL Program

COBOL Program

Create a new COBOL program

Program Name: PROG01

Author: barosa

Target
- ○ Partitioned Data Set
- ○ Sequential Data Set
- ● Local file

☑ Add comments to generated program

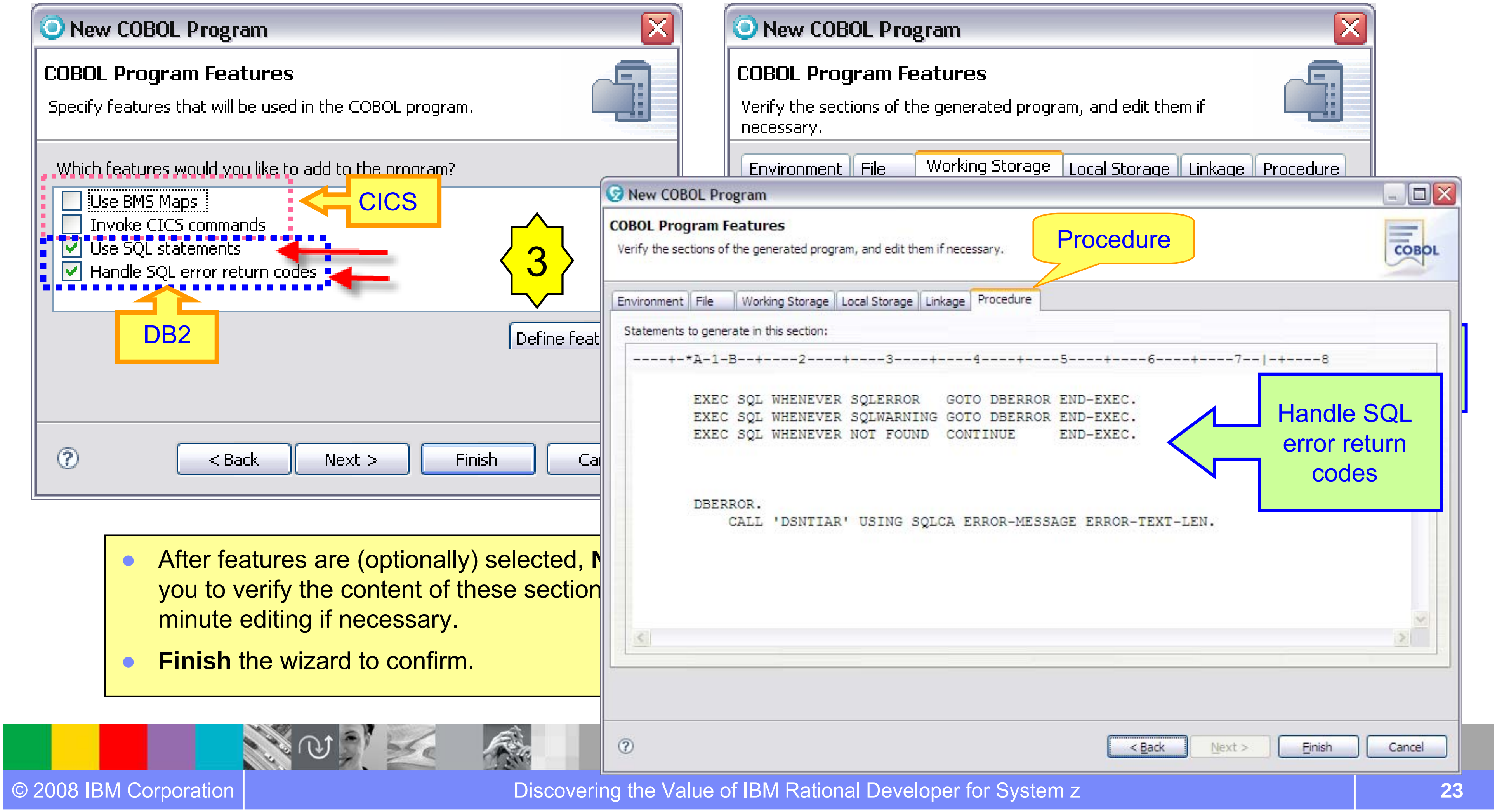
☑ Open Snippets view when finished

Include Template (Program Frame)

Add Snippets (Shared Codes)

COBOL Program Wizard – select features

- Can create the new COBOL program with only the program structure as defined by the templates
- Or, can build the new program using user-defined customized blocks of code, which correspond to named “features”
- A few basic samples of these are included to get you started, and these samples can be edited.



New COBOL Program

COBOL Program Features

Specify features that will be used in the COBOL program.

Which features would you like to add to the program?

- ☐ Use BMS Maps
- ☐ Invoke CICS commands
- ☑ Use SQL statements
- ☑ Handle SQL error return codes

New COBOL Program

COBOL Program Features

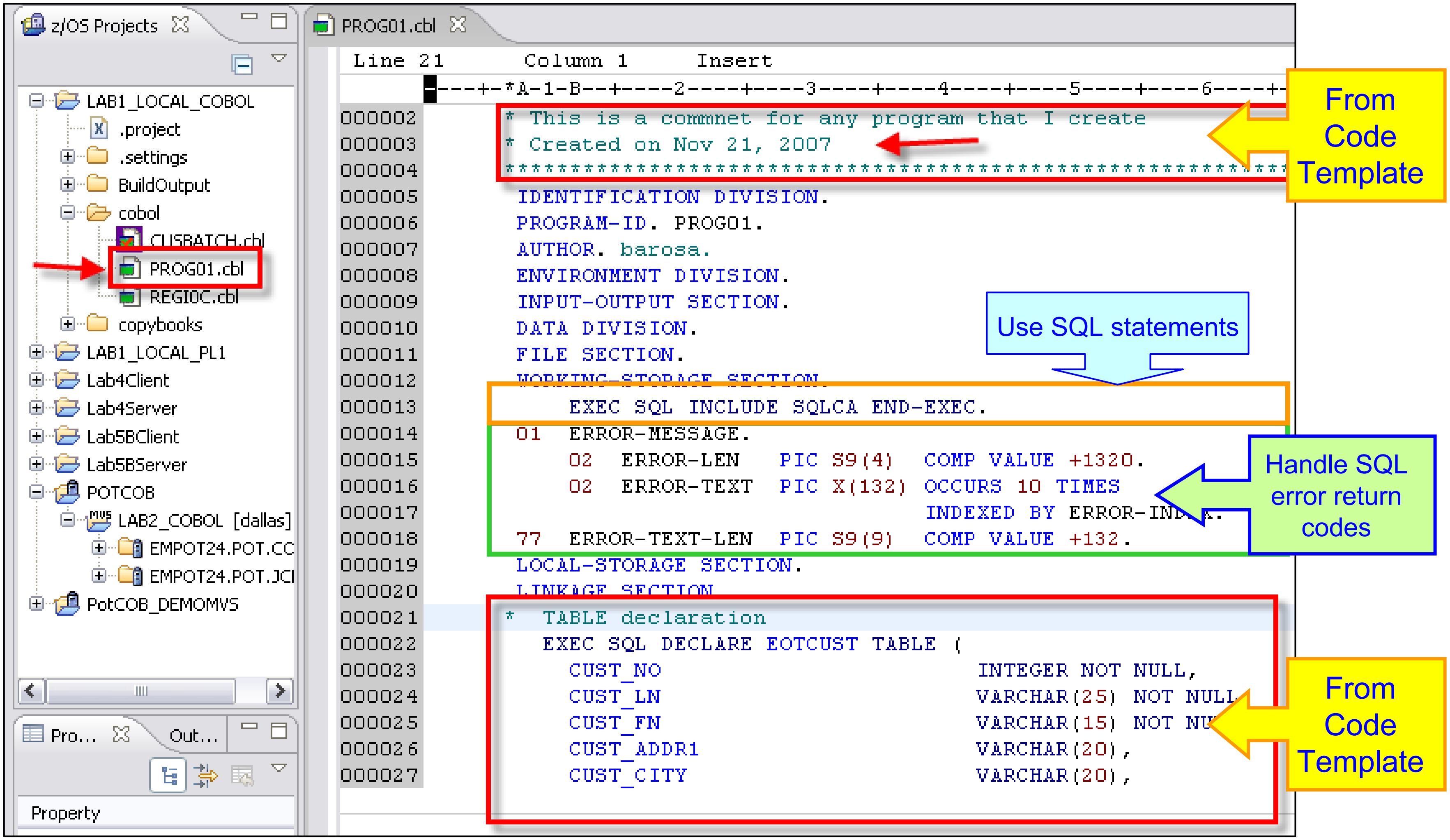
Verify the sections of the generated program, and edit them if necessary.

Statements to generate in this section:

```
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----8

           EXEC SQL WHENEVER SQLERROR   GOTO DBERROR END-EXEC.
           EXEC SQL WHENEVER SQLWARNING GOTO DBERROR END-EXEC.
           EXEC SQL WHENEVER NOT FOUND  CONTINUE     END-EXEC.



           DBERROR.
               CALL 'DSNTIAR' USING SQLCA ERROR-MESSAGE ERROR-TEXT-LEN.
```

- After features are (optionally) selected, N you to verify the content of these section minute editing if necessary.
- **Finish** the wizard to confirm.

COBOL Program Wizard – completed wizard (1)



```
Line 21        Column 1      Insert
     ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+-
      * This is a commnet for any program that I create
      * Created on Nov 21, 2007
      ***********************************************************
       IDENTIFICATION DIVISION.
       PROGRAM-ID. PROG01.
       AUTHOR. barosa.
       ENVIRONMENT DIVISION.
       INPUT-OUTPUT SECTION.
       DATA DIVISION.
       FILE SECTION.
       WORKING-STORAGE SECTION.
           EXEC SQL INCLUDE SQLCA END-EXEC.
       01  ERROR-MESSAGE.
           02  ERROR-LEN    PIC S9(4)   COMP VALUE +1320.
           02  ERROR-TEXT   PIC X(132)  OCCURS 10 TIMES
                                        INDEXED BY ERROR-INDEX.
       77  ERROR-TEXT-LEN   PIC S9(9)   COMP VALUE +132.
       LOCAL-STORAGE SECTION.
       LINKAGE SECTION.
      *  TABLE declaration
         EXEC SQL DECLARE EOTCUST TABLE (
           CUST_NO                              INTEGER NOT NULL,
           CUST_LN                              VARCHAR(25) NOT NULL
           CUST_FN                              VARCHAR(15) NOT NU
           CUST_ADDR1                           VARCHAR(20),
           CUST_CITY                            VARCHAR(20),
```

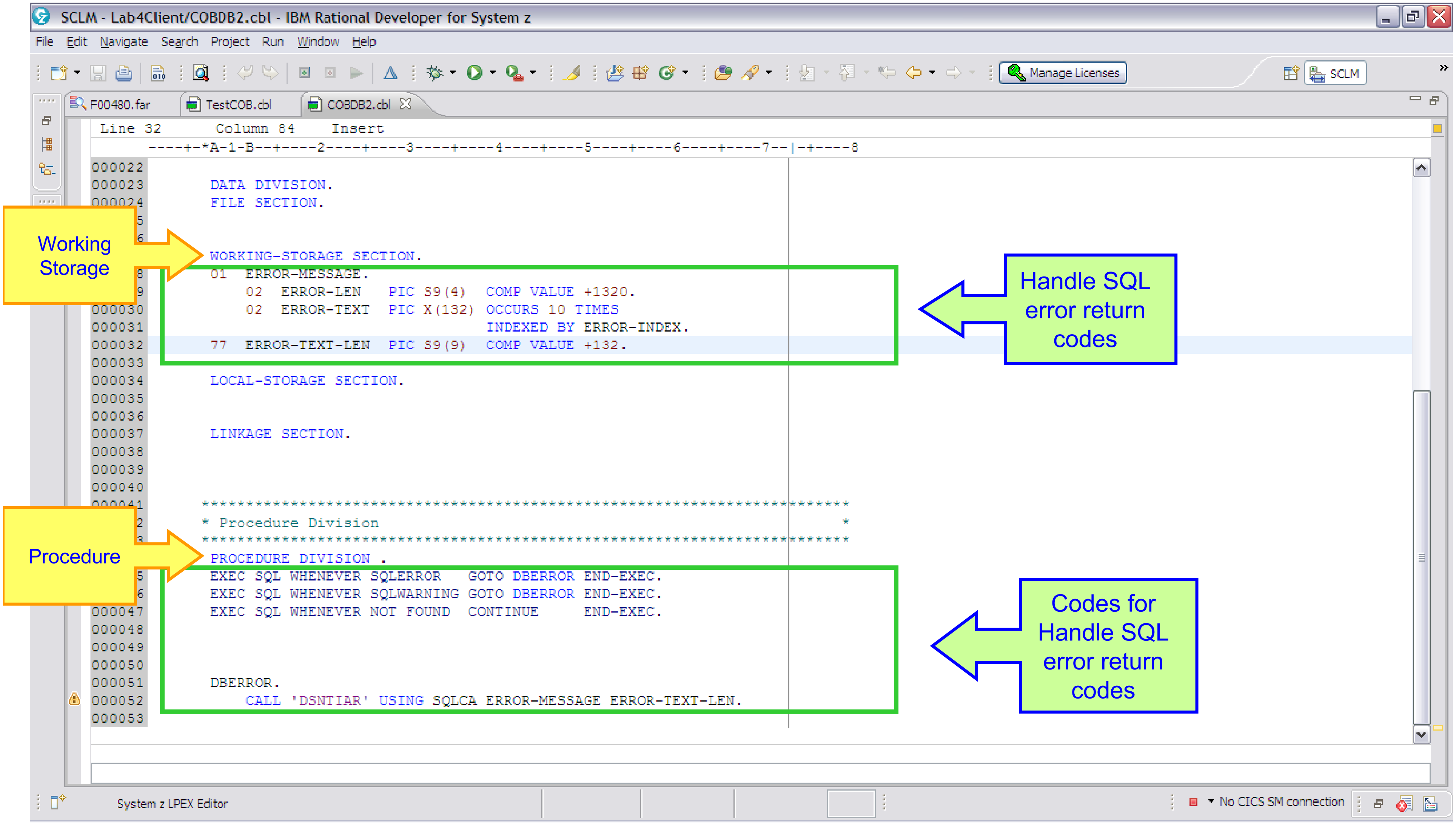
From Code Template

Use SQL statements

Handle SQL error return codes

From Code Template

COBOL Program Wizard – completed wizard (2)


SCLM - Lab4Client/COBDB2.cbl - IBM Rational Developer for System z
File Edit Navigate Search Project Run Window Help
Manage Licenses
SCLM
F00480.far
TestCOB.cbl
COBDB2.cbl
System z LPEX Editor
No CICS SM connection

```
 Line 32      Column 84    Insert
      ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----8

       DATA DIVISION.
       FILE SECTION.


       WORKING-STORAGE SECTION.
       01  ERROR-MESSAGE.
           02  ERROR-LEN    PIC S9(4)   COMP VALUE +1320.
           02  ERROR-TEXT   PIC X(132)  OCCURS 10 TIMES
                                        INDEXED BY ERROR-INDEX.
       77  ERROR-TEXT-LEN   PIC S9(9)   COMP VALUE +132.

       LOCAL-STORAGE SECTION.


       LINKAGE SECTION.



      *************************************************************************
      * Procedure Division                                                    *
      *************************************************************************
       PROCEDURE DIVISION .
       EXEC SQL WHENEVER SQLERROR   GOTO DBERROR END-EXEC.
       EXEC SQL WHENEVER SQLWARNING GOTO DBERROR END-EXEC.
       EXEC SQL WHENEVER NOT FOUND  CONTINUE     END-EXEC.



       DBERROR.
           CALL 'DSNTIAR' USING SQLCA ERROR-MESSAGE ERROR-TEXT-LEN.

```

Working Storage

Handle SQL error return codes

Procedure

Codes for Handle SQL error return codes

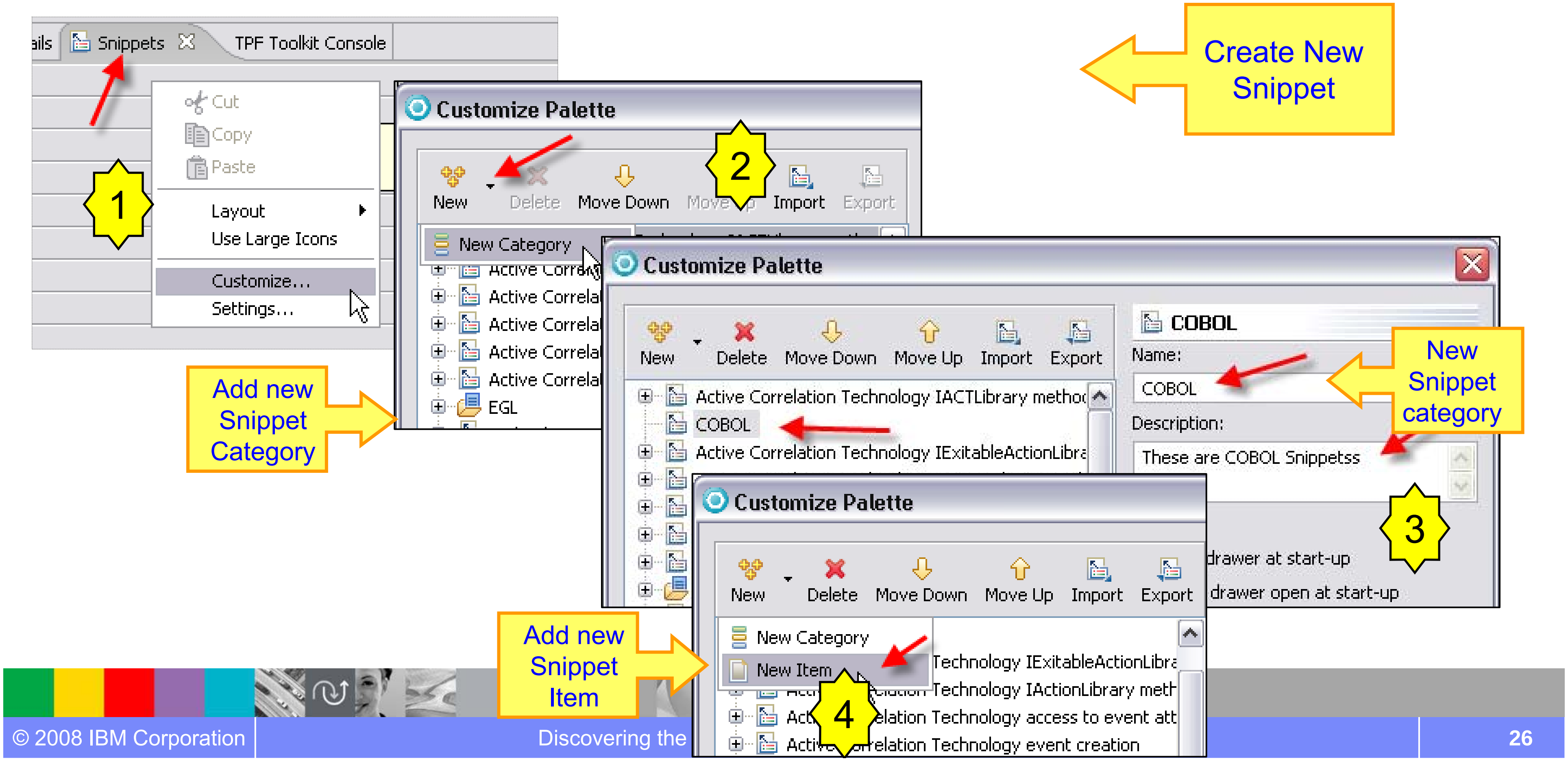
Snippet Insertion

Benefits:

Speed application creation and ensure conformance to **shop standards**

→ Define **re-usable logic** in an organized manner that can be easily used in programs

→ Define **organization-wide code templates** to share with others



Name: COBOL

Description: These are COBOL Snippetss

Create New Snippet

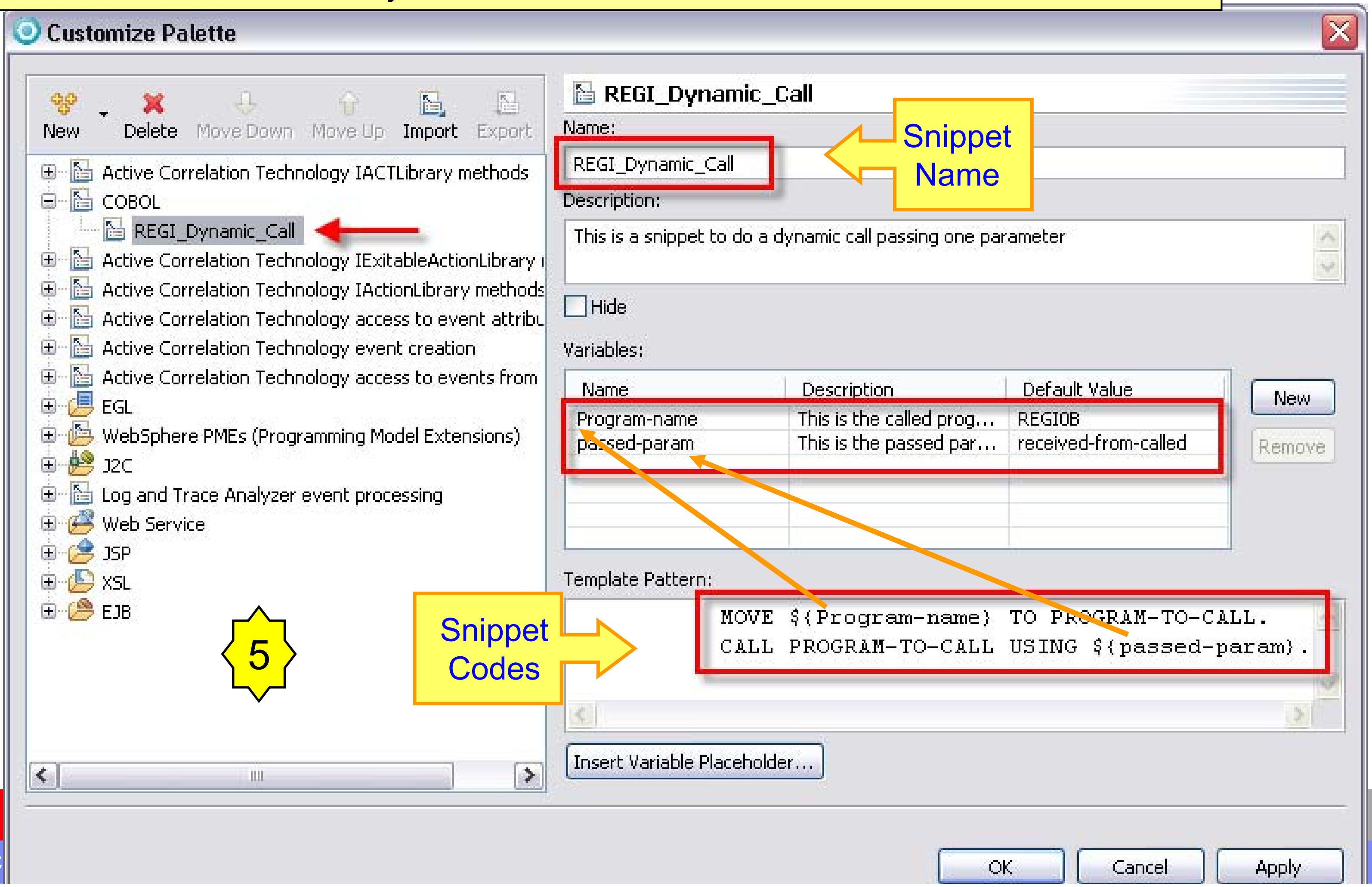
Add new Snippet Category

New Snippet category

Add new Snippet Item

Snippet Insertion…

- Define **small bits of code** and save code into a snippet view
- Optionally define variables in the code block
- Insert the code later directly into the editor



Customize Palette
New
Delete
Move Down
Move Up
Import
Export
Active Correlation Technology IACTLibrary methods
COBOL
REGI_Dynamic_Call
Active Correlation Technology IExitableActionLibrary
Active Correlation Technology IActionLibrary methods
Active Correlation Technology access to event attribu
Active Correlation Technology event creation
Active Correlation Technology access to events from
EGL
WebSphere PMEs (Programming Model Extensions)
J2C
Log and Trace Analyzer event processing
Web Service
JSP
XSL
EJB
5
Snippet Name
Snippet Codes
New
Remove
Insert Variable Placeholder…
OK
Cancel
Apply

REGI_Dynamic_Call

Name: REGI_Dynamic_Call

Description: This is a snippet to do a dynamic call passing one parameter

□ Hide

Variables:

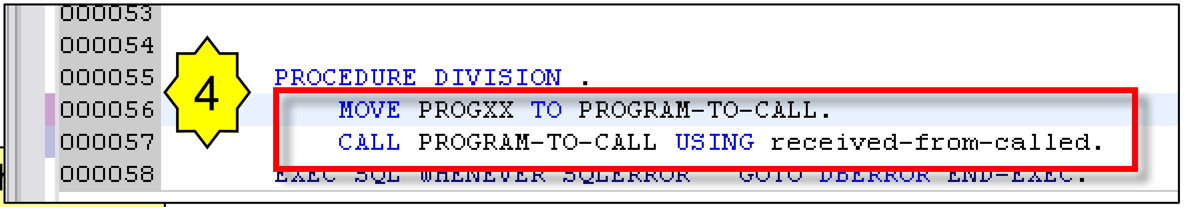
Name	Description	Default Value
Program-name	This is the called prog…	REGI0B
passed-param	This is the passed par…	received-from-called

Template Pattern:

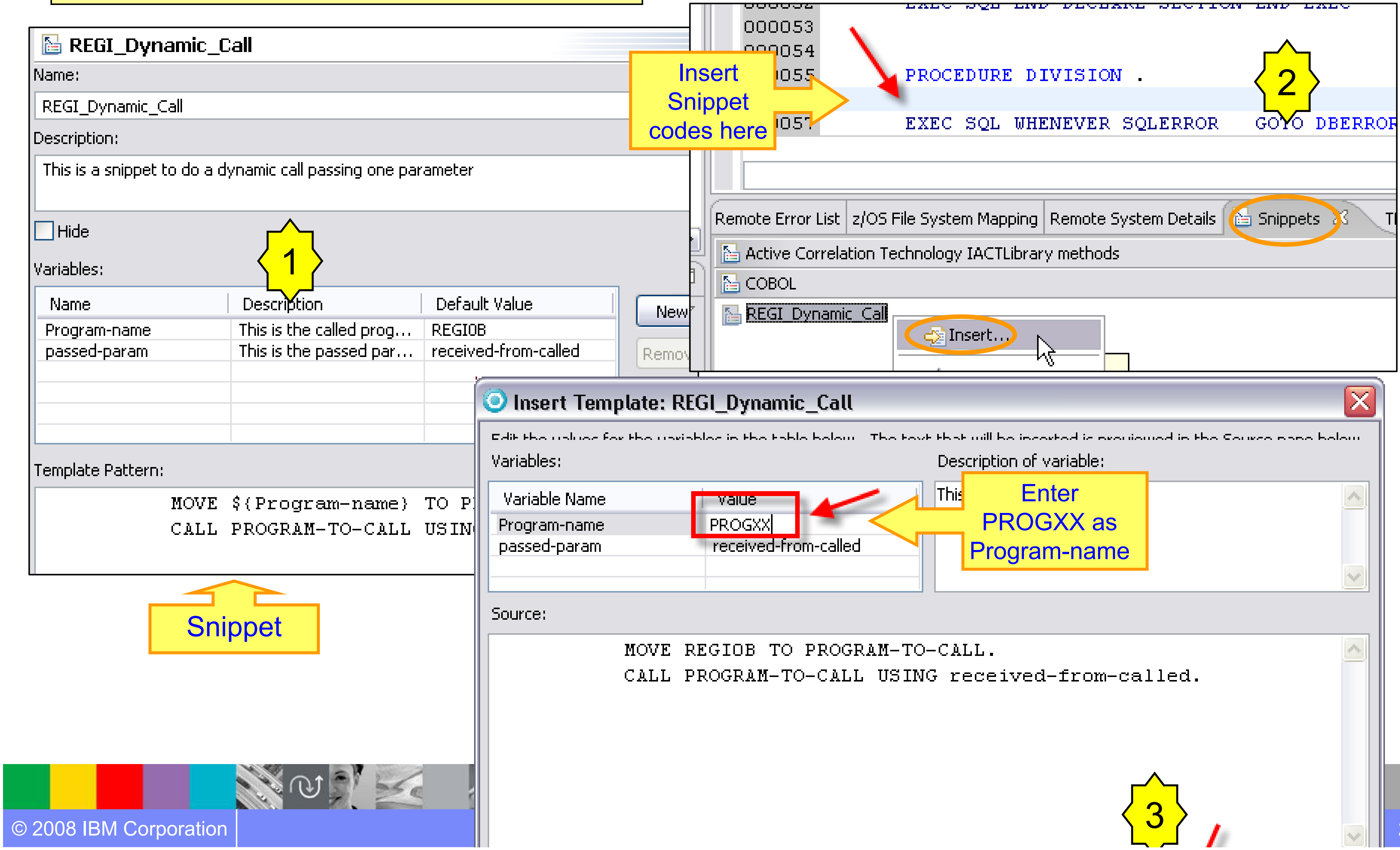
```
MOVE ${Program-name} TO PROGRAM-TO-CALL.
CALL PROGRAM-TO-CALL USING ${passed-param}.
```

Snippet Insertion…

- Insert the code later directly into th



```
PROCEDURE DIVISION .
    MOVE PROGXX TO PROGRAM-TO-CALL.
    CALL PROGRAM-TO-CALL USING received-from-called.
EXEC SQL WHENEVER SQLERROR    GOTO DBERROR END-EXEC.
```



```
    EXEC SQL END DECLARE SECTION END-EXEC

PROCEDURE DIVISION .

    EXEC SQL WHENEVER SQLERROR    GOTO DBERROR
```

Insert Snippet codes here

REGI_Dynamic_Call

Name: REGI_Dynamic_Call

Description: This is a snippet to do a dynamic call passing one parameter

□ Hide

Variables:

Name	Description	Default Value
Program-name	This is the called prog…	REGIOB
passed-param	This is the passed par…	received-from-called

Template Pattern:

```
MOVE ${Program-name} TO P
CALL PROGRAM-TO-CALL USIN
```

Snippet

Insert Template: REGI_Dynamic_Call

Edit the values for the variables in the table below. The text that will be inserted is previewed in the Source pane below.

Variables:

Variable Name	Value
Program-name	PROGXX
passed-param	received-from-called

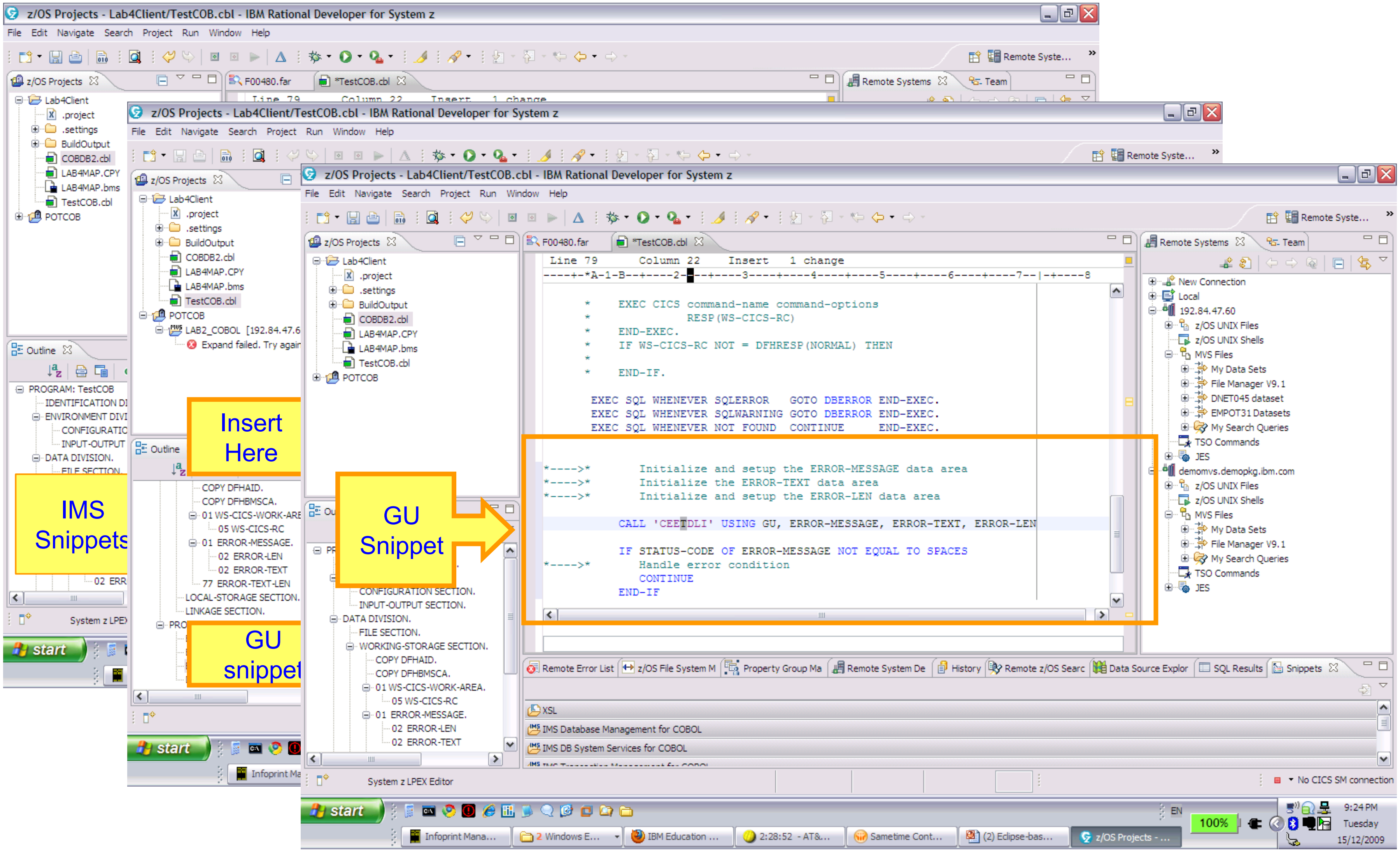
Description of variable: This

Enter PROGXX as Program-name

Source:

```
MOVE REGIOB TO PROGRAM-TO-CALL.
CALL PROGRAM-TO-CALL USING received-from-called.
```

Snippet Insertion… built-in IMS snipplets



Insert Here

IMS Snippets

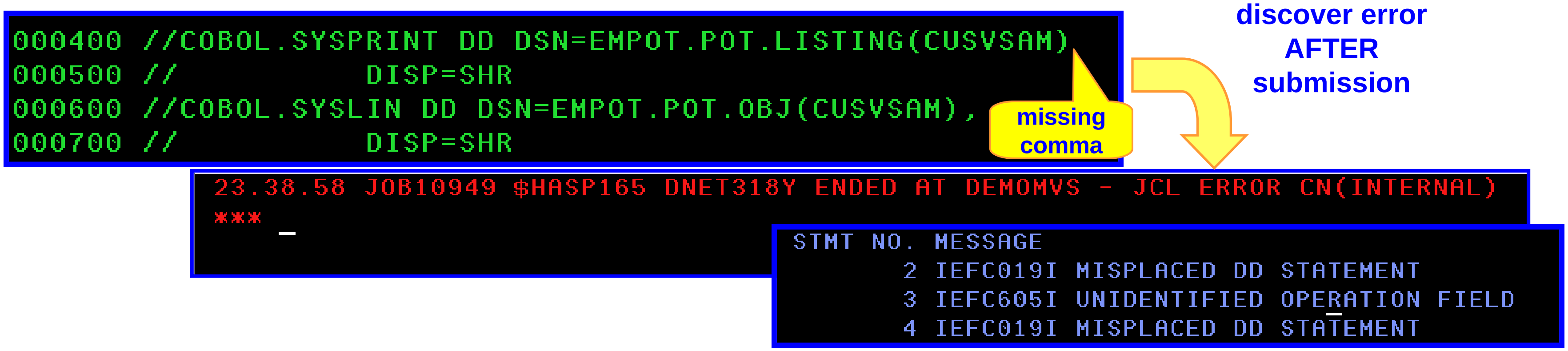
GU Snippet

GU snippet

```
Line 79      Column 22     Insert    1 change
----+-*A-1-B--+----2-█--+----3----+----4----+----5----+----6----+----7--|-+----8

      *    EXEC CICS command-name command-options
      *              RESP(WS-CICS-RC)
      *    END-EXEC.
      *    IF WS-CICS-RC NOT = DFHRESP(NORMAL) THEN
      *
      *    END-IF.

       EXEC SQL WHENEVER SQLERROR   GOTO DBERROR END-EXEC.
       EXEC SQL WHENEVER SQLWARNING GOTO DBERROR END-EXEC.
       EXEC SQL WHENEVER NOT FOUND  CONTINUE     END-EXEC.


*---->*       Initialize and setup the ERROR-MESSAGE data area
*---->*       Initialize the ERROR-TEXT data area
*---->*       Initialize and setup the ERROR-LEN data area

           CALL 'CEETDLI' USING GU, ERROR-MESSAGE, ERROR-TEXT, ERROR-LEN

           IF STATUS-CODE OF ERROR-MESSAGE NOT EQUAL TO SPACES
*---->*       Handle error condition
              CONTINUE
           END-IF
```

RDz Smart Editor for COBOL, JCL etc..

❑ ISPF Editor – no smart editing function



```
000400 //COBOL.SYSPRINT DD DSN=EMPOT.POT.LISTING(CUSVSAM)
000500 //           DISP=SHR
000600 //COBOL.SYSLIN DD DSN=EMPOT.POT.OBJ(CUSVSAM),
000700 //           DISP=SHR
```

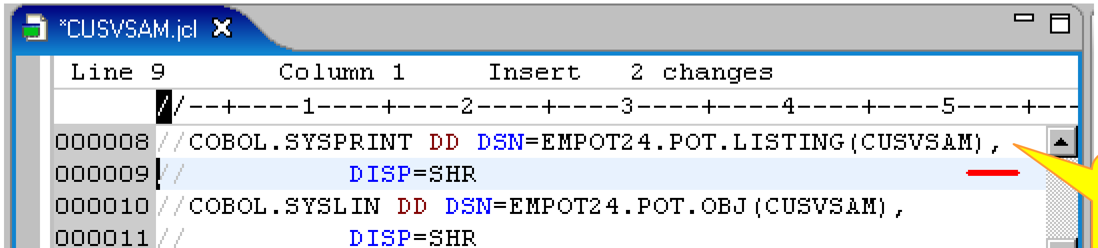
missing comma

discover error AFTER submission

```
 23.38.58 JOB10949 $HASP165 DNET318Y ENDED AT DEMOMVS - JCL ERROR CN(INTERNAL)
 ***
```

```
STMT NO. MESSAGE
       2 IEFC019I MISPLACED DD STATEMENT
       3 IEFC605I UNIDENTIFIED OPERATION FIELD
       4 IEFC019I MISPLACED DD STATEMENT
```

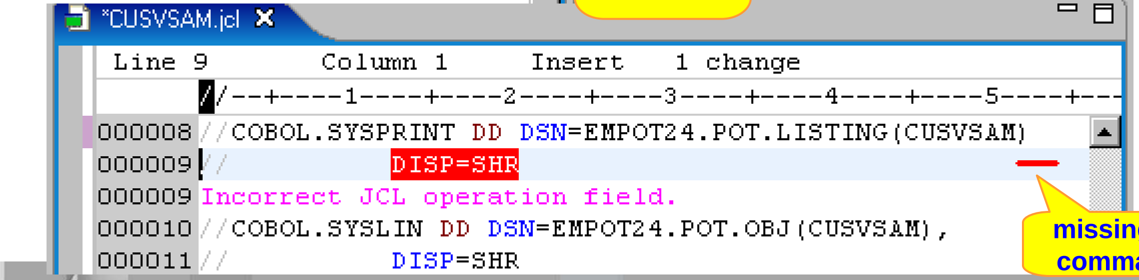
❑ The Eclipse-based RDz editor is sensitive to coding mistakes



```
 Line 9        Column 1       Insert    2 changes
          //--+----1----+----2----+----3----+----4----+----5----+---
000008 //COBOL.SYSPRINT DD DSN=EMPOT24.POT.LISTING(CUSVSAM),
000009 //           DISP=SHR
000010 //COBOL.SYSLIN DD DSN=EMPOT24.POT.OBJ(CUSVSAM),
000011 //           DISP=SHR
```

If this comma is deleted

discover error immediately



```
 Line 9        Column 1       Insert    1 change
          //--+----1----+----2----+----3----+----4----+----5----+---
000008 //COBOL.SYSPRINT DD DSN=EMPOT24.POT.LISTING(CUSVSAM)
000009 //           DISP=SHR
000009 Incorrect JCL operation field.
000010 //COBOL.SYSLIN DD DSN=EMPOT24.POT.OBJ(CUSVSAM),
000011 //           DISP=SHR
```

missing comma

a) The error is highlighted

b) Error message code is also displayed

RDz Smart Editor: COBOL Code Assist function

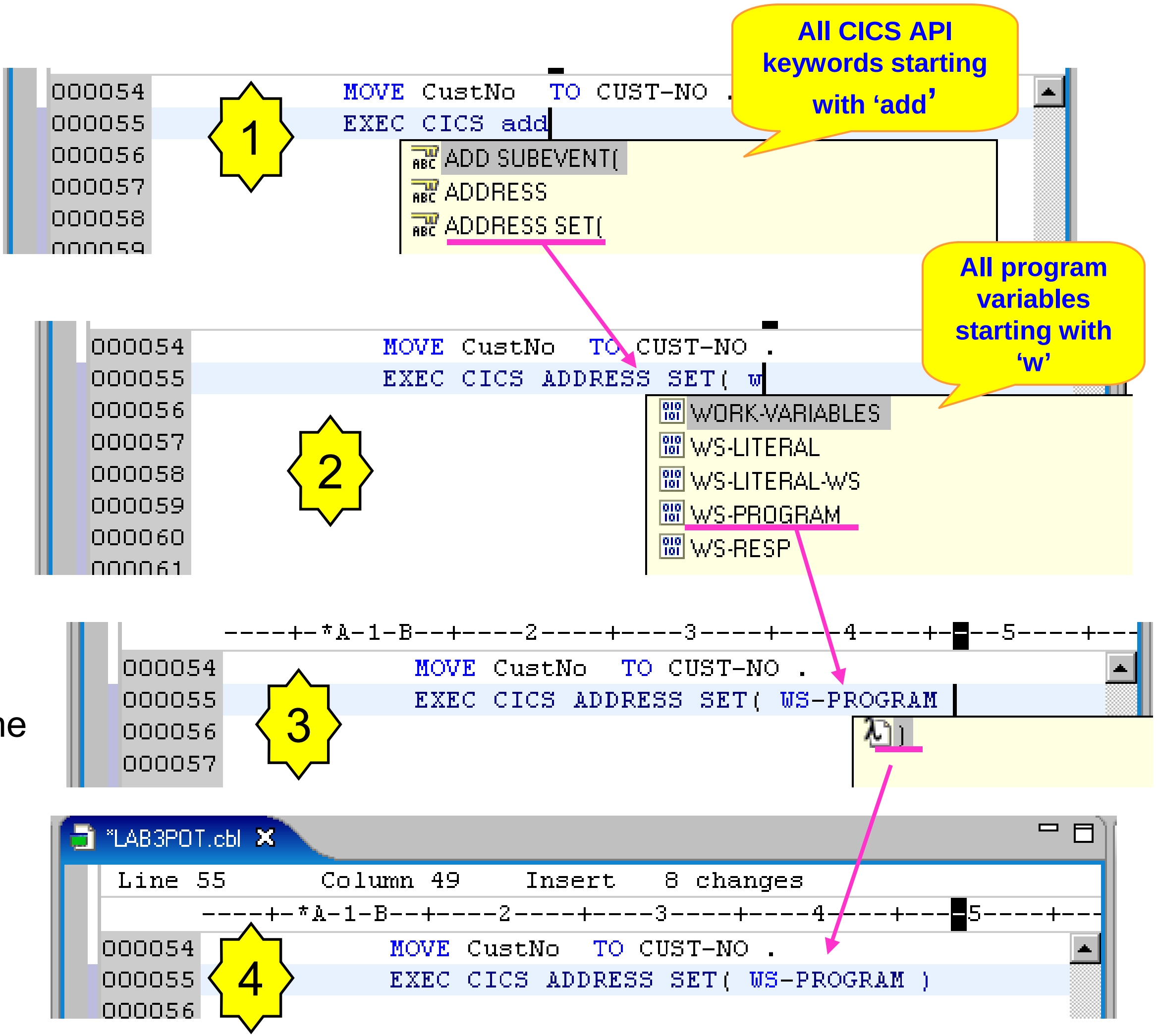
- ❑ Avoid syntax error on Keywords (COBOL, CICS … etc) and Program Variables

1. <Ctrl + space>
   Select the statement
   e.g **EXEC CICS**
   type ‘**add**'

2. <Ctrl + space>
   Select **ADDRESS SET(**
   type ‘**w**’

3. <Ctrl + space>
   Select the **WS-PROGRAM** data name

4. <Ctrl + space>
   Select the ‘**)**’



All CICS API keywords starting with ‘add’

```
000054              MOVE CustNo  TO CUST-NO .
000055              EXEC CICS add
000056                        ADD SUBEVENT(
000057                        ADDRESS
000058                        ADDRESS SET(
```

All program variables starting with ‘w’

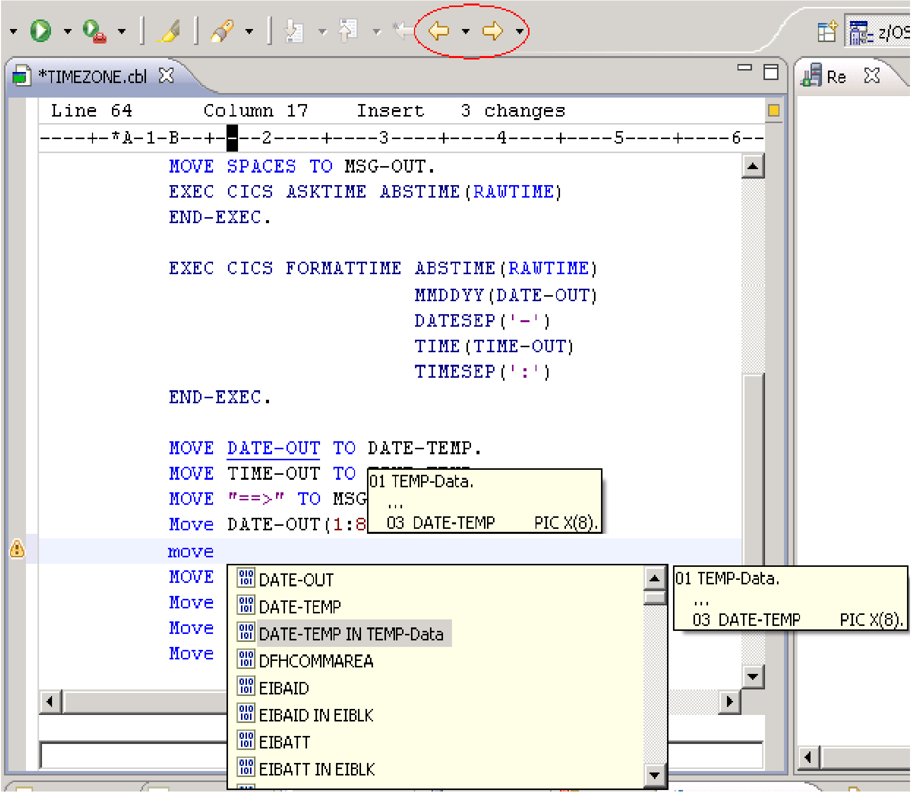
```
000054              MOVE CustNo  TO CUST-NO .
000055              EXEC CICS ADDRESS SET( w
000056                                   WORK-VARIABLES
000057                                   WS-LITERAL
000058                                   WS-LITERAL-WS
000059                                   WS-PROGRAM
000060                                   WS-RESP
```

```
----+-*A-1-B--+----2----+----3----+----4----+----5----+---
000054              MOVE CustNo  TO CUST-NO .
000055              EXEC CICS ADDRESS SET( WS-PROGRAM
000056                                                )
000057
```

```
*LAB3POT.cbl
Line 55      Column 49     Insert    8 changes
----+-*A-1-B--+----2----+----3----+----4----+----5----+---
000054              MOVE CustNo  TO CUST-NO .
000055              EXEC CICS ADDRESS SET( WS-PROGRAM )
000056
```

RDz Smart Editor: Hover

- Hover info for data items
- Hover info for data items in content assist
- Fully qualified suggestions in content assist
- Open Declaration mapped to F3 and hyperlink (hold down ctrl key and use mouse)
- Navigation Arrows supported



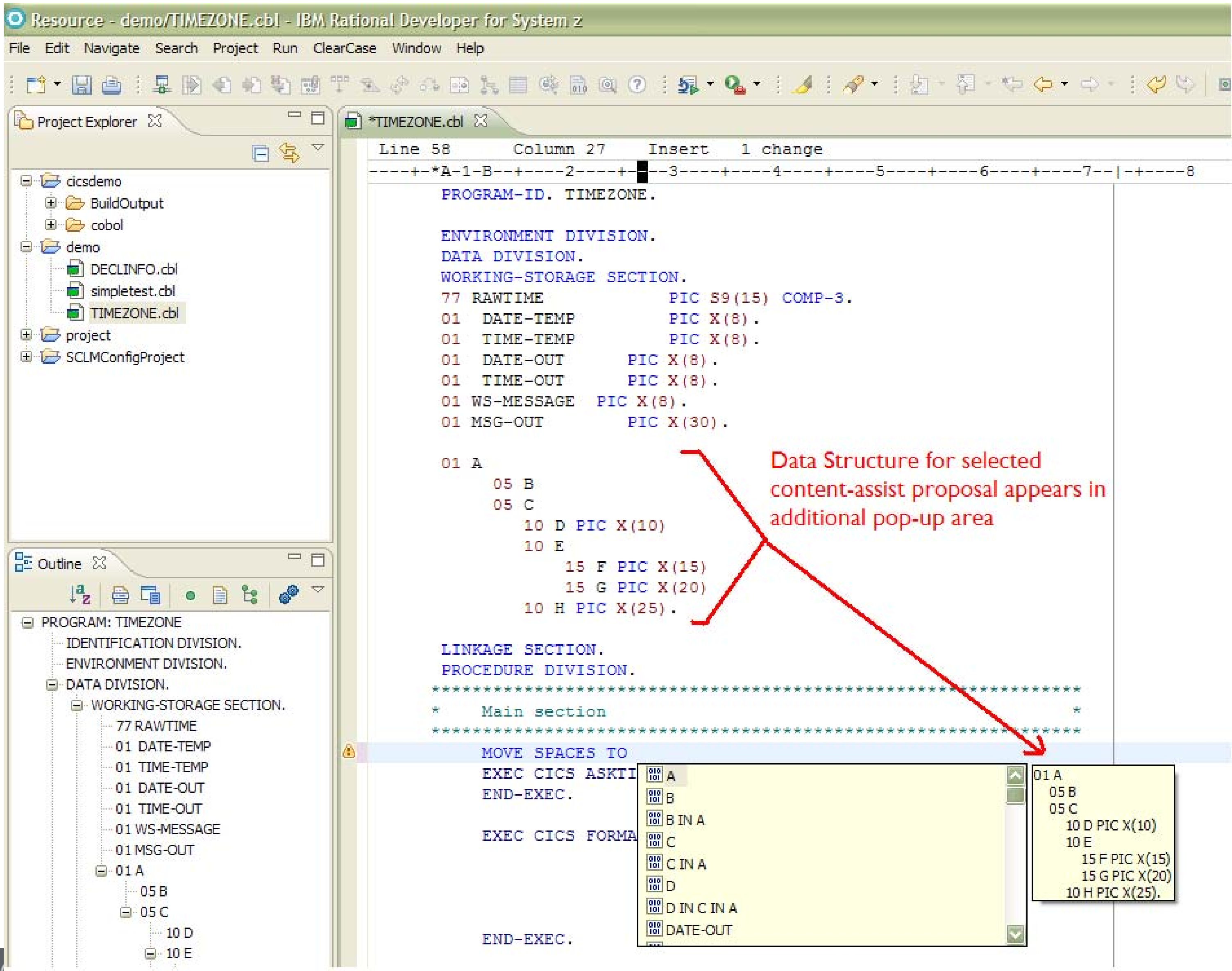
```
 Line 64       Column 17     Insert    3 changes
----+-*A-1-B--+--2----+----3----+----4----+----5----+----6--
           MOVE SPACES TO MSG-OUT.
           EXEC CICS ASKTIME ABSTIME(RAWTIME)
           END-EXEC.

           EXEC CICS FORMATTIME ABSTIME(RAWTIME)
                                MMDDYY(DATE-OUT)
                                DATESEP('-')
                                TIME(TIME-OUT)
                                TIMESEP(':')
           END-EXEC.

           MOVE DATE-OUT TO DATE-TEMP.
           MOVE TIME-OUT TO
           MOVE "==>" TO MSG
           Move DATE-OUT(1:8
           move
           MOVE
           Move
           Move
           Move
```

```
01 TEMP-Data.
  ...
  03 DATE-TEMP        PIC X(8).
```

```
DATE-OUT
DATE-TEMP
DATE-TEMP IN TEMP-Data
DFHCOMMAREA
EIBAID
EIBAID IN EIBLK
EIBATT
EIBATT IN EIBLK
```

```
01 TEMP-Data.
  ...
  03 DATE-TEMP        PIC X(8).
```

RDz Smart Editor: Hover



```
 Line 58       Column 27      Insert    1 change
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----8
       PROGRAM-ID. TIMEZONE.

       ENVIRONMENT DIVISION.
       DATA DIVISION.
       WORKING-STORAGE SECTION.
       77 RAWTIME              PIC S9(15) COMP-3.
       01  DATE-TEMP           PIC X(8).
       01  TIME-TEMP           PIC X(8).
       01  DATE-OUT        PIC X(8).
       01  TIME-OUT        PIC X(8).
       01 WS-MESSAGE   PIC X(8).
       01 MSG-OUT          PIC X(30).

       01 A
            05 B
            05 C
               10 D PIC X(10)
               10 E
                   15 F PIC X(15)
                   15 G PIC X(20)
               10 H PIC X(25).

       LINKAGE SECTION.
       PROCEDURE DIVISION.
      ***************************************************************
      *    Main section                                             *
      ***************************************************************
           MOVE SPACES TO
           EXEC CICS ASKTI
           END-EXEC.

           EXEC CICS FORMA

           END-EXEC.
```

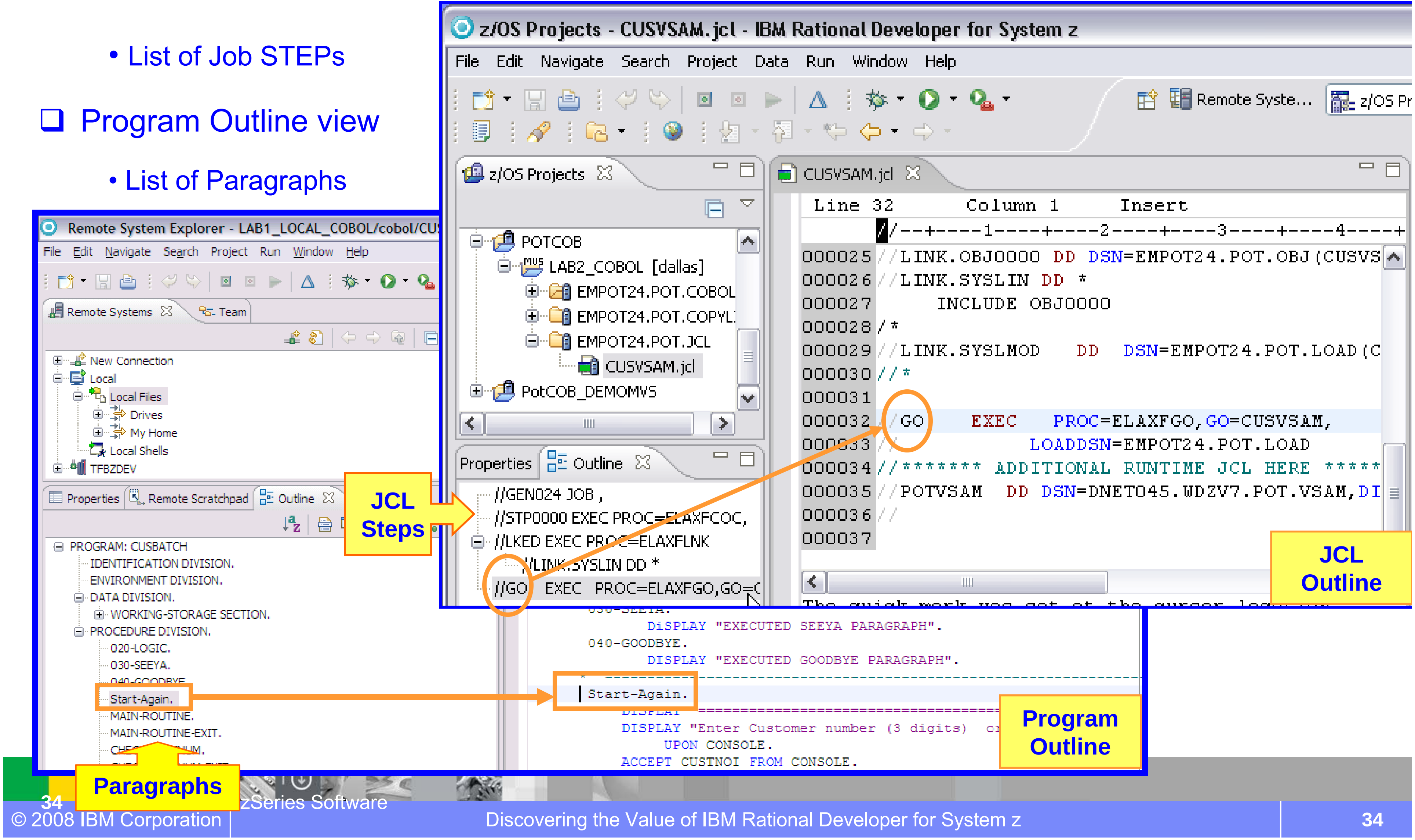
```
01 A
  05 B
  05 C
    10 D PIC X(10)
    10 E
      15 F PIC X(15)
      15 G PIC X(20)
    10 H PIC X(25).
```

Data Structure for selected content-assist proposal appears in additional pop-up area

RDz Smart Editor : Use of Outline View

A summary view of the JCL step / program paragraph

- ❑ JCL Outline View
  - List of Job STEPs
- ❑ Program Outline view
  - List of Paragraphs



```
//GEN024 JOB ,
//STP0000 EXEC PROC=ELAXFCOC,
//LKED EXEC PROC=ELAXFLNK
//LINK.SYSLIN DD *
//GO   EXEC  PROC=ELAXFGO,GO=C
```

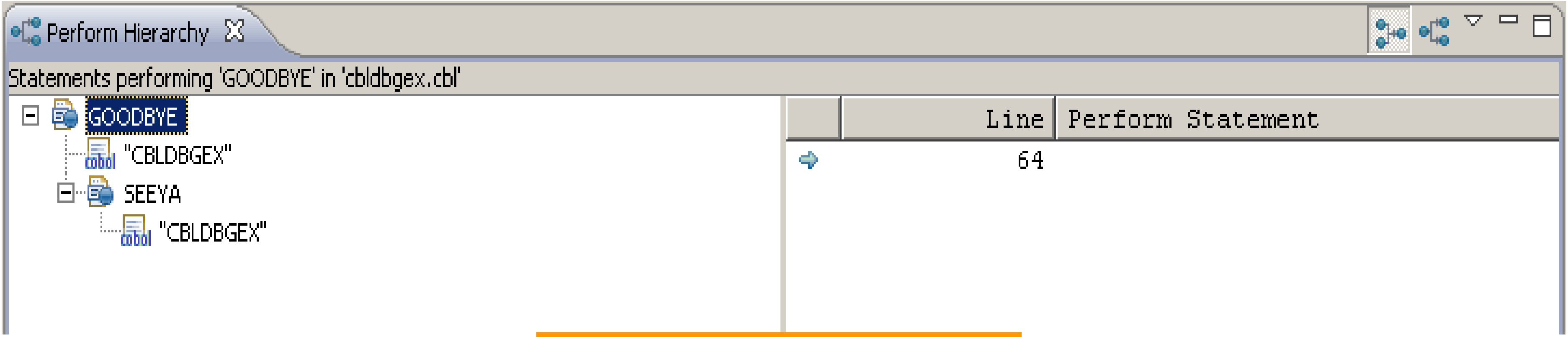
```
/--+----1----+----2----+----3----+----4----+
000025 //LINK.OBJ0000 DD DSN=EMPOT24.POT.OBJ(CUSVS
000026 //LINK.SYSLIN DD *
000027     INCLUDE OBJ0000
000028 /*
000029 //LINK.SYSLMOD   DD  DSN=EMPOT24.POT.LOAD(C
000030 //*
000031
000032 //GO     EXEC    PROC=ELAXFGO,GO=CUSVSAM,
000033 //             LOADDSN=EMPOT24.POT.LOAD
000034 //******* ADDITIONAL RUNTIME JCL HERE *****
000035 //POTVSAM  DD DSN=DNET045.WDZV7.POT.VSAM,DI
000036 //
000037
```

```
PROGRAM: CUSBATCH
  IDENTIFICATION DIVISION.
  ENVIRONMENT DIVISION.
  DATA DIVISION.
    WORKING-STORAGE SECTION.
  PROCEDURE DIVISION.
    020-LOGIC.
    030-SEEYA.
    040-GOODBYE.
    Start-Again.
    MAIN-ROUTINE.
    MAIN-ROUTINE-EXIT.
    CHE      NUM.
```

```
           DiSPLAY "EXECUTED SEEYA PARAGRAPH".
       040-GOODBYE.
           DISPLAY "EXECUTED GOODBYE PARAGRAPH".
      *-----------------------------------------------------
       Start-Again.
           DISPLAY ======================================
           DISPLAY "Enter Customer number (3 digits)  or
               UPON CONSOLE.
           ACCEPT CUSTNOI FROM CONSOLE.
```

zSeries Software

RDz **Smart Editor**: PERFORM Hierarchy



Statements performing 'GOODBYE' in 'cbldbgex.cbl'

```
GOODBYE
  "CBLDBGEX"
  SEEYA
    "CBLDBGEX"
```

Line	Perform Statement
64	

```
GOODBYE.
    PERFORM SEEYA.
SEEYA.
    MOVE ….
    COMPUTE ….
```

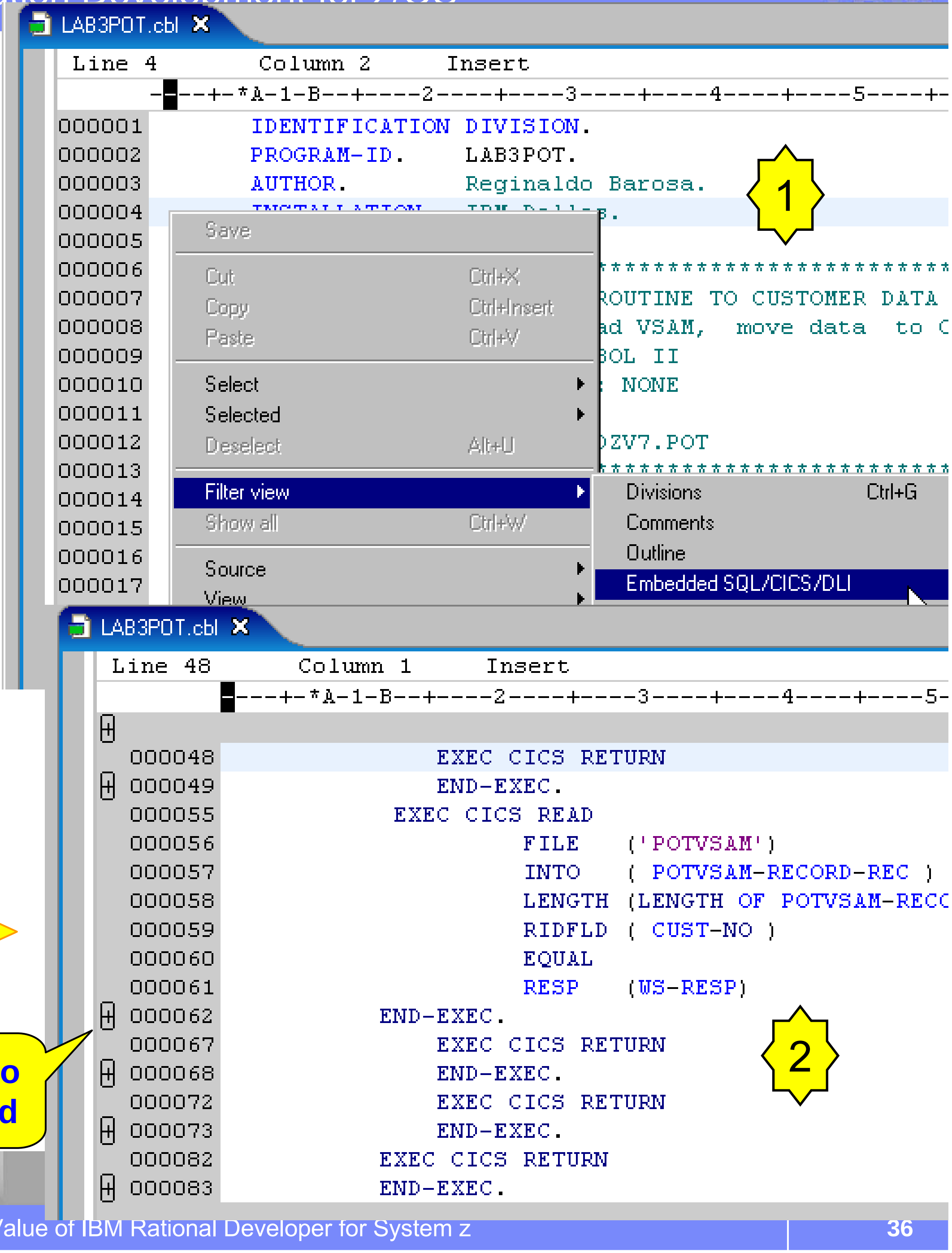
- A view is available to show the Hierarchy of PERFORM statements within a program

Smart Editor: Code Filtering

- From the context menu select *Filter view*
- Options are to show only:
  a) Divisions
    – Identification, Environment,
    – Data, Procedure
  b) Comments
  c) Outline
    – 01 level data
    – Paragraph
  d) Embedded SQL/CICS/DLI
  e) Errors

Result for 'SQL, CICS and DLI' is shown

Click to expand

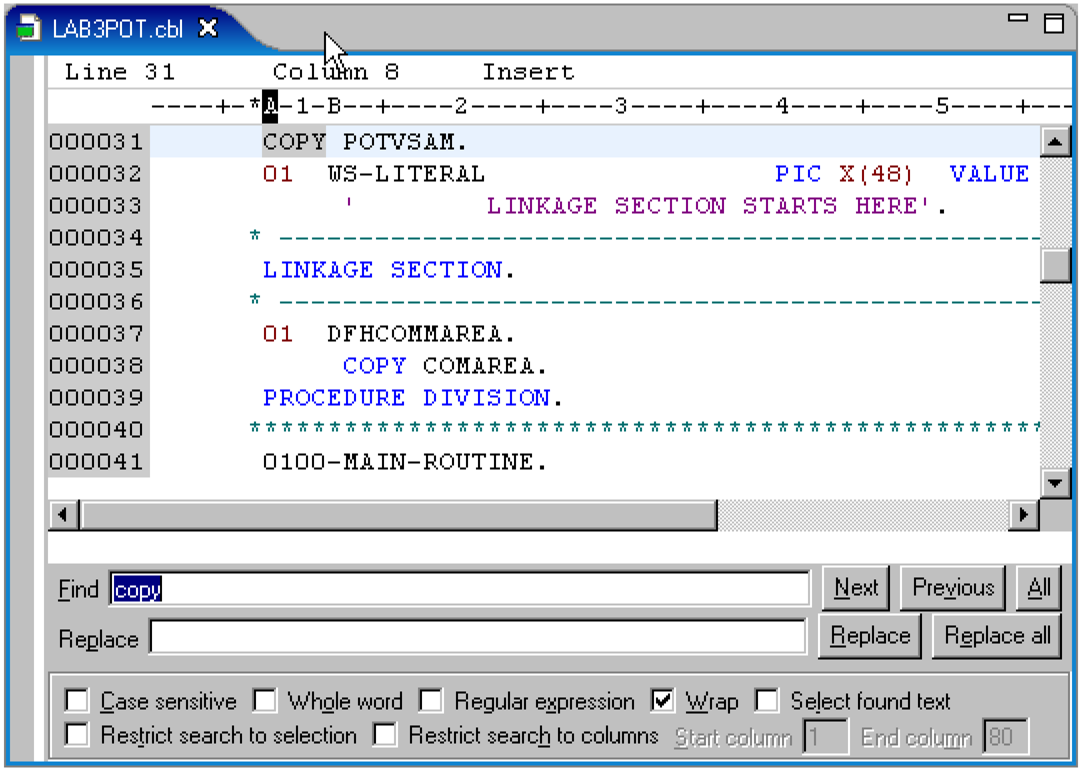


```
 Line 4        Column 2      Insert
         -█--+-*A-1-B--+----2----+----3----+----4----+----5----+-
000001        IDENTIFICATION DIVISION.
000002        PROGRAM-ID.    LAB3POT.
000003        AUTHOR.        Reginaldo Barosa.
000004        INSTALLATION   IBM Dallas.
000005
000006                                          ************************
000007                                          ROUTINE TO CUSTOMER DATA
000008                                          ad VSAM,  move data  to C
000009                                          BOL II
000010                                          : NONE
000011
000012                                          ZV7.POT
000013                                          ************************
000014
000015
000016
000017
```

```
 Line 48       Column 1      Insert
         █---+-*A-1-B--+----2----+----3----+----4----+----5-
000048                    EXEC CICS RETURN
000049                    END-EXEC.
000055               EXEC CICS READ
000056                         FILE    ('POTVSAM')
000057                         INTO    ( POTVSAM-RECORD-REC )
000058                         LENGTH  (LENGTH OF POTVSAM-RECC
000059                         RIDFLD  ( CUST-NO )
000060                         EQUAL
000061                         RESP    (WS-RESP)
000062              END-EXEC.
000067                    EXEC CICS RETURN
000068                    END-EXEC.
000072                    EXEC CICS RETURN
000073                    END-EXEC.
000082              EXEC CICS RETURN
000083              END-EXEC.
```

Smart Editor: Find and Replace

- Enter Ctrl+F
- Overtype with your search string: 'c..o..p..'
  - Goes to 'COPY' as you type



```
 Line 31         Column 8        Insert
          ----+-*A-1-B--+----2----+----3----+----4----+----5----+--
000031           COPY POTVSAM.
000032           01  WS-LITERAL                      PIC X(48)  VALUE
000033                '          LINKAGE SECTION STARTS HERE'.
000034          * ------------------------------------------------
000035           LINKAGE SECTION.
000036          * ------------------------------------------------
000037           01  DFHCOMMAREA.
000038                COPY COMAREA.
000039           PROCEDURE DIVISION.
000040          ************************************************
000041           0100-MAIN-ROUTINE.
```

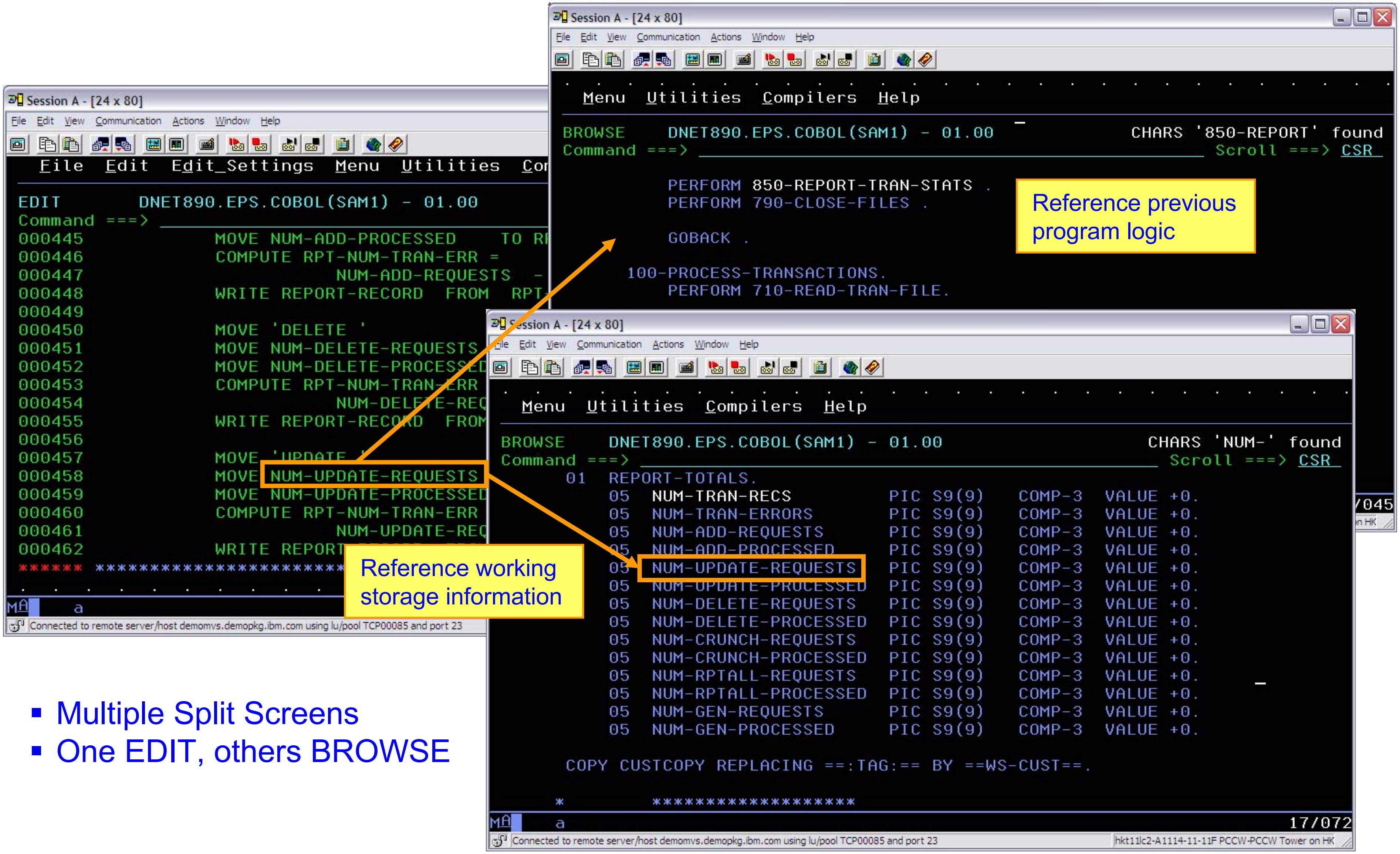
Find: copy

Replace:

□ Case sensitive □ Whole word □ Regular expression ☑ Wrap □ Select found text

□ Restrict search to selection □ Restrict search to columns Start column 1 End column 80

RDz Smart Editor: Split Screen … (1)



```
 File  Edit  Edit_Settings  Menu  Utilities  Con
EDIT       DNET890.EPS.COBOL(SAM1) - 01.00
Command ===> ____________________________________
000445           MOVE NUM-ADD-PROCESSED     TO RP
000446           COMPUTE RPT-NUM-TRAN-ERR =
000447                      NUM-ADD-REQUESTS   -
000448           WRITE REPORT-RECORD  FROM  RPT-
000449
000450           MOVE 'DELETE '
000451           MOVE NUM-DELETE-REQUESTS
000452           MOVE NUM-DELETE-PROCESSED
000453           COMPUTE RPT-NUM-TRAN-ERR
000454                      NUM-DELETE-REQ
000455           WRITE REPORT-RECORD  FROM
000456
000457           MOVE 'UPDATE '
000458           MOVE NUM-UPDATE-REQUESTS
000459           MOVE NUM-UPDATE-PROCESSED
000460           COMPUTE RPT-NUM-TRAN-ERR
000461                      NUM-UPDATE-REQ
000462           WRITE REPORT
****** ***********************
MA      a
Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00085 and port 23
```

```
 Menu  Utilities  Compilers  Help
BROWSE    DNET890.EPS.COBOL(SAM1) - 01.00              CHARS '850-REPORT' found
Command ===> ______________________________________________  Scroll ===> CSR
          PERFORM 850-REPORT-TRAN-STATS .
          PERFORM 790-CLOSE-FILES .

          GOBACK .

      100-PROCESS-TRANSACTIONS.
          PERFORM 710-READ-TRAN-FILE.
                                                                       /045
```

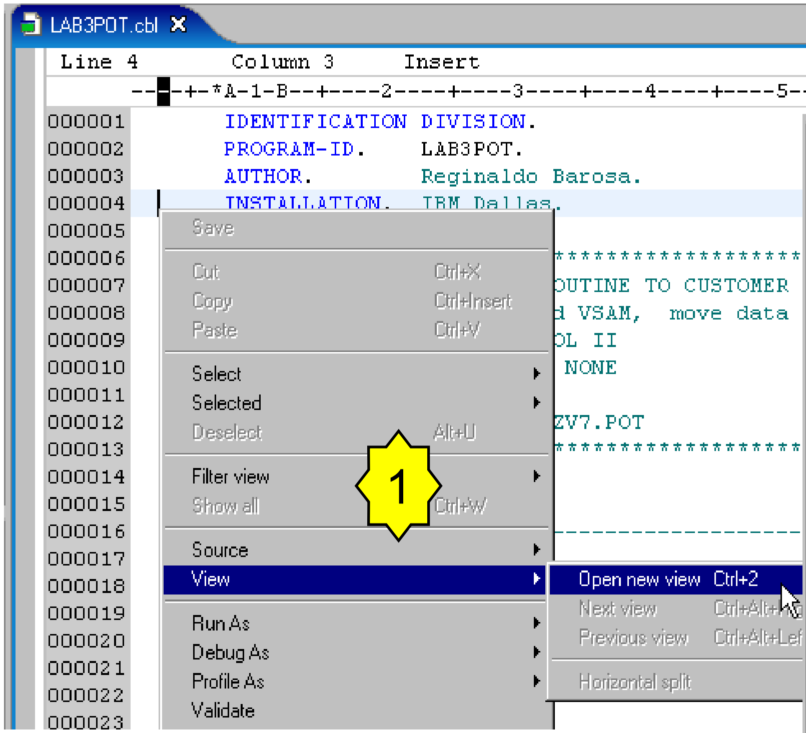
Reference previous program logic

```
 Menu  Utilities  Compilers  Help
BROWSE    DNET890.EPS.COBOL(SAM1) - 01.00                      CHARS 'NUM-' found
Command ===> ____________________________________________________  Scroll ===> CSR
       01  REPORT-TOTALS.
           05  NUM-TRAN-RECS          PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-TRAN-ERRORS        PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-ADD-REQUESTS       PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-ADD-PROCESSED      PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-UPDATE-REQUESTS    PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-UPDATE-PROCESSED   PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-DELETE-REQUESTS    PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-DELETE-PROCESSED   PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-CRUNCH-REQUESTS    PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-CRUNCH-PROCESSED   PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-RPTALL-REQUESTS    PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-RPTALL-PROCESSED   PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-GEN-REQUESTS       PIC S9(9)   COMP-3  VALUE +0.
           05  NUM-GEN-PROCESSED      PIC S9(9)   COMP-3  VALUE +0.

       COPY CUSTCOPY REPLACING ==:TAG:== BY ==WS-CUST==.

      *    ******************
MA      a                                                              17/072
Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00085 and port 23    hkt11lc2-A1114-11-11F PCCW-PCCW Tower on HK
```

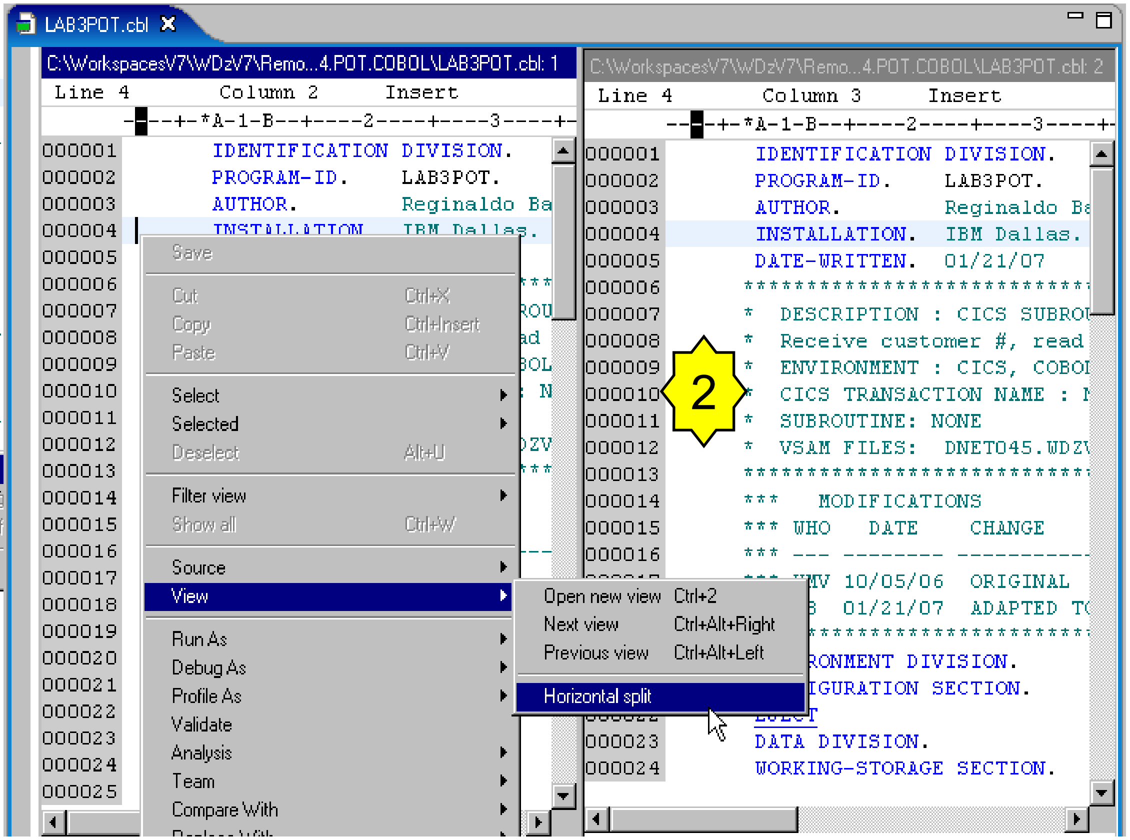
Reference working storage information

- Multiple Split Screens
- One EDIT, others BROWSE

RDz Smart Editor: Split Screen … (2)



```
Line 4        Column 3       Insert
--|-+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+---
       IDENTIFICATION DIVISION.
       PROGRAM-ID.    LAB3POT.
       AUTHOR.        Reginaldo Barosa.
       INSTALLATION.  IBM Dallas.
```



```
Line 4        Column 3       Insert
--|-+-*A-1-B--+----2----+----3----+-
       IDENTIFICATION DIVISION.
       PROGRAM-ID.    LAB3POT.
       AUTHOR.        Reginaldo Ba
       INSTALLATION.  IBM Dallas.
       DATE-WRITTEN.  01/21/07
      ****************************
      *  DESCRIPTION : CICS SUBROU
      *  Receive customer #, read
      *  ENVIRONMENT : CICS, COBOL
      *  CICS TRANSACTION NAME : N
      *  SUBROUTINE: NONE
      *  VSAM FILES:  DNET045.WDZV
      ****************************
      ***   MODIFICATIONS
      *** WHO   DATE     CHANGE
      *** ---  --------  ----------
         MV  10/05/06  ORIGINAL
         B   01/21/07  ADAPTED TO
      ****************************
          RONMENT DIVISION.
          IGURATION SECTION.
       DATA DIVISION.
       WORKING-STORAGE SECTION.
```

Multiple LPEX views of a file can be open at once.

Changes to one view immediately appear in the others.

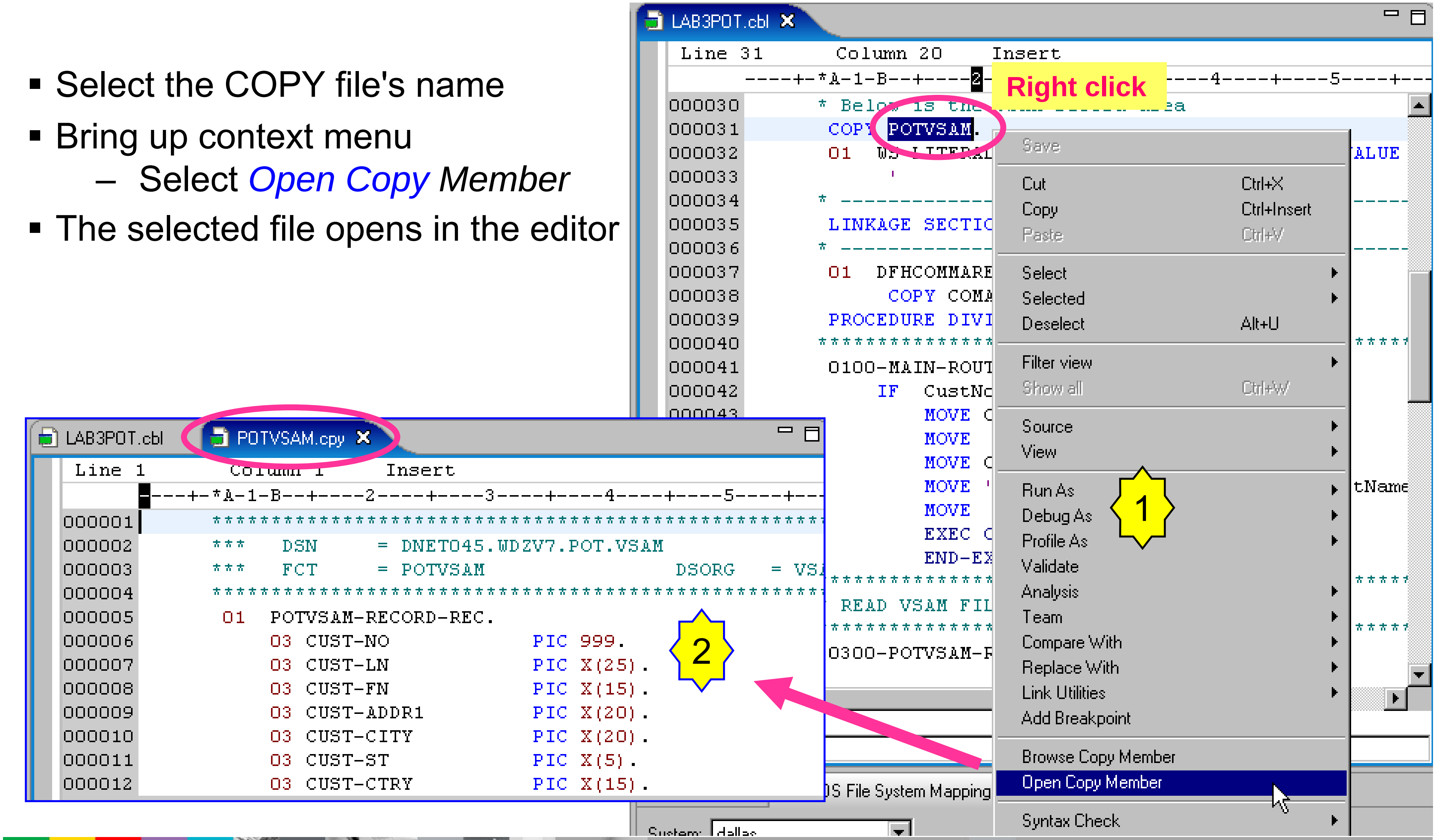
Right-click → **View → Open new view**

On the second view: Right-click → **View → Close**

Save the effort of scrolling large file for viewing/editing

RDz Smart Editor: Open Copybook

- Select the COPY file's name
- Bring up context menu
  - Select *Open Copy Member*
- The selected file opens in the editor



LAB3POT.cbl

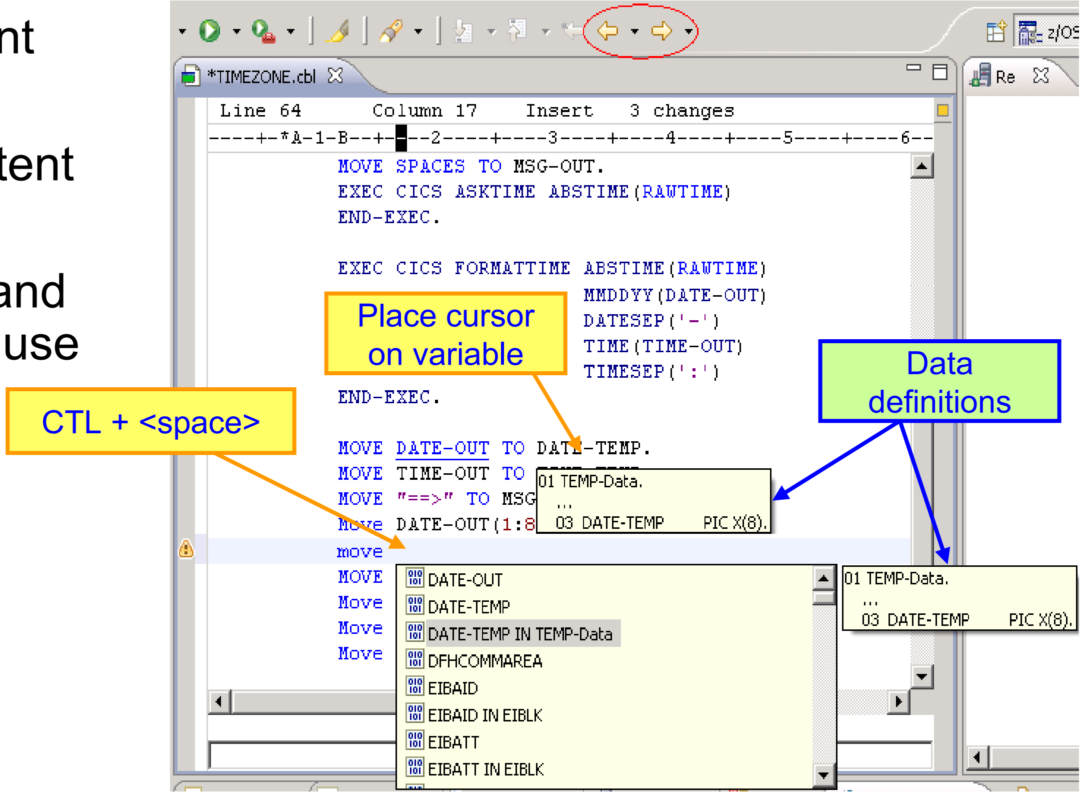
```
Line 31        Column 20      Insert
         ----+-*A-1-B--+----2----+----3----+----4----+----5----+---
000030         * Below is the
000031          COPY POTVSAM.
000032          01  WS-LITERAL                                    ALUE
000033                '
000034         * -------------                                    -----
000035          LINKAGE SECTIO
000036         * -------------                                    -----
000037          01  DFHCOMMARE
000038                   COPY COMA
000039          PROCEDURE DIVI
000040         **************                                     *****
000041          0100-MAIN-ROUT
000042              IF  CustNo
000043                      MOVE C
                            MOVE
                            MOVE C
                            MOVE '                                tName
                            MOVE
                            EXEC C
                            END-EX
         **************                                           *****
          READ VSAM FIL
         **************                                           *****
          0300-POTVSAM-R
```

LAB3POT.cbl | POTVSAM.cpy

```
Line 1         Column 1       Insert
         ----+-*A-1-B--+----2----+----3----+----4----+----5----+---
000001         ***************************************************
000002         ***    DSN      = DNET045.WDZV7.POT.VSAM
000003         ***    FCT      = POTVSAM                   DSORG    = VSA
000004         ***************************************************
000005          01  POTVSAM-RECORD-REC.
000006              03  CUST-NO               PIC 999.
000007              03  CUST-LN               PIC X(25).
000008              03  CUST-FN               PIC X(15).
000009              03  CUST-ADDR1            PIC X(20).
000010              03  CUST-CITY             PIC X(20).
000011              03  CUST-ST               PIC X(5).
000012              03  CUST-CTRY             PIC X(15).
```

RDz **Smart Editor**: Hover & Open Declaration

- Hover info for data items
- Hover info for data items in content assist
- Fully qualified suggestions in content assist
- Open Declaration mapped to F3 and hyperlink (hold down ctrl key and use mouse)
- Navigation Arrows supported



```
Line 64      Column 17     Insert    3 changes
----+-*A-1-B--+--2----+----3----+----4----+----5----+----6--
           MOVE SPACES TO MSG-OUT.
           EXEC CICS ASKTIME ABSTIME(RAWTIME)
           END-EXEC.

           EXEC CICS FORMATTIME ABSTIME(RAWTIME)
                     MMDDYY(DATE-OUT)
                     DATESEP('-')
                     TIME(TIME-OUT)
                     TIMESEP(':')
           END-EXEC.

           MOVE DATE-OUT TO DATE-TEMP.
           MOVE TIME-OUT TO
           MOVE "==>" TO MSG
           Move DATE-OUT(1:8
           move
           MOVE
           Move
           Move
           Move
```

```
01 TEMP-Data.
  ...
  03  DATE-TEMP       PIC X(8).
```

```
DATE-OUT
DATE-TEMP
DATE-TEMP IN TEMP-Data
DFHCOMMAREA
EIBAID
EIBAID IN EIBLK
EIBATT
EIBATT IN EIBLK
```

```
01 TEMP-Data.
  ...
  03  DATE-TEMP       PIC X(8).
```

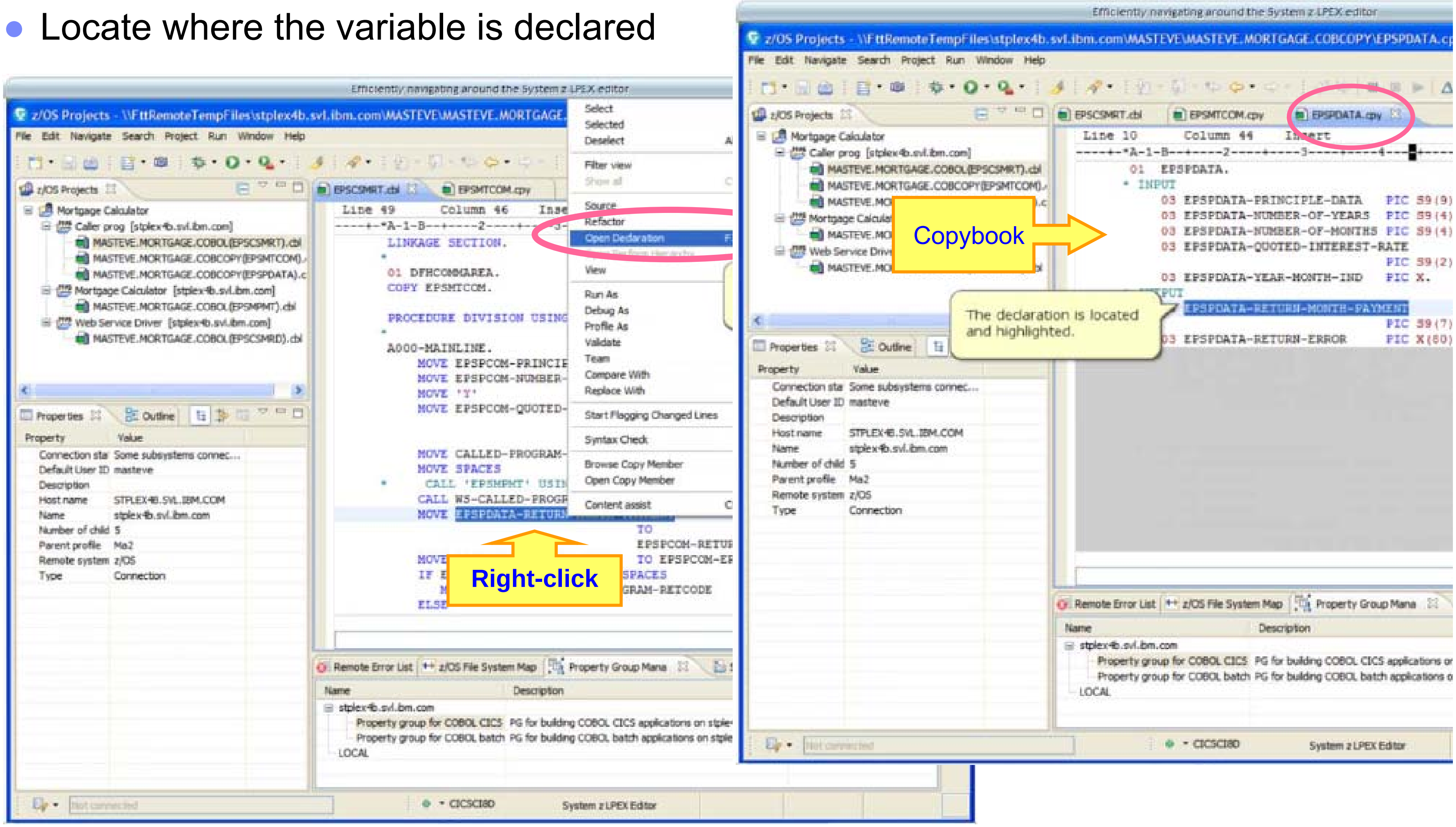
CTL + <space>

Place cursor on variable

Data definitions

RDz Smart Editor: Hover & Open Declaration

- Locate where the variable is declared



```
Line 49        Column 46      Inse
----+-*A-1-B--+----2----+----
     LINKAGE SECTION.
    *
     01 DFHCOMMAREA.
     COPY EPSMTCOM.

     PROCEDURE DIVISION USING
    *
     A000-MAINLINE.
         MOVE EPSPCOM-PRINCIE
         MOVE EPSPCOM-NUMBER-
         MOVE 'Y'
         MOVE EPSPCOM-QUOTED-

         MOVE CALLED-PROGRAM-
         MOVE SPACES
    *     CALL 'EPSMPMT' USIN
         CALL WS-CALLED-PROGR
         MOVE EPSPDATA-RETURN
                              TO
                              EPSPCOM-RETUR
         MOVE                 TO EPSPCOM-EF
         IF E                 SPACES
           M                  GRAM-RETCODE
         ELSE
```

```
Line 10      Column 44      Insert
----+-*A-1-B--+----2----+----3----+----4----+----
       01 EPSPDATA.
      * INPUT
          03 EPSPDATA-PRINCIPLE-DATA      PIC S9(9)
          03 EPSPDATA-NUMBER-OF-YEARS     PIC S9(4)
          03 EPSPDATA-NUMBER-OF-MONTHS    PIC S9(4)
          03 EPSPDATA-QUOTED-INTEREST-RATE
                                          PIC S9(2)
          03 EPSPDATA-YEAR-MONTH-IND      PIC X.
      * OUTPUT
          03 EPSPDATA-RETURN-MONTH-PAYMENT
                                          PIC S9(7)
          03 EPSPDATA-RETURN-ERROR        PIC X(80)
```

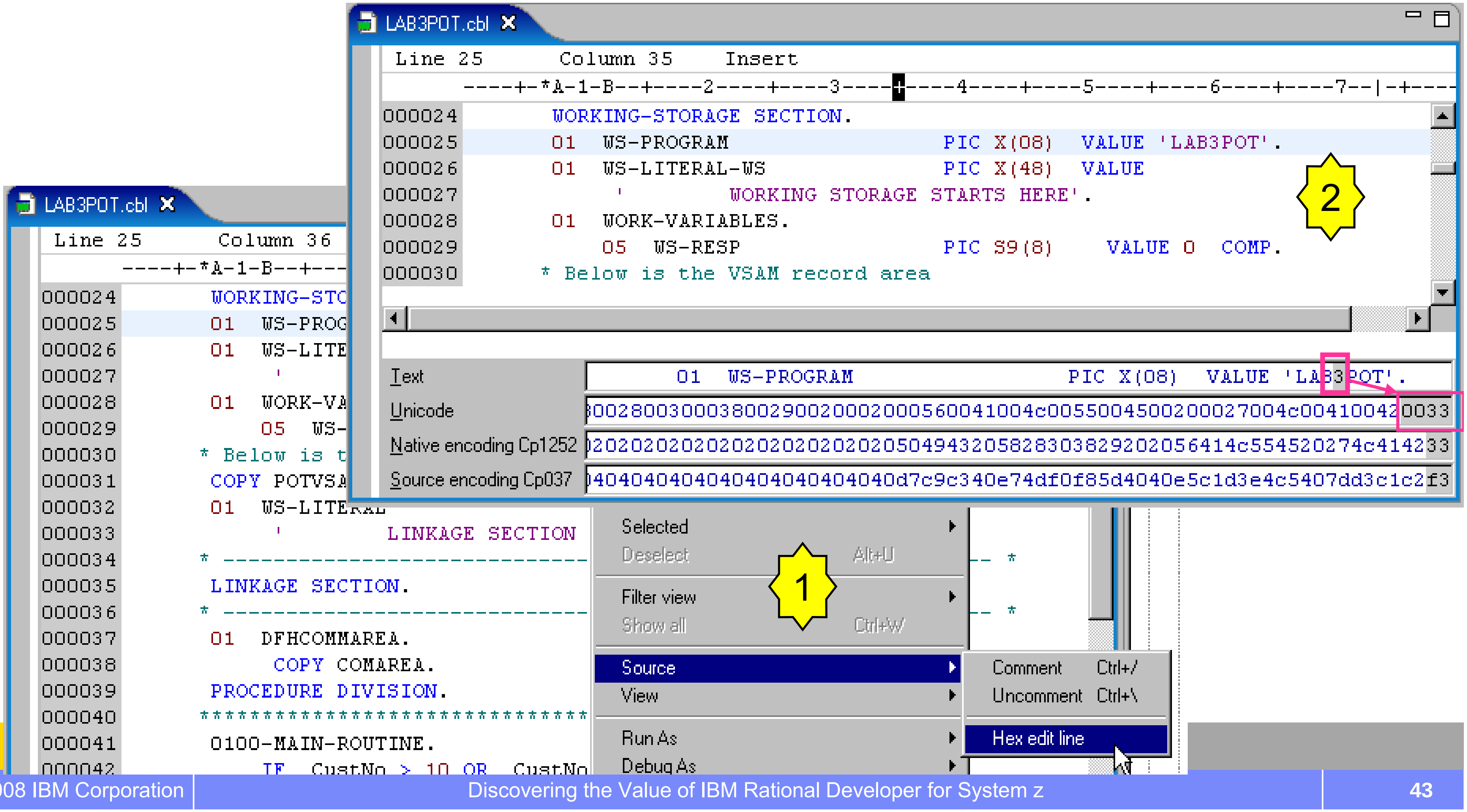
Property	Value
Connection sta	Some subsystems connec...
Default User ID	masteve
Description	
Host name	STPLEX4B.SVL.IBM.COM
Name	stplex4b.svl.ibm.com
Number of child	5
Parent profile	Ma2
Remote system	z/OS
Type	Connection

Name	Description
stplex4b.svl.ibm.com	
Property group for COBOL CICS	PG for building COBOL CICS applications on stplex
Property group for COBOL batch	PG for building COBOL batch applications on stplex
LOCAL	

Efficiently navigating around the System z LPEX editor
z/OS Projects - \\FttRemoteTempFiles\stplex4b.svl.ibm.com\MASTEVE\MASTEVE.MORTGAGE.COBCOPY\EPSPDATA.cpy
File Edit Navigate Search Project Run Window Help
z/OS Projects
Mortgage Calculator
Caller prog [stplex4b.svl.ibm.com]
MASTEVE.MORTGAGE.COBOL(EPSCSMRT).cbl
MASTEVE.MORTGAGE.COBCOPY(EPSMTCOM).c
MASTEVE.MORTGAGE.COBCOPY(EPSPDATA).c
Mortgage Calculator [stplex4b.svl.ibm.com]
MASTEVE.MORTGAGE.COBOL(EPSMPMT).cbl
Web Service Driver [stplex4b.svl.ibm.com]
MASTEVE.MORTGAGE.COBOL(EPSCSMRD).cbl
EPSCSMRT.cbl
EPSMTCOM.cpy
EPSPDATA.cpy
Properties
Outline
Select
Selected
Deselect
Filter view
Show all
Source
Refactor
Open Declaration
View
Run As
Debug As
Profile As
Validate
Team
Compare With
Replace With
Start Flagging Changed Lines
Syntax Check
Browse Copy Member
Open Copy Member
Content assist
Remote Error List
z/OS File System Map
Property Group Mana
Not connected
CICSCI8D
System z LPEX Editor
Right-click
Copybook
The declaration is located and highlighted.

RDz Smart Editor: Hex Edit Line

- Right-click → **Source** → **Hex edit line**
- Allows you to edit a line in Hex: Unicode, Native (ASCII), or Source (EBCDIC) encoding.



```
Line 25       Column 35     Insert
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----
000024        WORKING-STORAGE SECTION.
000025        01  WS-PROGRAM                     PIC X(08)  VALUE 'LAB3POT'.
000026        01  WS-LITERAL-WS                  PIC X(48)  VALUE
000027          '         WORKING STORAGE STARTS HERE'.
000028        01  WORK-VARIABLES.
000029            05  WS-RESP                    PIC S9(8)    VALUE 0  COMP.
000030       * Below is the VSAM record area
```

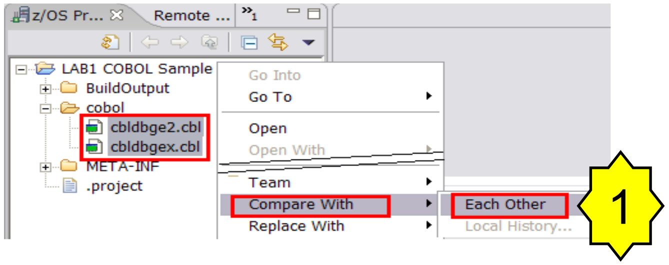
```
Text                     01  WS-PROGRAM                    PIC X(08)  VALUE 'LAB3POT'.
Unicode                 00280030003800290020002000560041004c00550045002000027004c004100420033
Native encoding Cp1252  2020202020202020202020202050494320582830382920205641 4c554520274c414233
Source encoding Cp037   404040404040404040404040d7c9c340e74df0f85d4040e5c1d3e4c5407dd3c1c2f3
```

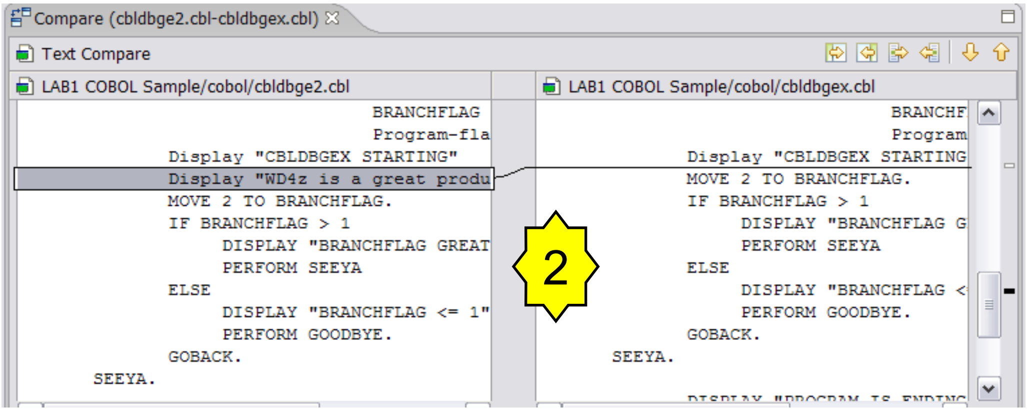
```
Line 25       Column 36
----+-*A-1-B--+---
000024        WORKING-STO
000025        01  WS-PROG
000026        01  WS-LITE
000027          '
000028        01  WORK-VA
000029            05  WS-
000030       * Below is t
000031        COPY POTVSA
000032        01  WS-LITERAL
000033          '         LINKAGE SECTION
000034       * ----------------------------
000035        LINKAGE SECTION.
000036       * ----------------------------
000037        01  DFHCOMMAREA.
000038            COPY COMAREA.
000039        PROCEDURE DIVISION.
000040       ******************************
000041        0100-MAIN-ROUTINE.
000042            IF  CustNo > 10 OR  CustNo
```

Useful Eclipse features available to z/OS assets..

(1) Like Compare

Able to merge the differences using the icons





LAB1 COBOL Sample/cobol/cbldbge2.cbl

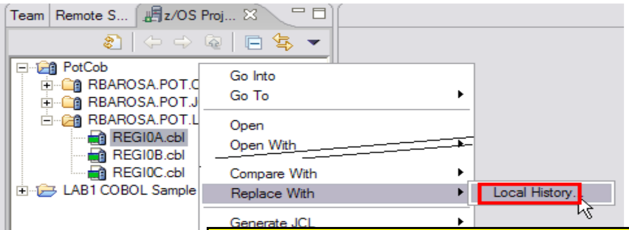
```
                           BRANCHFLAG
                           Program-fla
            Display "CBLDBGEX STARTING"
            Display "WD4z is a great produ
            MOVE 2 TO BRANCHFLAG.
            IF BRANCHFLAG > 1
                 DISPLAY "BRANCHFLAG GREAT
                 PERFORM SEEYA
            ELSE
                 DISPLAY "BRANCHFLAG <= 1"
                 PERFORM GOODBYE.
            GOBACK.
     SEEYA.
```

LAB1 COBOL Sample/cobol/cbldbgex.cbl

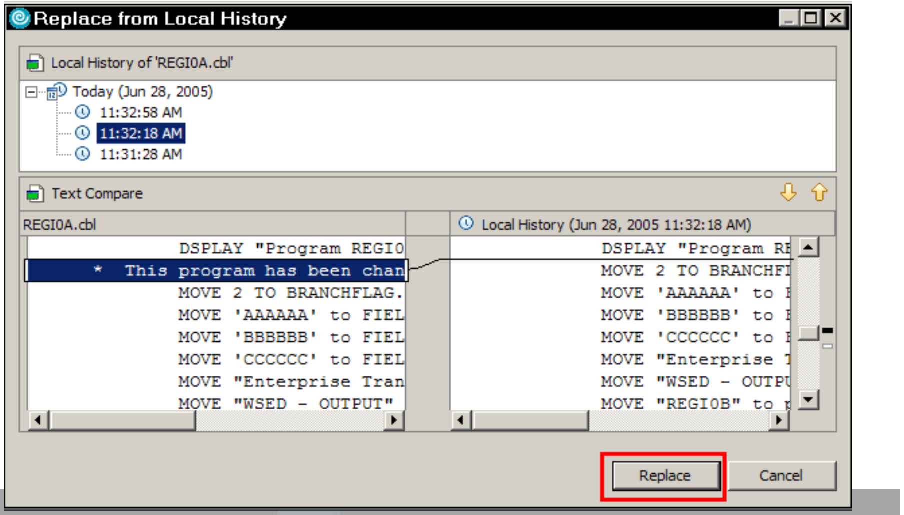
```
                           BRANCHF
                           Program
            Display "CBLDBGEX STARTING
            MOVE 2 TO BRANCHFLAG.
            IF BRANCHFLAG > 1
                 DISPLAY "BRANCHFLAG G
                 PERFORM SEEYA
            ELSE
                 DISPLAY "BRANCHFLAG <
                 PERFORM GOODBYE.
            GOBACK.
     SEEYA.
```

Benefit: **Improve productivity**

(2) Like Replace with Local History



Keep as many local versions as you want and **compare** with the z/OS current version..



Local History of 'REGI0A.cbl'

- Today (Jun 28, 2005)
  - 11:32:58 AM
  - 11:32:18 AM
  - 11:31:28 AM

REGI0A.cbl

```
              DSPLAY "Program REGIO
        *   This program has been chan
              MOVE 2 TO BRANCHFLAG.
              MOVE 'AAAAAA' to FIEL
              MOVE 'BBBBBB' to FIEL
              MOVE 'CCCCCC' to FIEL
              MOVE "Enterprise Tran
              MOVE "WSED - OUTPUT"
```

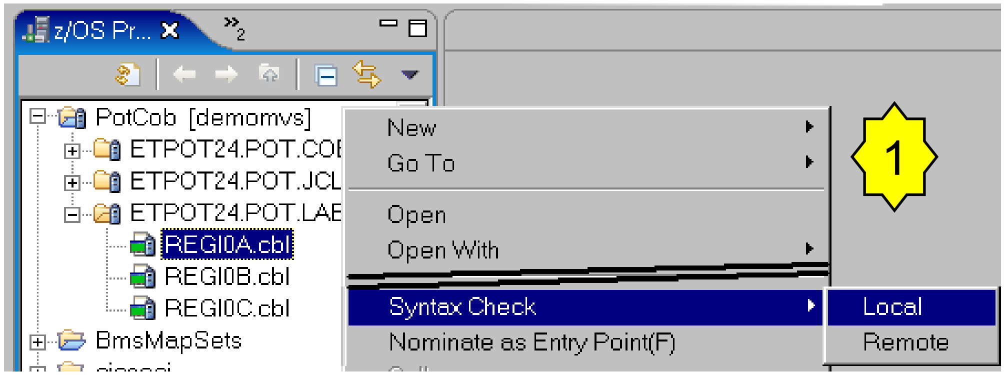
Local History (Jun 28, 2005 11:32:18 AM)

```
              DSPLAY "Program RE
              MOVE 2 TO BRANCHFI
              MOVE 'AAAAAA' to F
              MOVE 'BBBBBB' to F
              MOVE 'CCCCCC' to F
              MOVE "Enterprise T
              MOVE "WSED - OUTPU
              MOVE "REGI0B" to r
```

Benefit: **Improve productivity saving recover time…**

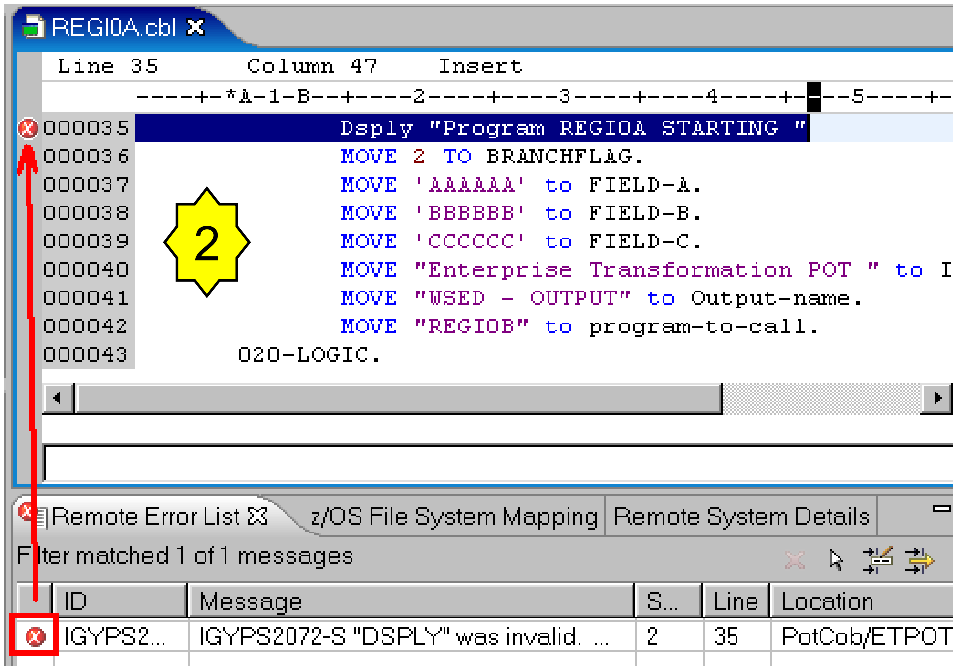
Use local or remote compiler to do syntax checking

(local syntax checking - CPU Saving)



Local Syntax checking..

Just double-click to find the error



```
 Line 35         Column 47      Insert
        ----+-*A-1-B--+----2----+----3----+----4----+----5----+-
000035                 Dsply "Program REGIOA STARTING "
000036                 MOVE 2 TO BRANCHFLAG.
000037                 MOVE 'AAAAAA' to FIELD-A.
000038                 MOVE 'BBBBBB' to FIELD-B.
000039                 MOVE 'CCCCCC' to FIELD-C.
000040                 MOVE "Enterprise Transformation POT " to I
000041                 MOVE "WSED - OUTPUT" to Output-name.
000042                 MOVE "REGIOB" to program-to-call.
000043         020-LOGIC.
```

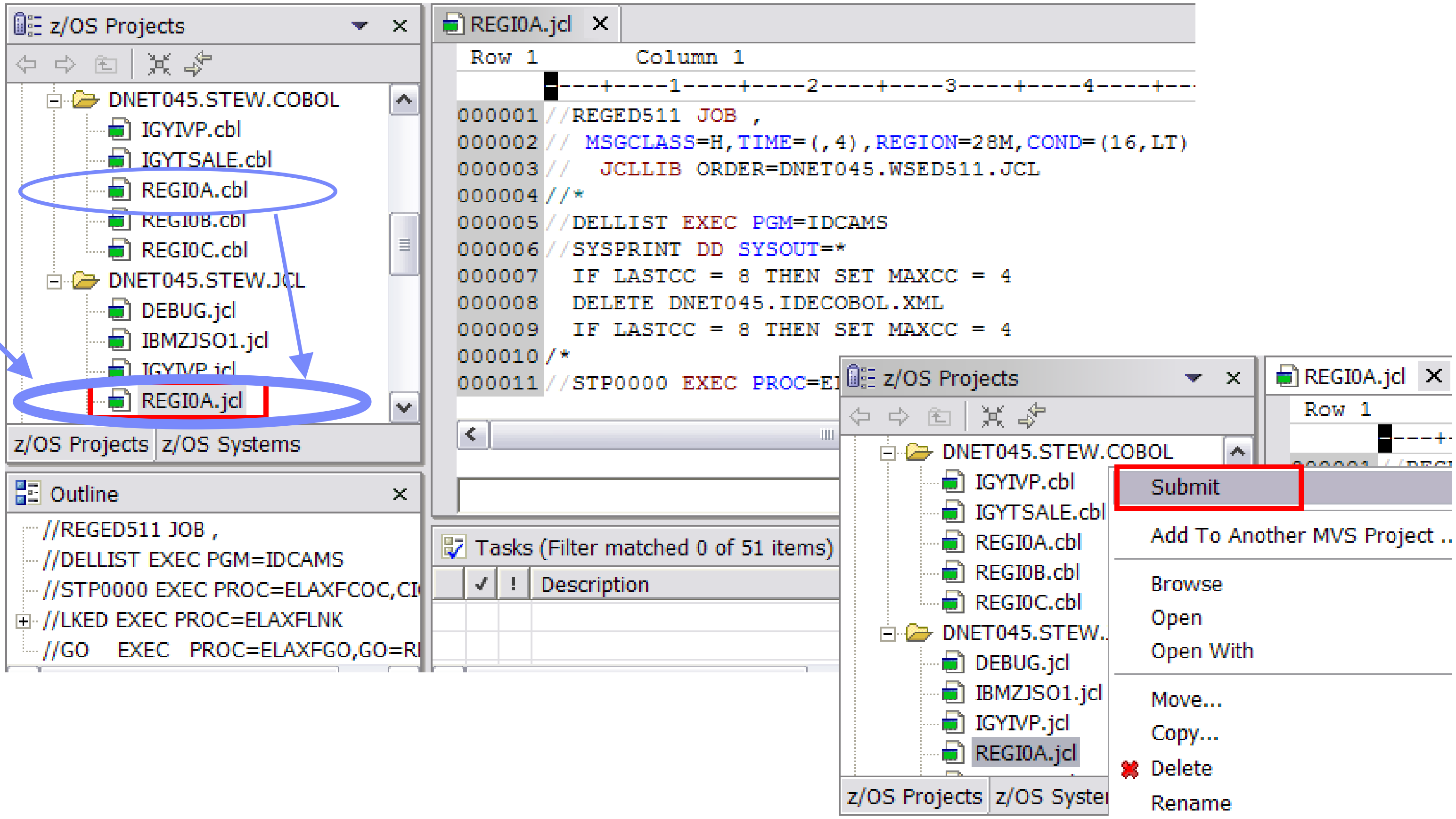
Filter matched 1 of 1 messages

	ID	Message	S...	Line	Location
⊗	IGYPS2...	IGYPS2072-S "DSPLY" was invalid. ...	2	35	PotCob/ETPOT

Benefit: Improve productivity, can save z/OS CPU.

JCL Generation and Submission to z/OS execution

JCL generated from COBOL/PL/I/C Code



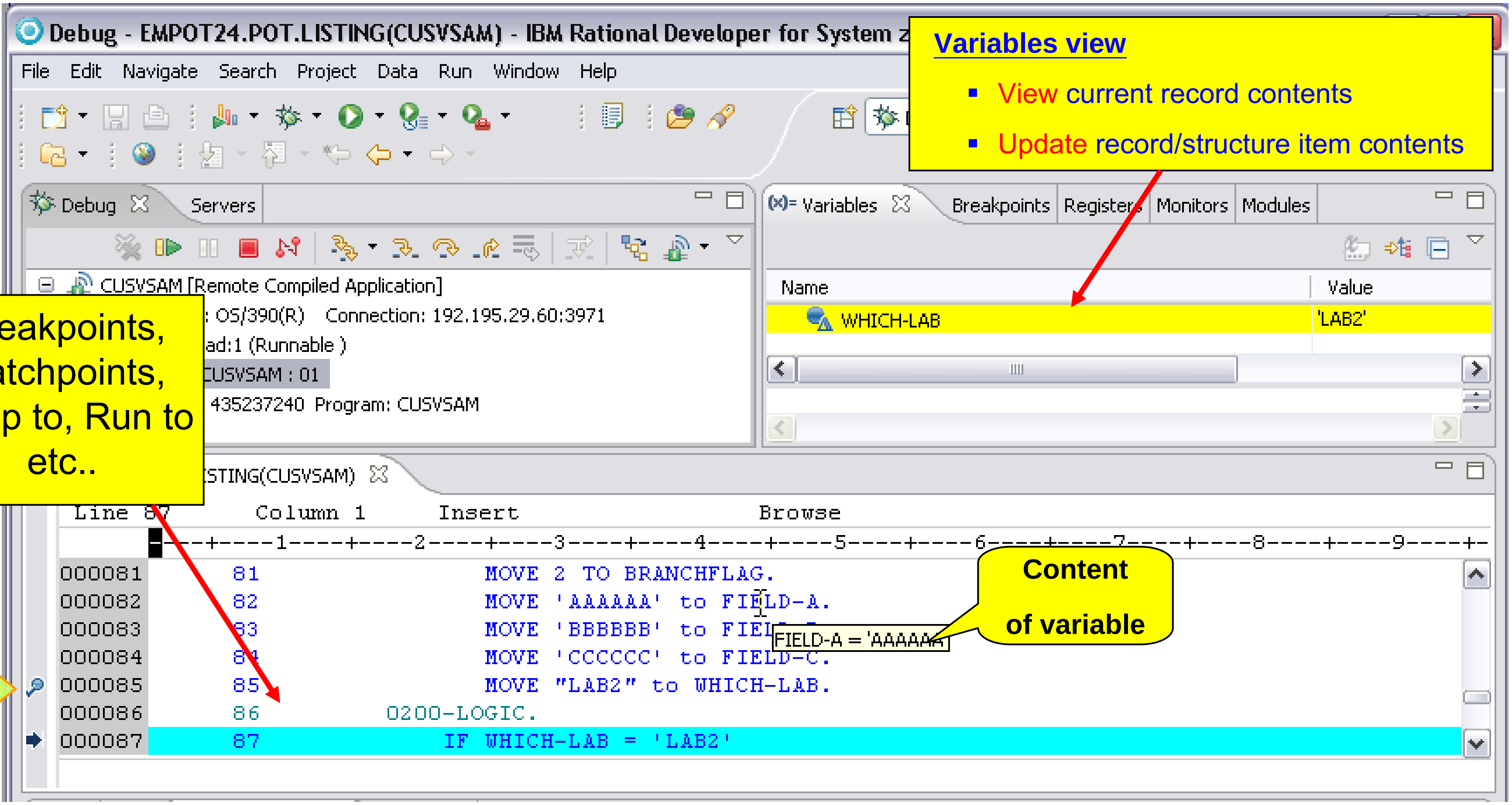
```
//REGED511 JOB ,
// MSGCLASS=H,TIME=(,4),REGION=28M,COND=(16,LT)
//  JCLLIB ORDER=DNET045.WSED511.JCL
//*
//DELLIST EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
 IF LASTCC = 8 THEN SET MAXCC = 4
 DELETE DNET045.IDECOBOL.XML
 IF LASTCC = 8 THEN SET MAXCC = 4
/*
//STP0000 EXEC PROC=EI
```

```
//REGED511 JOB ,
//DELLIST EXEC PGM=IDCAMS
//STP0000 EXEC PROC=ELAXFCOC,CI
//LKED EXEC PROC=ELAXFLNK
//GO     EXEC   PROC=ELAXFGO,GO=RI
```

Benefit: Developers focused on business logic and not on writing JCL, JCL smart editor, Outline…

Remote and Local debug

→ Debug z/OS applications from workstation as they execute live in the remote runtime


Debug - EMPOT24.POT.LISTING(CUSVSAM) - IBM Rational Developer for System z
File Edit Navigate Search Project Data Run Window Help
Debug
Servers
Variables
Breakpoints
Registers
Monitors
Modules
Name
Value

CUSVSAM [Remote Compiled Application]
: OS/390(R) Connection: 192.195.29.60:3971
ad:1 (Runnable)
CUSVSAM : 01
435237240 Program: CUSVSAM

Name	Value
WHICH-LAB	'LAB2'

STING(CUSVSAM)

```
 Line 87        Column 1      Insert                     Browse
      ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+-
000081       81                   MOVE 2 TO BRANCHFLAG.
000082       82                   MOVE 'AAAAAA' to FIELD-A.
000083       83                   MOVE 'BBBBBB' to FIELD-B.
000084       84                   MOVE 'CCCCCC' to FIELD-C.
000085       85                   MOVE "LAB2" to WHICH-LAB.
000086       86            0200-LOGIC.
000087       87                IF WHICH-LAB = 'LAB2'
```

FIELD-A = 'AAAAAA'

Variables view

- View current record contents
- Update record/structure item contents

Breakpoints, watchpoints, Jump to, Run to etc..

Content of variable

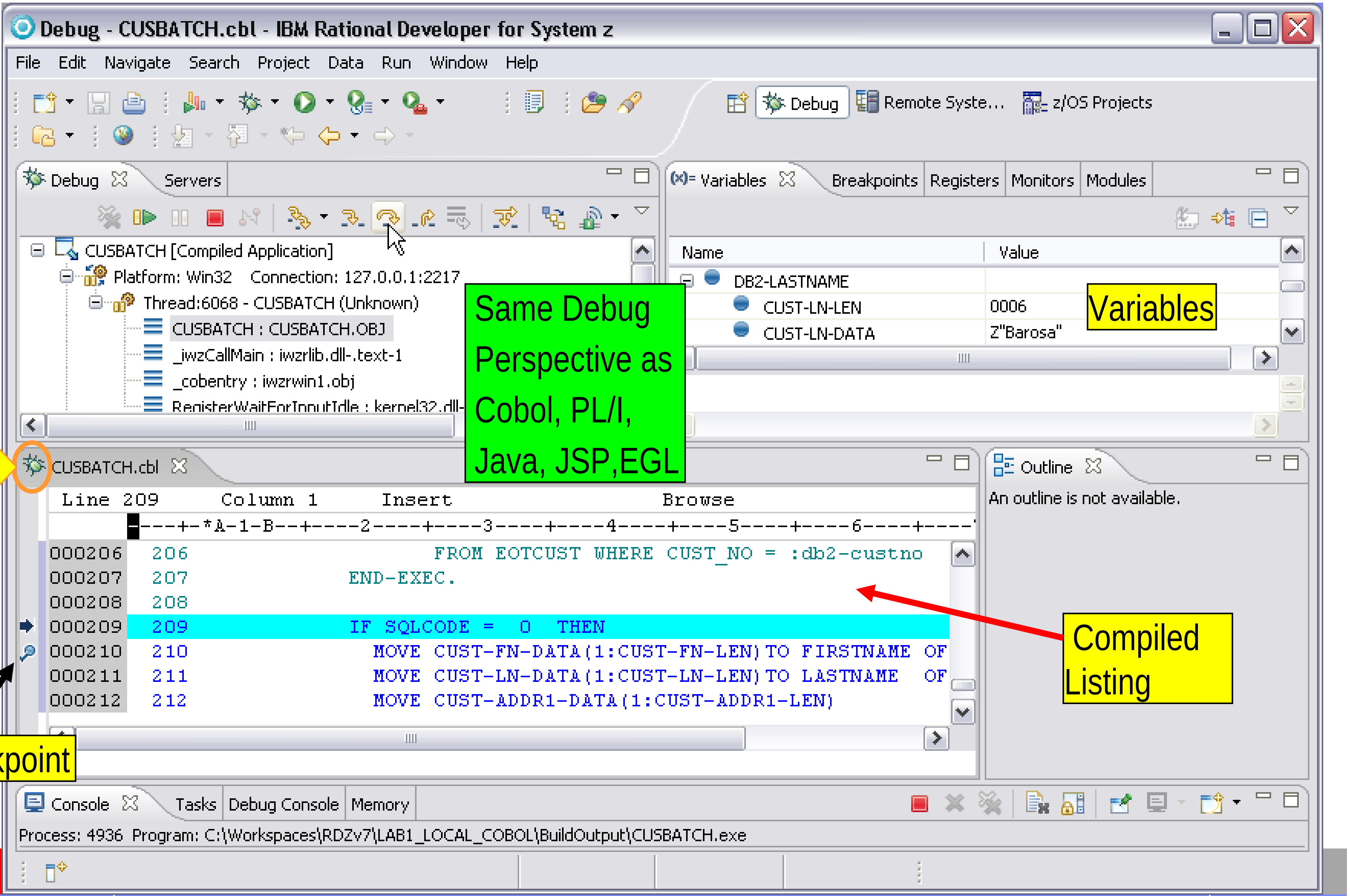
break point

Benefit: Same Debug Perspective used for COBOL, PL/I, C, C++, Java, JSP, etc..

→ END to END Debug

Needs z/OS Debug product installed.

Debug Perspective



Debug - CUSBATCH.cbl - IBM Rational Developer for System z

```
CUSBATCH [Compiled Application]
  Platform: Win32    Connection: 127.0.0.1:2217
    Thread:6068 - CUSBATCH (Unknown)
      CUSBATCH : CUSBATCH.OBJ
      _iwzCallMain : iwzrlib.dll-.text-1
      _cobentry : iwzrwin1.obj
      RegisterWaitForInputIdle : kernel32.dll-
```

Name	Value
DB2-LASTNAME	
CUST-LN-LEN	0006
CUST-LN-DATA	Z"Barosa"

An outline is not available.

```
 Line 209     Column 1     Insert                 Browse
 ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----
000206  206                 FROM EOTCUST WHERE CUST_NO = :db2-custno
000207  207             END-EXEC.
000208  208
000209  209             IF SQLCODE =   0  THEN
000210  210               MOVE CUST-FN-DATA(1:CUST-FN-LEN) TO FIRSTNAME  OF
000211  211               MOVE CUST-LN-DATA(1:CUST-LN-LEN) TO LASTNAME   OF
000212  212               MOVE CUST-ADDR1-DATA(1:CUST-ADDR1-LEN)
```

Process: 4936 Program: C:\Workspaces\RDZv7\LAB1_LOCAL_COBOL\BuildOutput\CUSBATCH.exe

Same Debug Perspective as Cobol, PL/I, Java, JSP,EGL

Variables

Debug icon

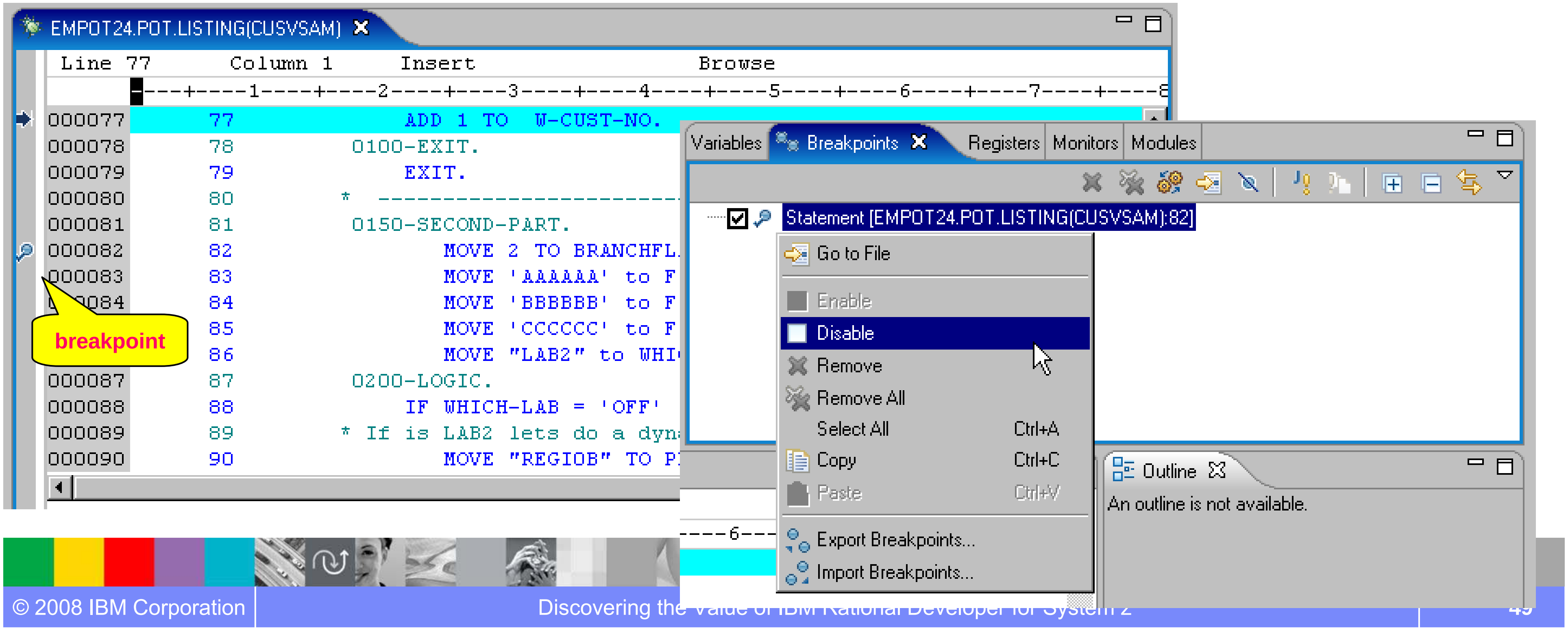
Compiled Listing

Breakpoint

Breakpoints

- Temporary **markers** you place in your program that tell the debugger to **suspend executing** your program at a given point.

- Setting a breakpoint in a statement causes the execution to stop
  - Source can then be stepped through and **variables inspected**
  - Breakpoints are set until they are explicitly removed
  - Breakpoints can be Removed, temporarily Disabled, Exported, Imported, etc.



```
 Line 77       Column 1       Insert                    Browse
          ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
000077      77              ADD 1 TO  W-CUST-NO.
000078      78          0100-EXIT.
000079      79              EXIT.
000080      80         *   -----------------------
000081      81          0150-SECOND-PART.
000082      82                 MOVE 2 TO BRANCHFL.
000083      83                 MOVE 'AAAAAA' to F
000084      84                 MOVE 'BBBBBB' to F
            85                 MOVE 'CCCCCC' to F
            86                 MOVE "LAB2" to WHI
000087      87          0200-LOGIC.
000088      88              IF WHICH-LAB = 'OFF'
000089      89         * If is LAB2 lets do a dyn
000090      90                 MOVE "REGIOB" TO P
```

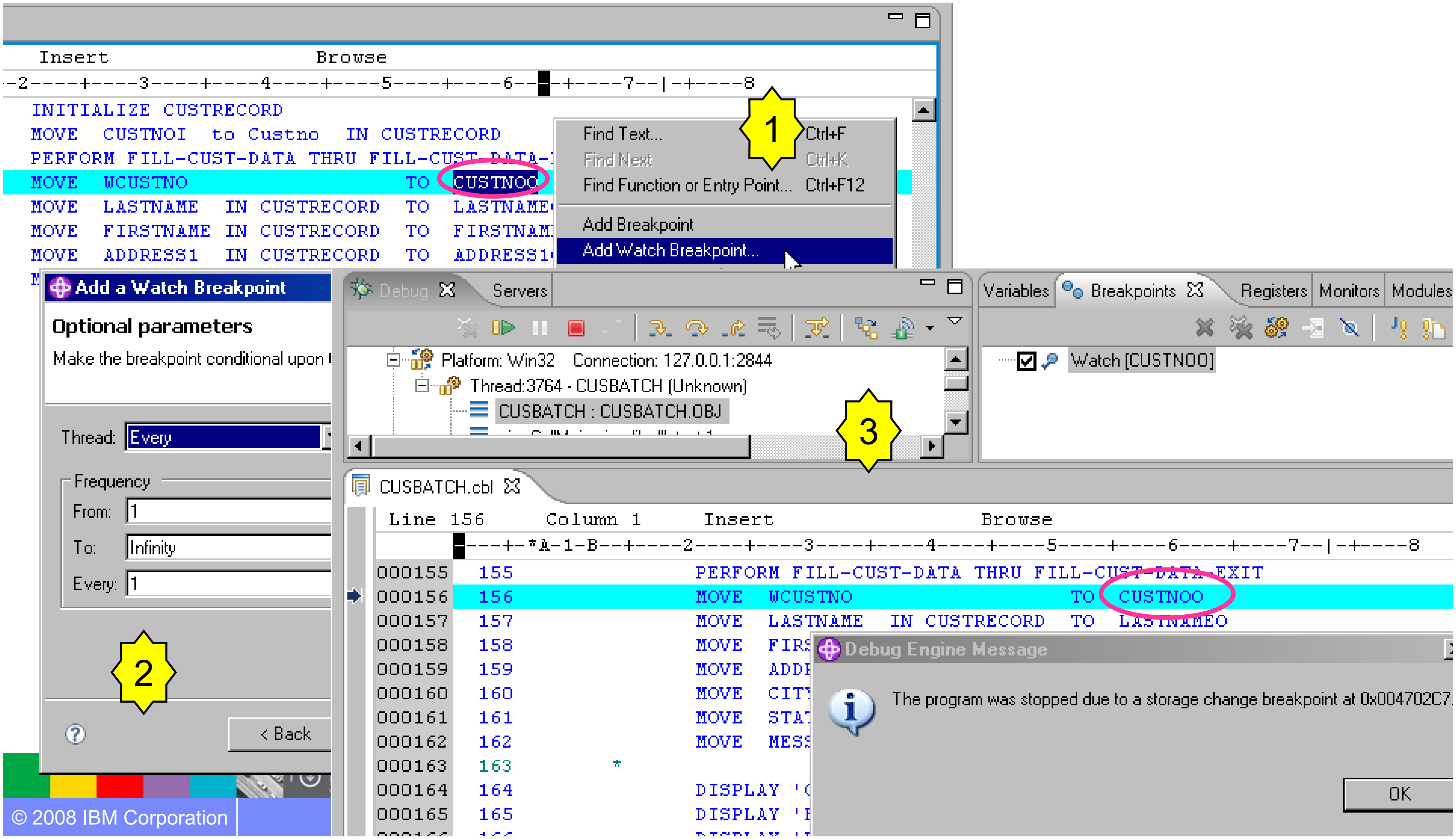
☑ Statement [EMPOT24.POT.LISTING(CUSVSAM):82]

An outline is not available.

Watch Breakpoints

→Breakpoint that suspends execution whenever a specified field is **accessed or modified**

→Other options also, Entry, Load, etc.



```
 Insert                          Browse
-2----+----3----+----4----+----5----+----6----+----7--|-+----8
 INITIALIZE CUSTRECORD
 MOVE  CUSTNOI  to Custno  IN CUSTRECORD
 PERFORM FILL-CUST-DATA THRU FILL-CUST-DATA-
 MOVE  WCUSTNO                   TO  CUSTNOO
 MOVE  LASTNAME  IN CUSTRECORD   TO  LASTNAME
 MOVE  FIRSTNAME IN CUSTRECORD   TO  FIRSTNAM
 MOVE  ADDRESS1  IN CUSTRECORD   TO  ADDRESS1
```

Add a Watch Breakpoint

Optional parameters

Make the breakpoint conditional upon

Thread: Every

Frequency

From: 1

To: Infinity

Every: 1

Platform: Win32 Connection: 127.0.0.1:2844

Thread:3764 - CUSBATCH (Unknown)

CUSBATCH : CUSBATCH.OBJ

☑ Watch [CUSTNOO]

CUSBATCH.cbl

```
 Line 156     Column 1      Insert                    Browse
        ---+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----8
000155  155                 PERFORM FILL-CUST-DATA THRU FILL-CUST-DATA-EXIT
000156  156                 MOVE  WCUSTNO                  TO  CUSTNOO
000157  157                 MOVE  LASTNAME  IN CUSTRECORD  TO  LASTNAMEO
000158  158                 MOVE  FIRS
000159  159                 MOVE  ADDR
000160  160                 MOVE  CITY
000161  161                 MOVE  STAT
000162  162                 MOVE  MESS
000163  163        *
000164  164                 DISPLAY 'C
000165  165                 DISPLAY 'E
```

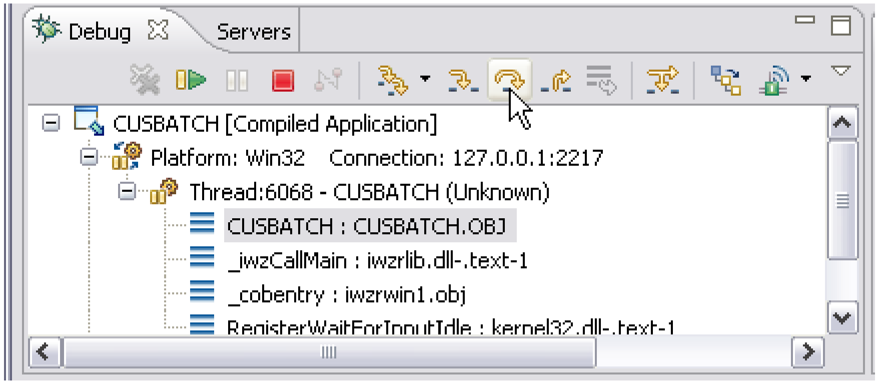
Debug Engine Message

The program was stopped due to a storage change breakpoint at 0x004702C7.

Debug View: Stepping Through Code

Debug view

- Once execution has been suspended at a breakpoint, the source for the current stack frame can be executed line-by-line using the debugger's navigation buttons



CUSBATCH [Compiled Application]
Platform: Win32 Connection: 127.0.0.1:2217
Thread:6068 - CUSBATCH (Unknown)
CUSBATCH : CUSBATCH.OBJ
_iwzCallMain : iwzrlib.dll-.text-1
_cobentry : iwzrwin1.obj
RegisterWaitForInputIdle : kernel32.dll-.text-1

"Step filters" - to filter out types that you do not wish to see and or step through while debugging.
(use for local debugging when assembler code is showing)

"**Run**" to next breakpoint

"Terminate" execution

"Animated Step Into" - the debugger issues a step into action repeatedly.
You can control the delay between each step by selecting the *Animated Step Into icon down-arrow*.

"**Step into**" next statement
(use for called programs)

"**Step over**" next statement

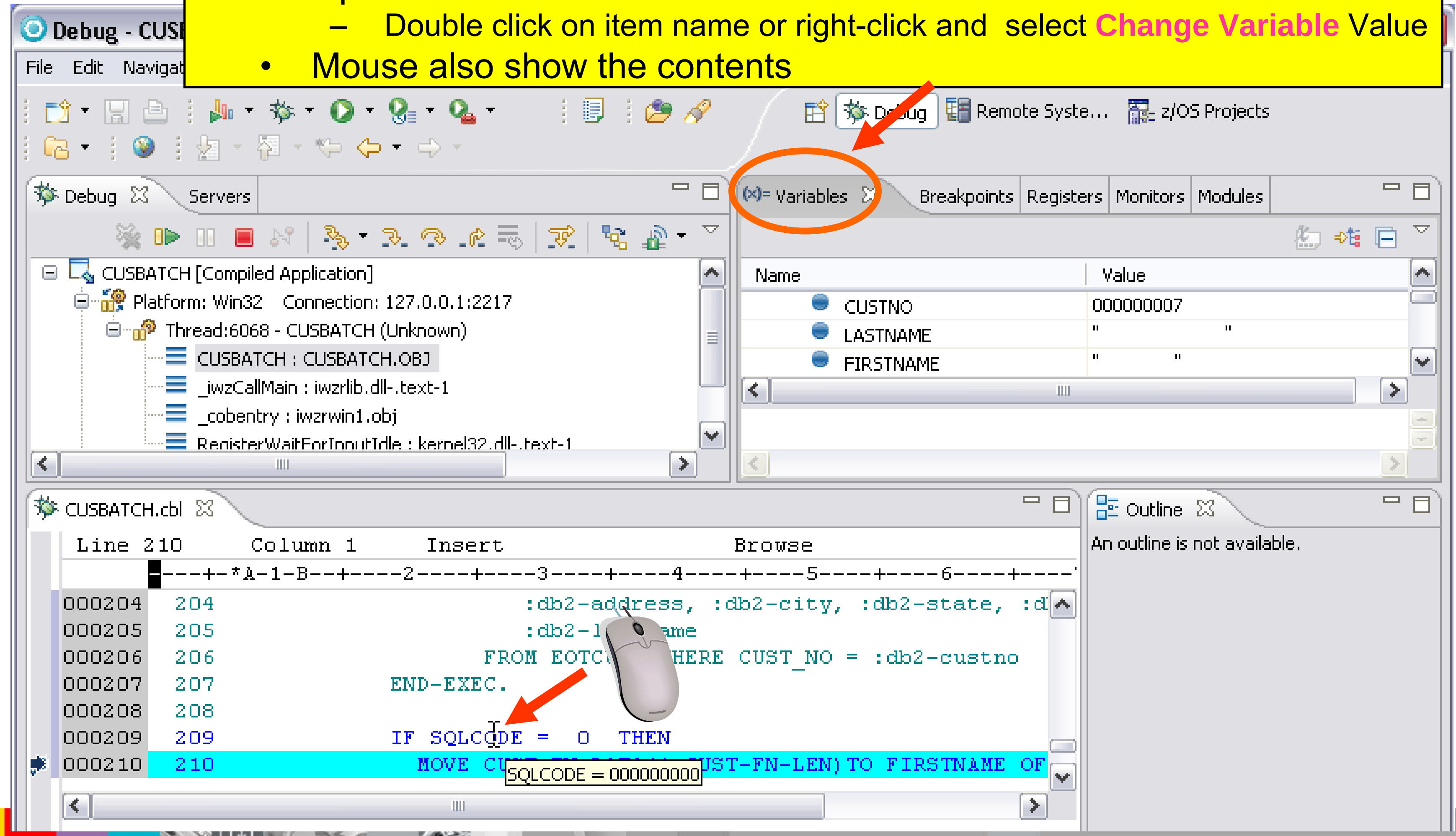
- Run contained statements but don't stop on them

"Run to return" to next higher level statement in program structure (return from a called program)

Variables View

Variables view

- View **current record** contents
- Update record/structure item contents
  - Double click on item name or right-click and select **Change Variable** Value
- Mouse also show the contents



CUSBATCH [Compiled Application]
Platform: Win32 Connection: 127.0.0.1:2217
Thread:6068 - CUSBATCH (Unknown)
CUSBATCH : CUSBATCH.OBJ
_iwzCallMain : iwzrlib.dll-.text-1
_cobentry : iwzrwin1.obj
RegisterWaitForInputIdle : kernel32.dll-.text-1

Name	Value
CUSTNO	000000007
LASTNAME	" "
FIRSTNAME	" "

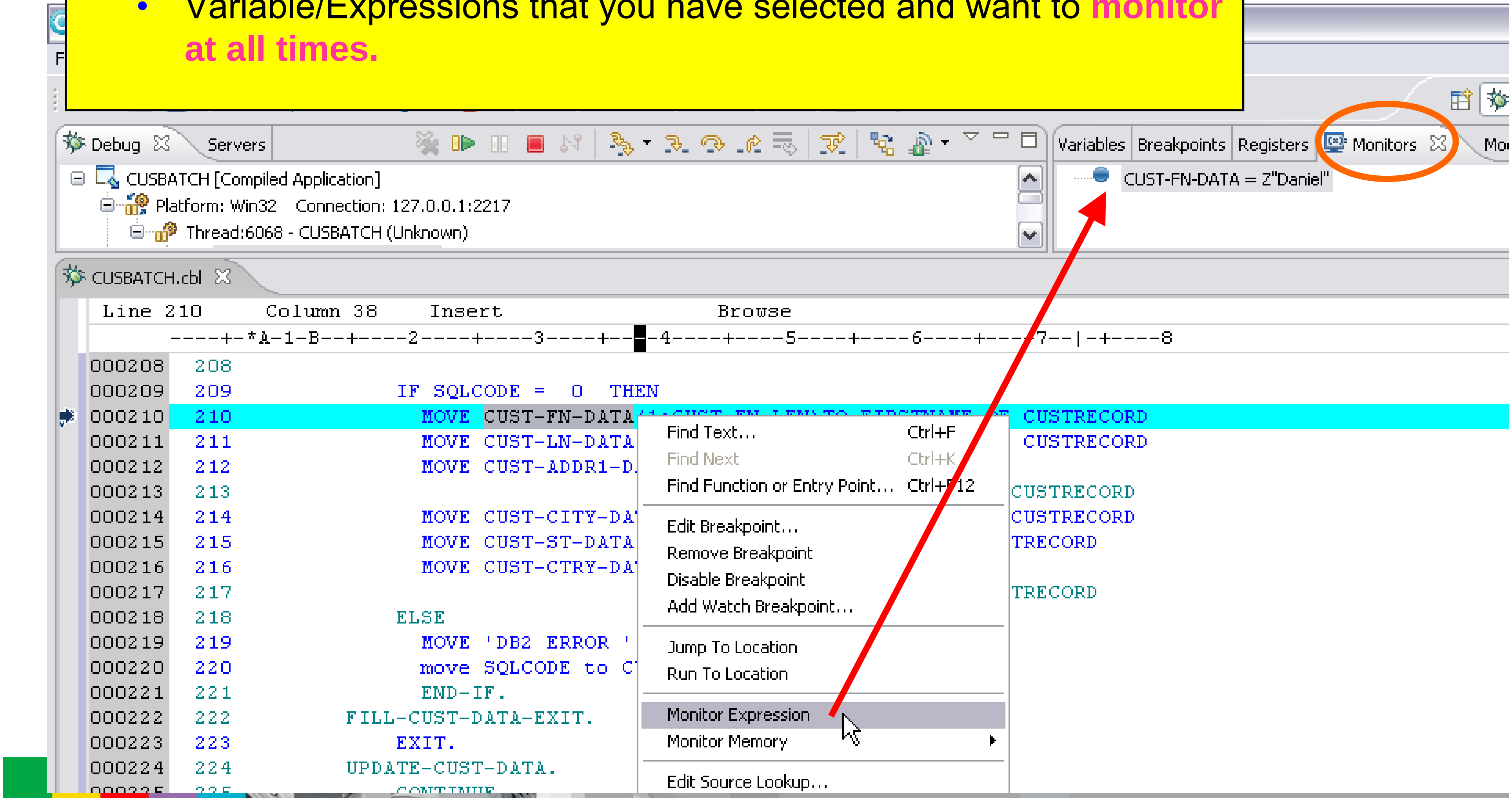
```
Line 210      Column 1      Insert                        Browse
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----
000204  204                          :db2-address, :db2-city, :db2-state, :d
000205  205                          :db2-l        ame
000206  206                       FROM EOTC      HERE CUST_NO = :db2-custno
000207  207                END-EXEC.
000208  208
000209  209                IF SQLCODE =  0  THEN
000210  210                  MOVE CU                  UST-FN-LEN) TO FIRSTNAME OF
```

SQLCODE = 000000000

An outline is not available.

Monitor Variable contents

- Monitors view
  - View the contents of a Variable or Expression
  - Variable/Expressions that you have selected and want to **monitor at all times.**



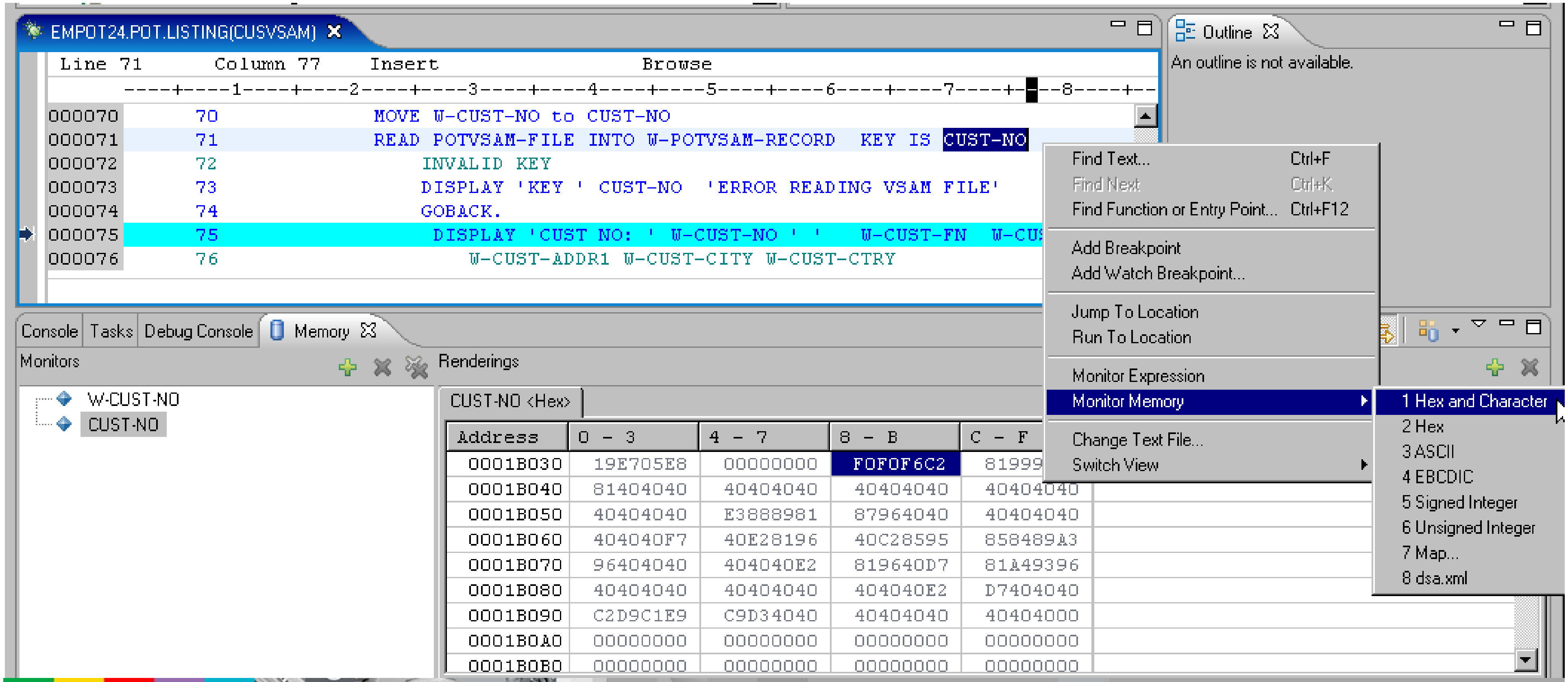
CUSBATCH [Compiled Application]
Platform: Win32 Connection: 127.0.0.1:2217
Thread:6068 - CUSBATCH (Unknown)

CUST-FN-DATA = Z"Daniel"

```
 Line 210      Column 38    Insert                 Browse
        ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----8
000208   208
000209   209              IF SQLCODE =  0  THEN
000210   210                 MOVE CUST-FN-DATA                          CUSTRECORD
000211   211                 MOVE CUST-LN-DATA                          CUSTRECORD
000212   212                 MOVE CUST-ADDR1-D
000213   213                                                           CUSTRECORD
000214   214                 MOVE CUST-CITY-DA                         CUSTRECORD
000215   215                 MOVE CUST-ST-DATA                         TRECORD
000216   216                 MOVE CUST-CTRY-DA
000217   217                                                           TRECORD
000218   218              ELSE
000219   219                 MOVE 'DB2 ERROR '
000220   220                 move SQLCODE to C
000221   221                 END-IF.
000222   222           FILL-CUST-DATA-EXIT.
000223   223              EXIT.
000224   224           UPDATE-CUST-DATA.
```

Monitor Memory

- **Monitor Memory**
  - The memory content can be shown (or “rendered”) in several different formats, such as raw HEX, EDBCDIC or ASCII, or even as a tree structure using customized XML mappings.



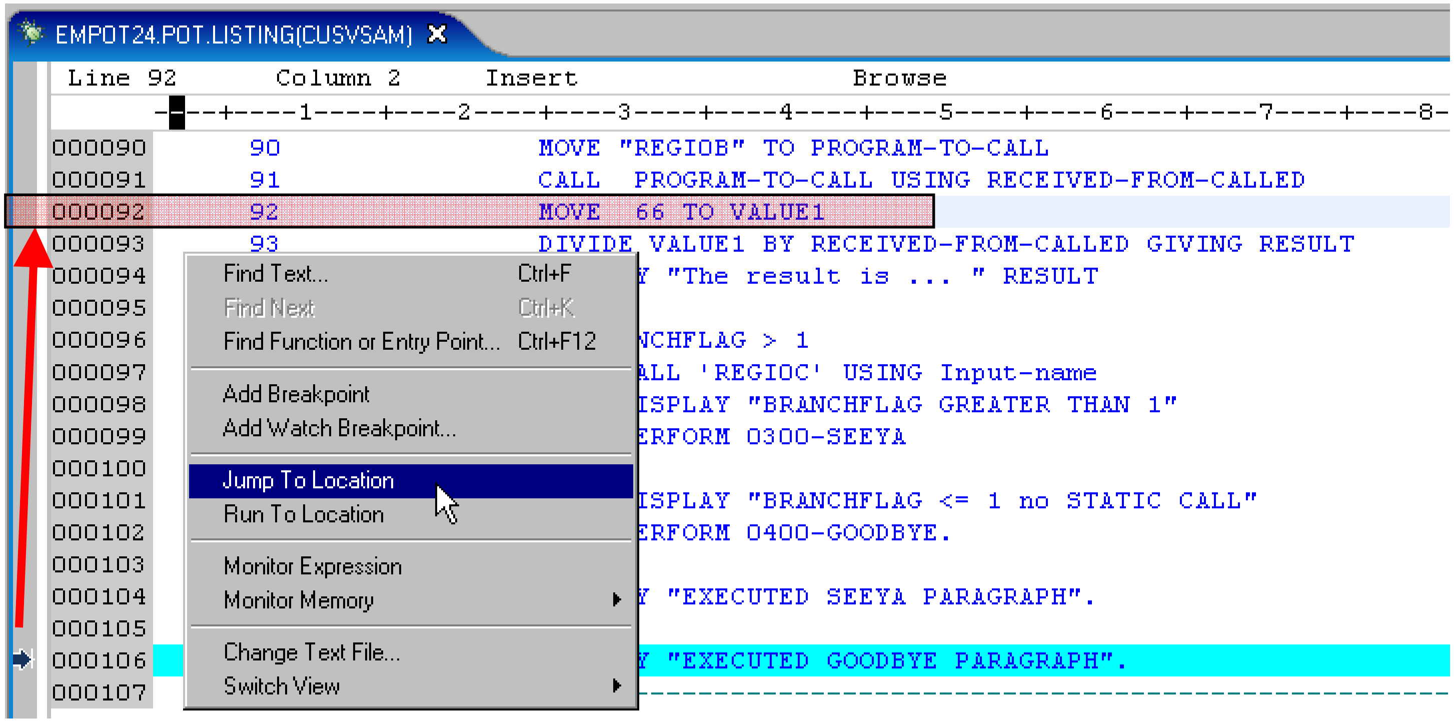
```
 Line 71          Column 77        Insert                           Browse
         ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+--
000070       70             MOVE W-CUST-NO to CUST-NO
000071       71             READ POTVSAM-FILE INTO W-POTVSAM-RECORD  KEY IS CUST-NO
000072       72                 INVALID KEY
000073       73                 DISPLAY 'KEY ' CUST-NO  'ERROR READING VSAM FILE'
000074       74                 GOBACK.
000075       75                  DISPLAY 'CUST NO: ' W-CUST-NO ' '   W-CUST-FN  W-CUS
000076       76                     W-CUST-ADDR1 W-CUST-CITY W-CUST-CTRY
```

Address	0 - 3	4 - 7	8 - B	C - F
0001B030	19E705E8	00000000	F0F0F6C2	81999
0001B040	81404040	40404040	40404040	40404040
0001B050	40404040	E3888981	87964040	40404040
0001B060	404040F7	40E28196	40C28595	858489A3
0001B070	96404040	404040E2	819640D7	81A49396
0001B080	40404040	40404040	404040E2	D7404040
0001B090	C2D9C1E9	C9D34040	40404040	40404000
0001B0A0	00000000	00000000	00000000	00000000
0001B0B0	00000000	00000000	00000000	00000000

Jump to / Run To

- **Jump to Location** - skip over sections of code to **avoid executing** certain statements or **move to a position** where certain statements can be executed again.
  → Useful to avoid called programs or I/OS to a not available dataset.

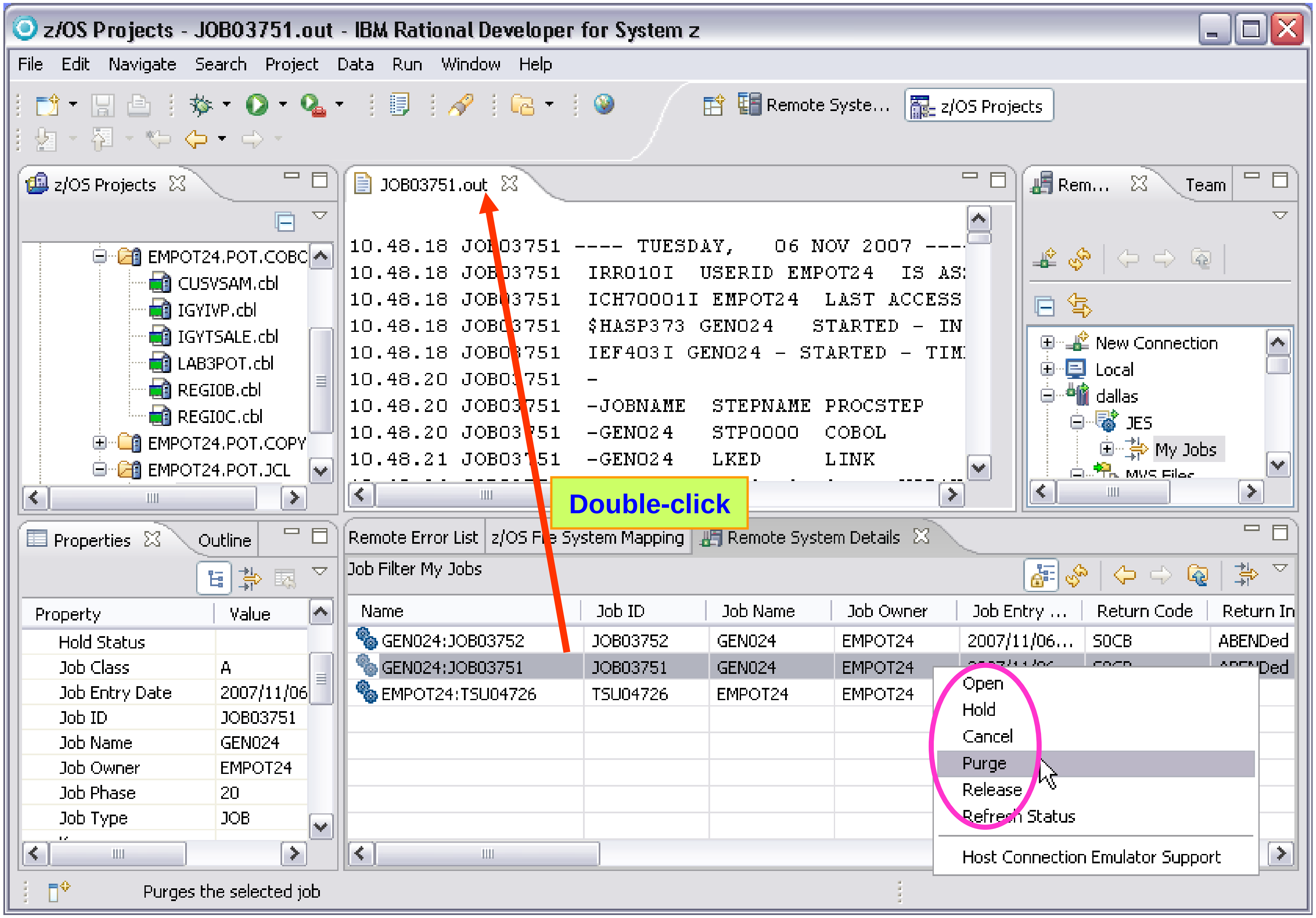
- **Run to Location** - **executes all statements between** the current location and the run-to location.



EMPOT24.POT.LISTING(CUSVSAM)

```
 Line 92        Column 2       Insert                   Browse
        -----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8-
000090      90                     MOVE "REGIOB" TO PROGRAM-TO-CALL
000091      91                     CALL  PROGRAM-TO-CALL USING RECEIVED-FROM-CALLED
000092      92                     MOVE  66 TO VALUE1
000093      93                     DIVIDE VALUE1 BY RECEIVED-FROM-CALLED GIVING RESULT
000094                                  Y "The result is ... " RESULT
000095
000096                                  NCHFLAG > 1
000097                                  ALL 'REGIOC' USING Input-name
000098                                  ISPLAY "BRANCHFLAG GREATER THAN 1"
000099                                  ERFORM 0300-SEEYA
000100
000101                                  ISPLAY "BRANCHFLAG <= 1 no STATIC CALL"
000102                                  ERFORM 0400-GOODBYE.
000103
000104                                  Y "EXECUTED SEEYA PARAGRAPH".
000105
000106                                  Y "EXECUTED GOODBYE PARAGRAPH".
000107                                  ------------------------------------------------
```

Monitoring Job Output



z/OS Projects - JOB03751.out - IBM Rational Developer for System z

```
10.48.18 JOB03751 ---- TUESDAY,   06 NOV 2007 ---
10.48.18 JOB03751  IRR010I  USERID EMPOT24   IS AS
10.48.18 JOB03751  ICH70001I EMPOT24  LAST ACCESS
10.48.18 JOB03751  $HASP373 GEN024   STARTED - IN
10.48.18 JOB03751  IEF403I GEN024 - STARTED - TIM
10.48.20 JOB03751  -
10.48.20 JOB03751  -JOBNAME  STEPNAME PROCSTEP
10.48.20 JOB03751  -GEN024   STP0000  COBOL
10.48.21 JOB03751  -GEN024   LKED     LINK
```

Property	Value
Hold Status	
Job Class	A
Job Entry Date	2007/11/06
Job ID	JOB03751
Job Name	GEN024
Job Owner	EMPOT24
Job Phase	20
Job Type	JOB

Name	Job ID	Job Name	Job Owner	Job Entry ...	Return Code	Return In
GEN024:JOB03752	JOB03752	GEN024	EMPOT24	2007/11/06...	S0CB	ABENDed
GEN024:JOB03751	JOB03751	GEN024	EMPOT24	2007/11/06...	S0CB	ABENDed
EMPOT24:TSU04726	TSU04726	EMPOT24	EMPOT24			

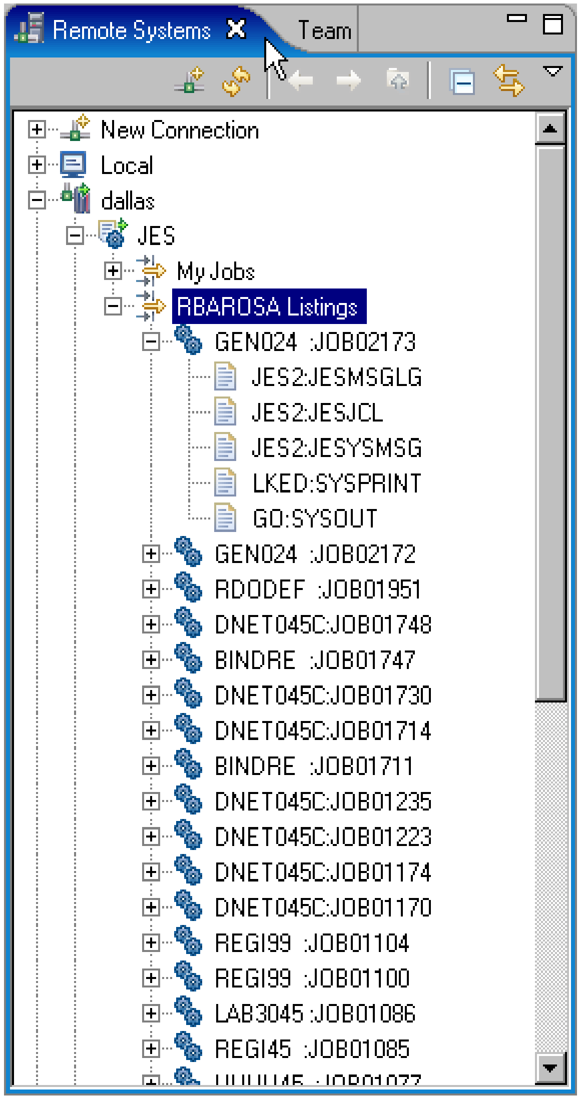
Purges the selected job

Benefit: → Developers do not have to continually switch between systems to use SDSF. Do not need TSO and SDSF.   → Local printing.

Job Monitor: Overview

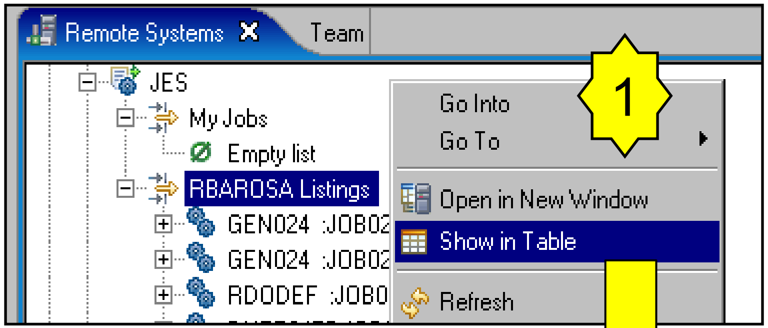
This feature allows the user to

- Connect/Disconnect to JES Subsystem.
- Monitor the job status.
- Work with job filters.
- View the entire job output.
- View the individual step output.
- Purge jobs.
- Hold jobs.
- Release jobs.
- Cancel or Kill jobs (if applicable).
- Refresh the job filters for latest job information.



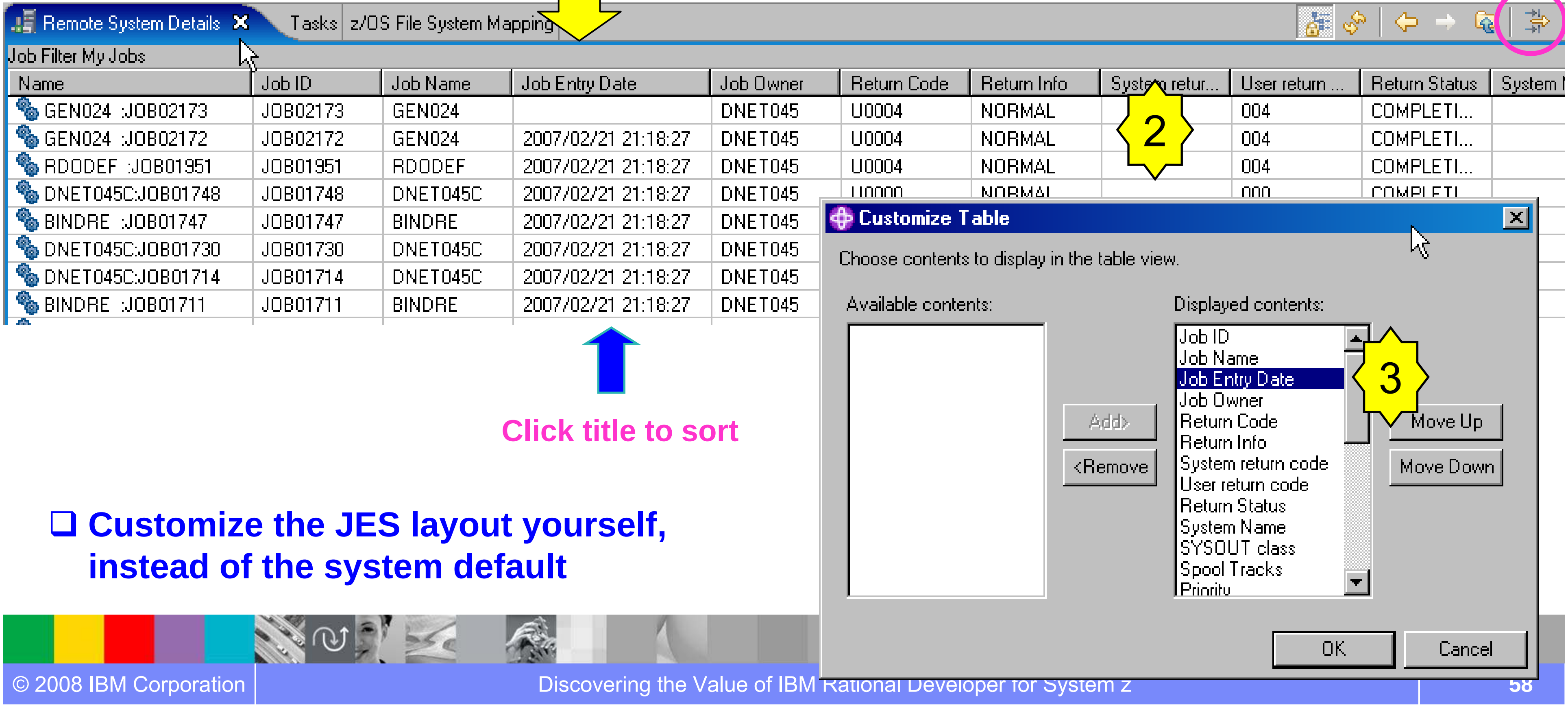
```
New Connection
Local
dallas
  JES
    My Jobs
    RBAROSA Listings
      GEN024  :JOB02173
        JES2:JESMSGLG
        JES2:JESJCL
        JES2:JESYSMSG
        LKED:SYSPRINT
        GO:SYSOUT
      GEN024  :JOB02172
      RDODEF  :JOB01951
      DNET045C:JOB01748
      BINDRE  :JOB01747
      DNET045C:JOB01730
      DNET045C:JOB01714
      BINDRE  :JOB01711
      DNET045C:JOB01235
      DNET045C:JOB01223
      DNET045C:JOB01174
      DNET045C:JOB01170
      REGI99  :JOB01104
      REGI99  :JOB01100
      LAB3045 :JOB01086
      REGI45  :JOB01085
      HUUU45  :JOB01077
```

Get the Output - JES Job Monitor customizations



- Sort by Column
- Customize Remote Systems Detail view

Select and arrange columns to be displayed



Job Filter My Jobs

Name	Job ID	Job Name	Job Entry Date	Job Owner	Return Code	Return Info	System retur...	User return ...	Return Status	System I
GEN024 :JOB02173	JOB02173	GEN024		DNET045	U0004	NORMAL		004	COMPLETI...	
GEN024 :JOB02172	JOB02172	GEN024	2007/02/21 21:18:27	DNET045	U0004	NORMAL		004	COMPLETI...	
RDODEF :JOB01951	JOB01951	RDODEF	2007/02/21 21:18:27	DNET045	U0004	NORMAL		004	COMPLETI...	
DNET045C:JOB01748	JOB01748	DNET045C	2007/02/21 21:18:27	DNET045	U0000	NORMAL		000	COMPLETI...	
BINDRE :JOB01747	JOB01747	BINDRE	2007/02/21 21:18:27	DNET045						
DNET045C:JOB01730	JOB01730	DNET045C	2007/02/21 21:18:27	DNET045						
DNET045C:JOB01714	JOB01714	DNET045C	2007/02/21 21:18:27	DNET045						
BINDRE :JOB01711	JOB01711	BINDRE	2007/02/21 21:18:27	DNET045						

Customize Table

Choose contents to display in the table view.

Available contents:

Displayed contents:

Job ID
Job Name
Job Entry Date
Job Owner
Return Code
Return Info
System return code
User return code
Return Status
System Name
SYSOUT class
Spool Tracks
Priority

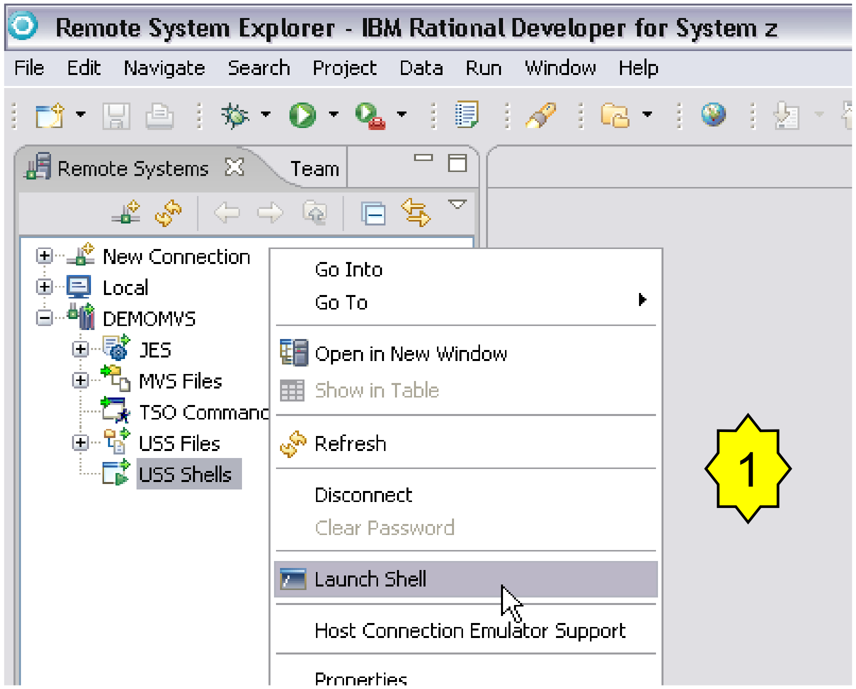
Add> <Remove Move Up Move Down

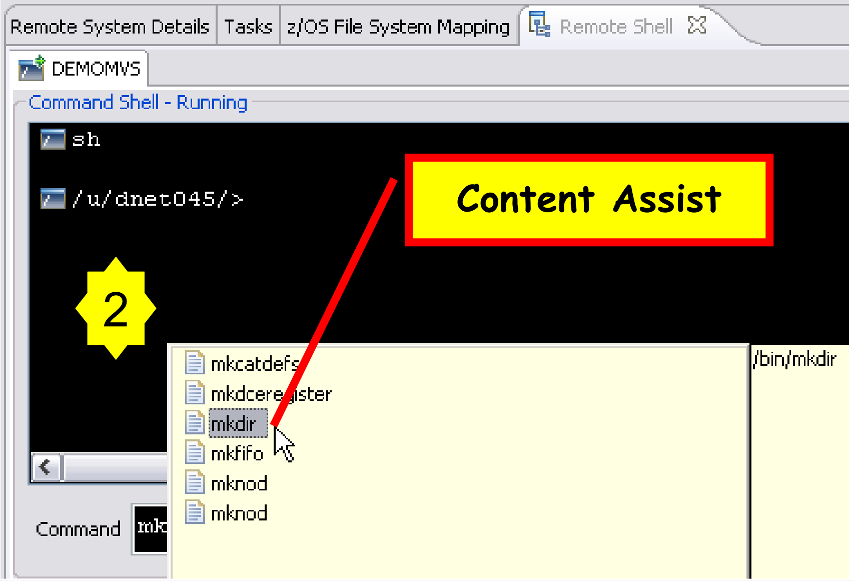
OK Cancel

Click title to sort

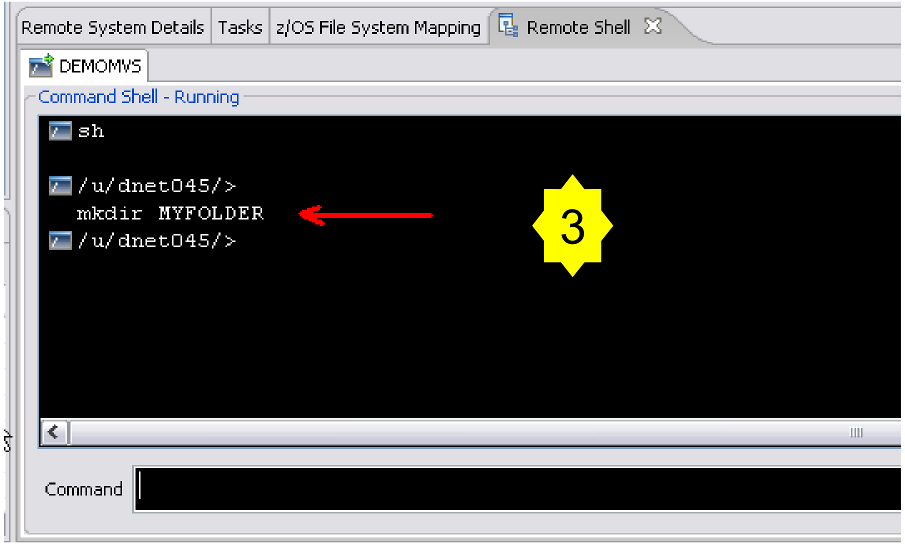
❑ **Customize the JES layout yourself, instead of the system default**

TSO and USS Shell for Commands





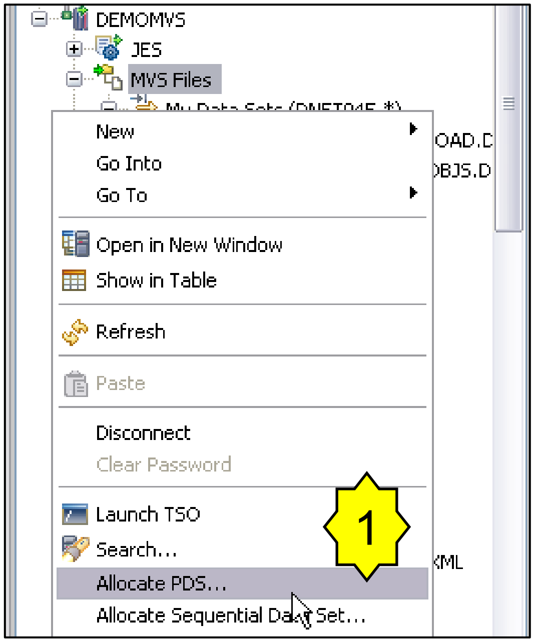
```
sh

/u/dnet045/>
```

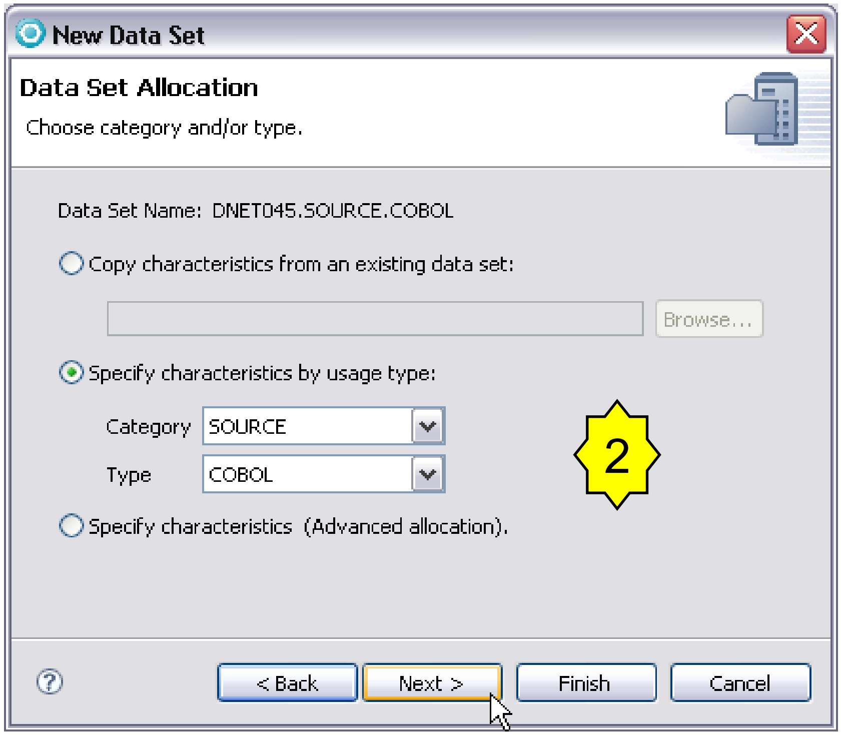


```
sh

/u/dnet045/>
 mkdir MYFOLDER
/u/dnet045/>
```

Benefit: Improve productivity when working with USS/TSO… Very useful for system programmers …

z/OS files and Dataset Management





Data Set Allocation

Choose category and/or type.

Data Set Name: DNET045.SOURCE.COBOL

○ Copy characteristics from an existing data set:

● Specify characteristics by usage type:

Category: SOURCE

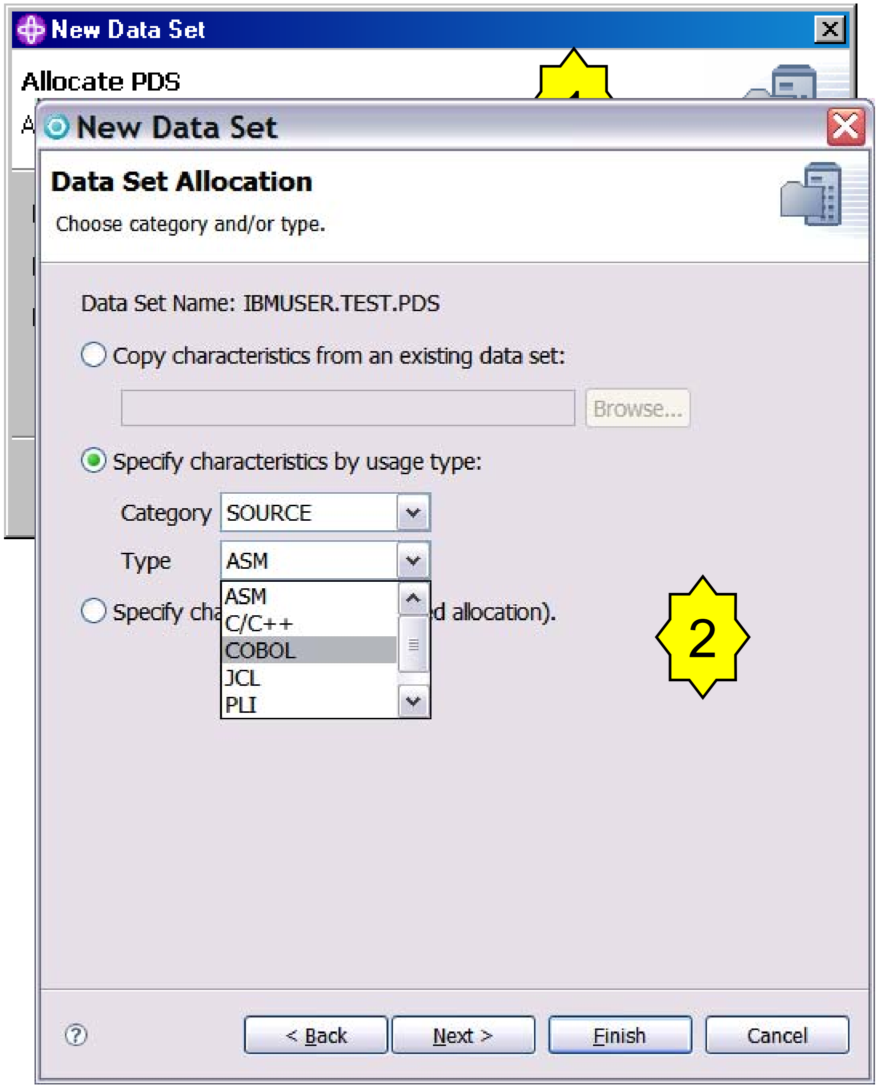
Type: COBOL

○ Specify characteristics (Advanced allocation).

- **Allocate**, Create PDS/PDSE, Member, etc....
- PDS allocation models, example PDS for COBOL source, PL/I, Listing, etc.
- **Compress**, Compress with Backup, Migrate
- **Copy** files between different systems (local or remote)
- etc.

Benefit: Developers can easily allocate datasets and create members on z/OS. No need for ISPF utilities.

Allocate data set example



New Data Set

Data Set Allocation

Choose category and/or type.

Data Set Name: IBMUSER.TEST.PDS

○ Copy characteristics from an existing data set:

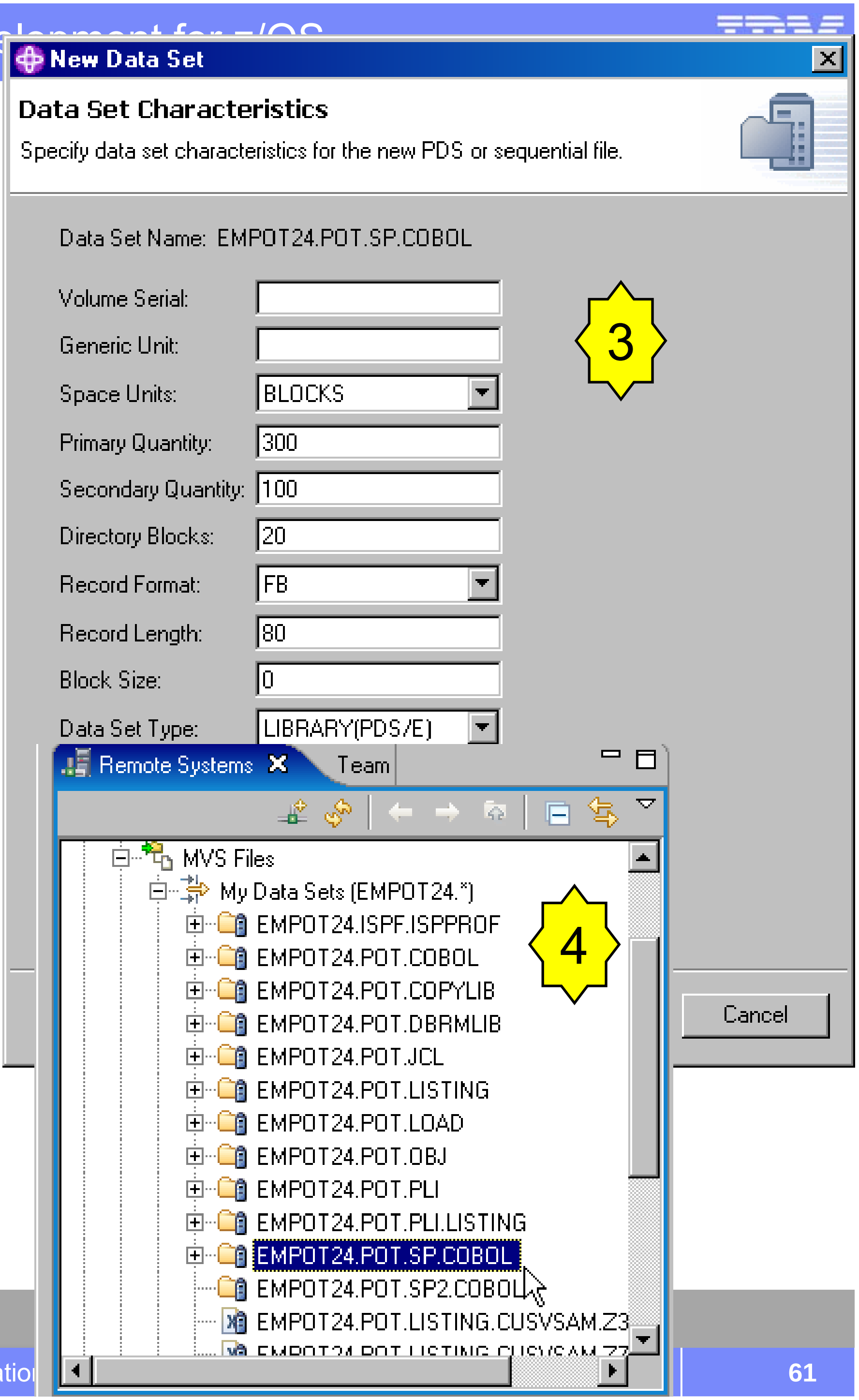
Browse...

● Specify characteristics by usage type:

Category	SOURCE
Type	ASM

ASM
C/C++
COBOL
JCL
PLI

○ Specify cha… …d allocation).



New Data Set

Data Set Characteristics

Specify data set characteristics for the new PDS or sequential file.

Data Set Name: EMPOT24.POT.SP.COBOL

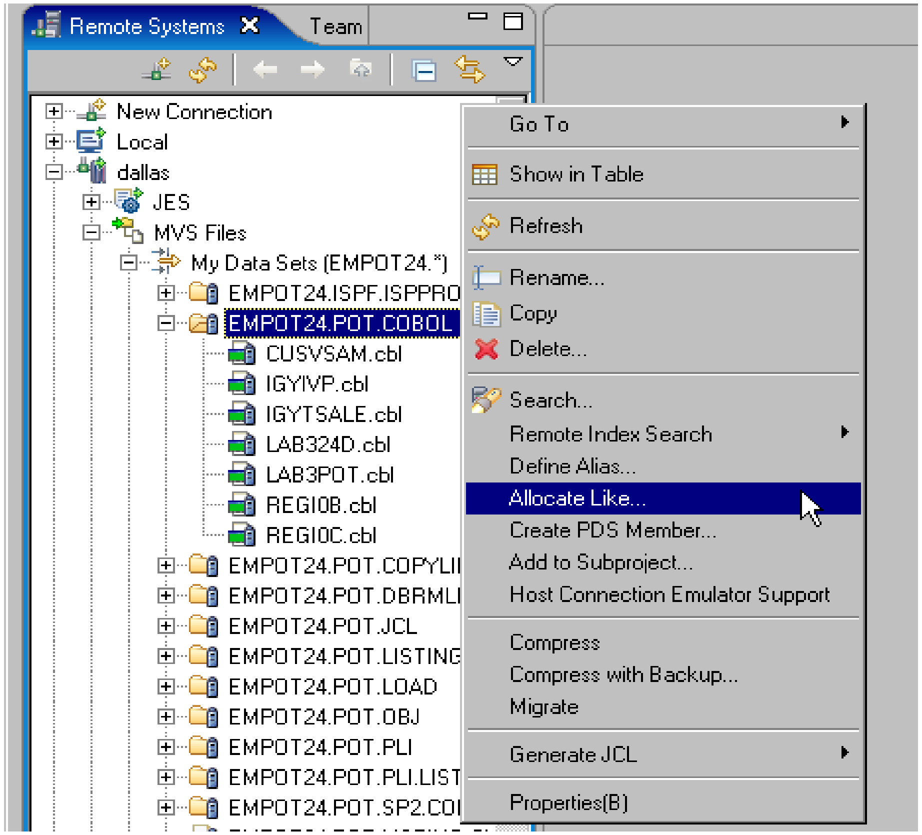
Volume Serial:	
Generic Unit:	
Space Units:	BLOCKS
Primary Quantity:	300
Secondary Quantity:	100
Directory Blocks:	20
Record Format:	FB
Record Length:	80
Block Size:	0
Data Set Type:	LIBRARY(PDS/E)

Remote Systems   Team

- MVS Files
  - My Data Sets (EMPOT24.*)
    - EMPOT24.ISPF.ISPPROF
    - EMPOT24.POT.COBOL
    - EMPOT24.POT.COPYLIB
    - EMPOT24.POT.DBRMLIB
    - EMPOT24.POT.JCL
    - EMPOT24.POT.LISTING
    - EMPOT24.POT.LOAD
    - EMPOT24.POT.OBJ
    - EMPOT24.POT.PLI
    - EMPOT24.POT.PLI.LISTING
    - EMPOT24.POT.SP.COBOL
    - EMPOT24.POT.SP2.COBOL
    - EMPOT24.POT.LISTING.CUSVSAM.Z3
    - EMPOT24.POT.LISTING.CUSVSAM.Z7

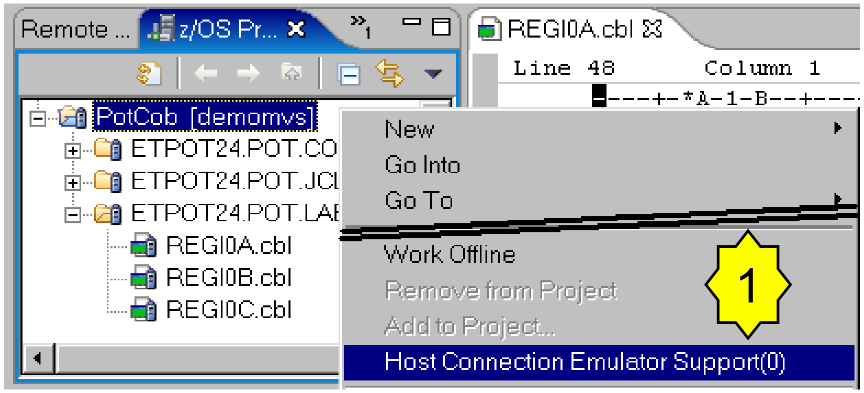
File Utilities in RD/z

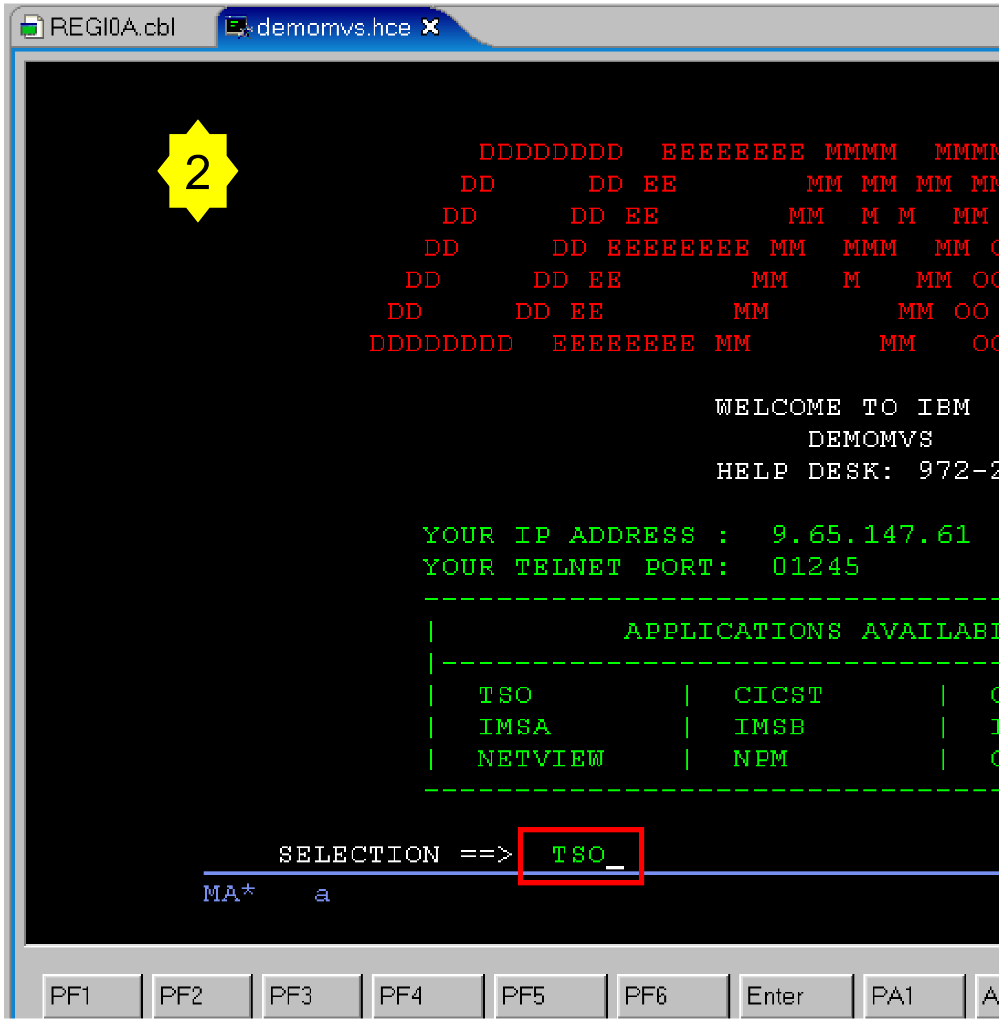
- Allocate
- Rename
- Copy
- Delete
- Compress
- Create PDS Member
- Save As
- GetFile



You may also manipulate your z/OS files with RDz

Invoking 3270 screens from Rational Developer for System z (for example a TSO session)



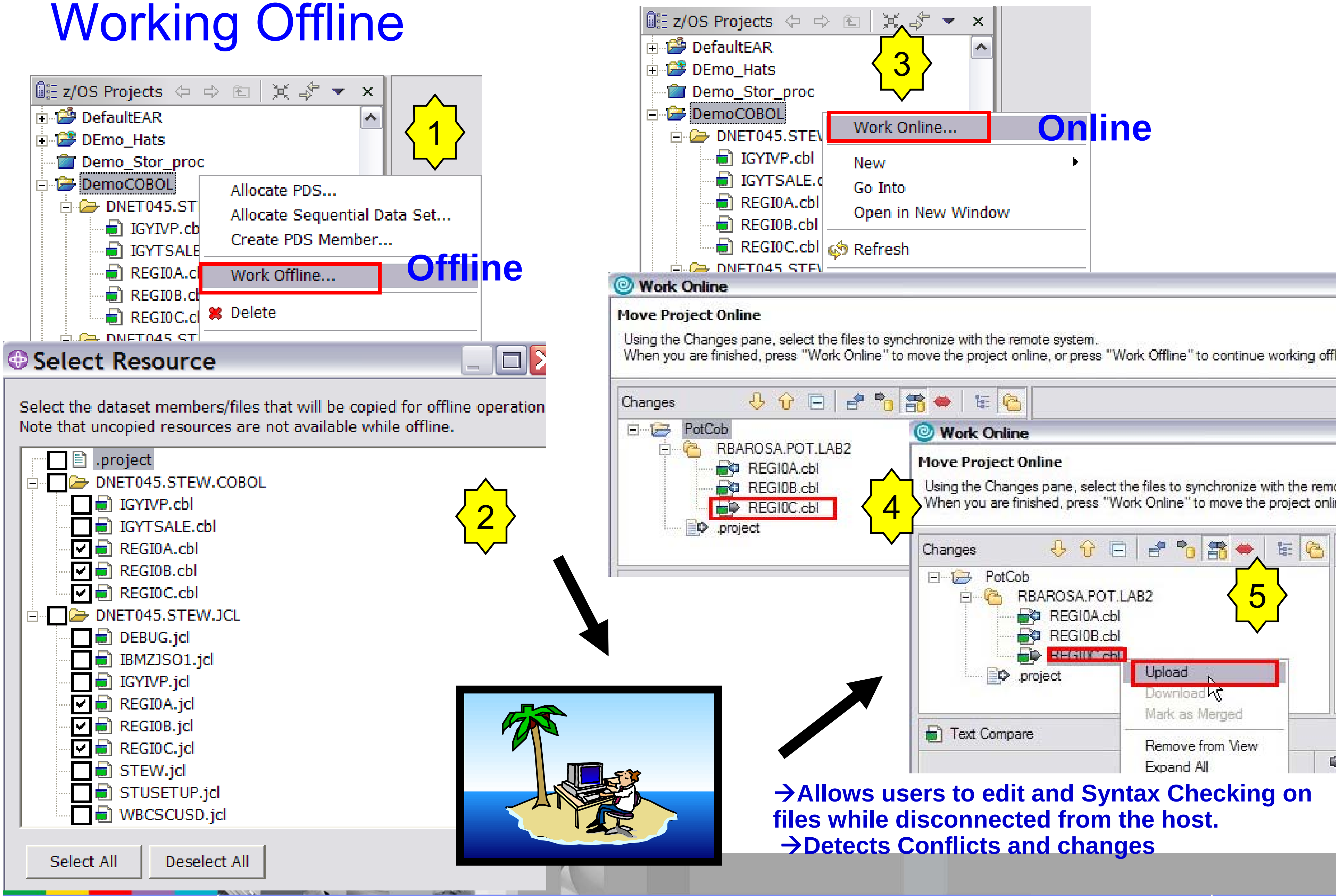


```
             DDDDDDDD   EEEEEEEE MMMM   MMMM
            DD      DD EE        MM MM  MM MM
           DD      DD EE        MM  M M  MM
          DD      DD EEEEEEEE MM   MMM   MM O
         DD      DD EE        MM    M    MM OO
        DD      DD EE        MM         MM OO
       DDDDDDDD  EEEEEEEE MM          MM   OO

                          WELCOME TO IBM
                               DEMOMVS
                          HELP DESK: 972-2

              YOUR IP ADDRESS :   9.65.147.61
              YOUR TELNET PORT:   01245
              ----------------------------------
              |          APPLICATIONS AVAILABI
              |---------------------------------
              |  TSO           |  CICST        |  C
              |  IMSA          |  IMSB         |  I
              |  NETVIEW       |  NPM          |  O
              ----------------------------------

     SELECTION ==>  TSO_
MA*    a
```

Can use macros to record operating sequence

Benefit: Eliminates need of terminal emulation, complement developer needs

Working Offline



Select the dataset members/files that will be copied for offline operation
Note that uncopied resources are not available while offline.

- □ .project
- □ DNET045.STEW.COBOL
  - □ IGYIVP.cbl
  - □ IGYTSALE.cbl
  - ☑ REGI0A.cbl
  - ☑ REGI0B.cbl
  - ☑ REGI0C.cbl
- □ DNET045.STEW.JCL
  - □ DEBUG.jcl
  - □ IBMZJSO1.jcl
  - □ IGYIVP.jcl
  - ☑ REGI0A.jcl
  - ☑ REGI0B.jcl
  - ☑ REGI0C.jcl
  - □ STEW.jcl
  - □ STUSETUP.jcl
  - □ WBCSCUSD.jcl

Move Project Online

Using the Changes pane, select the files to synchronize with the remote system.
When you are finished, press "Work Online" to move the project online, or press "Work Offline" to continue working offl

Move Project Online

Using the Changes pane, select the files to synchronize with the remo
When you are finished, press "Work Online" to move the project onli

→Allows users to edit and Syntax Checking on files while disconnected from the host.

→Detects Conflicts and changes

IBM Rational Developer for System z

XML Services for the Enterprise

- SOA access to CICS V3.x and IMS V9 or V10 COBOL/PLI applications
- Bottom-up/Top-down or meet-in-the-middle COBOL/PLI to XML mapping support
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- Create DB2 stored procedures on z/OS in either COBOL or PL/I
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- Read/Write/Update VSAM datasets via integration with IBM File Manager
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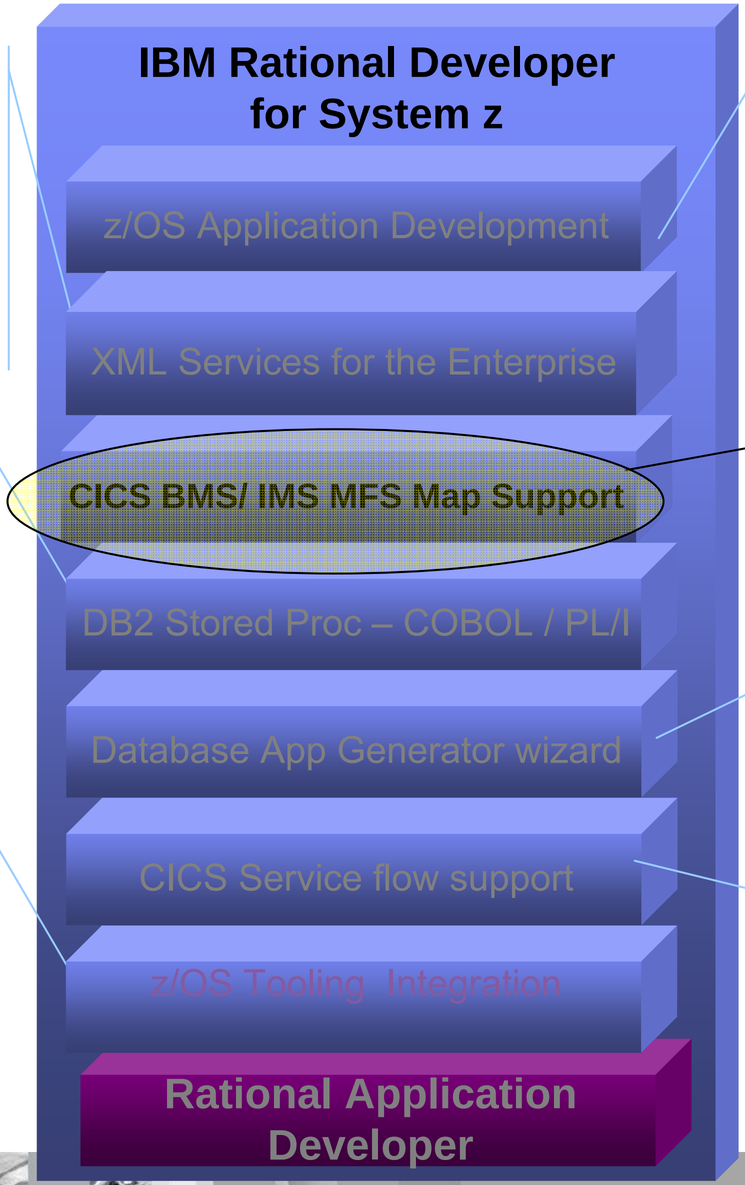
IBM Rational Developer for System z
z/OS Application Development
XML Services for the Enterprise
CICS BMS/ IMS MFS Map Support
DB2 Stored Proc – COBOL / PL/I
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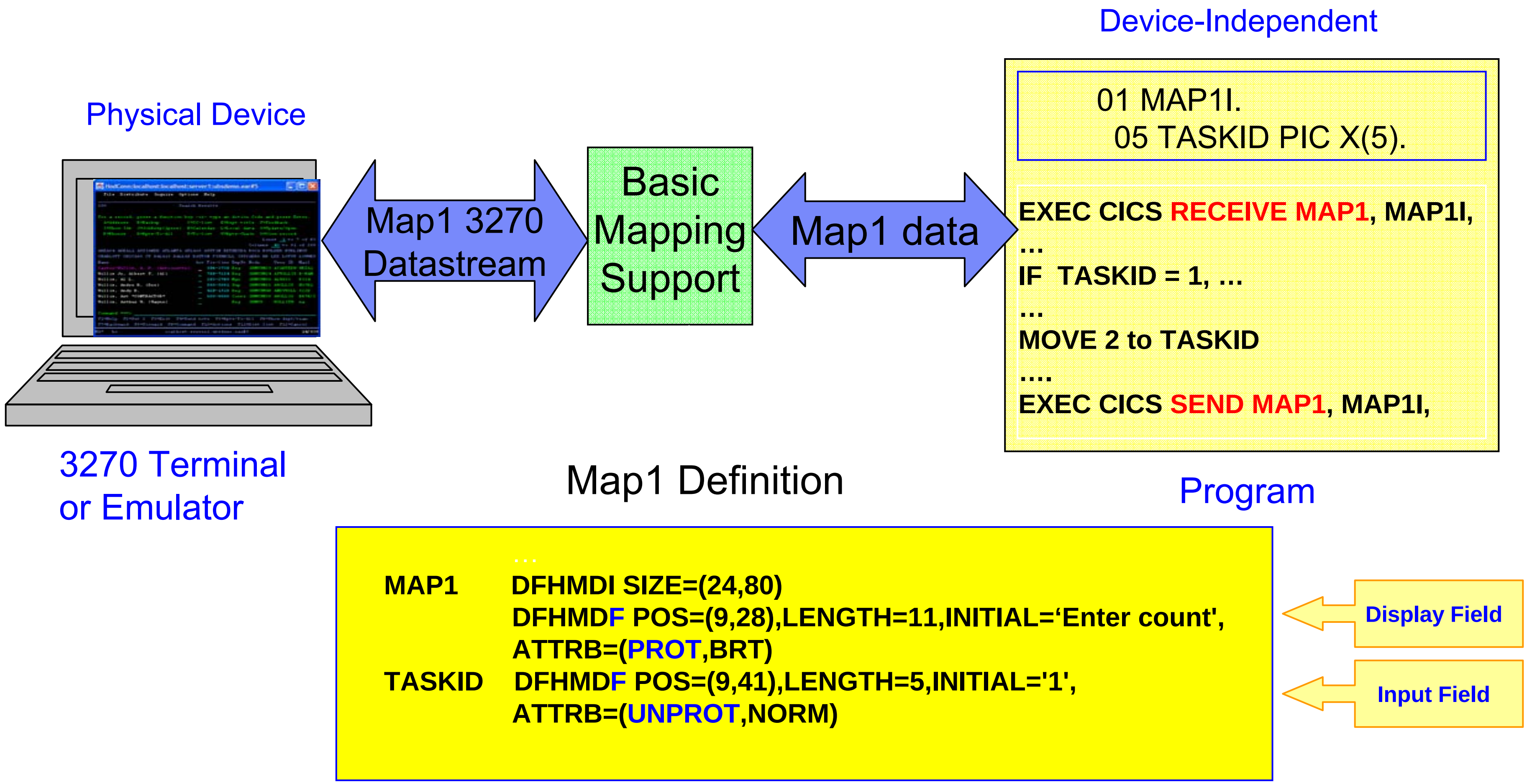
- Generate CRUD DB2 program code from UML, which can also be integrated into web service applications

CICS Service Flow Feature

- Implements SOA and Web Services
- Service Flow is a tool to build service flows out of your existing COMMAREA and Terminal based CICS applications.

What is CICS BMS – Basic Mapping Support



```
01 MAP1I.
  05 TASKID PIC X(5).
```

```
EXEC CICS RECEIVE MAP1, MAP1I,
...
IF  TASKID = 1, ...
...
MOVE 2 to TASKID
....
EXEC CICS SEND MAP1, MAP1I,
```

```
          ...
MAP1      DFHMDI SIZE=(24,80)
          DFHMDF POS=(9,28),LENGTH=11,INITIAL=‘Enter count',
          ATTRB=(PROT,BRT)
TASKID    DFHMDF POS=(9,41),LENGTH=5,INITIAL='1',
          ATTRB=(UNPROT,NORM)
```

BMS Editor Highlights

- What you see is what you get it (*WYSIWYG*) editor for BMS Map Set files
- Works with local and remote scenarios
- Color highlighted source editor
- Filtering for easy editing
- Integrated into Remote System Explorer default file mappings

→**BMS mapped to **.bms**

So you don't have to imagine the appearance

Visual Editor

(source editor

+ preview pane)

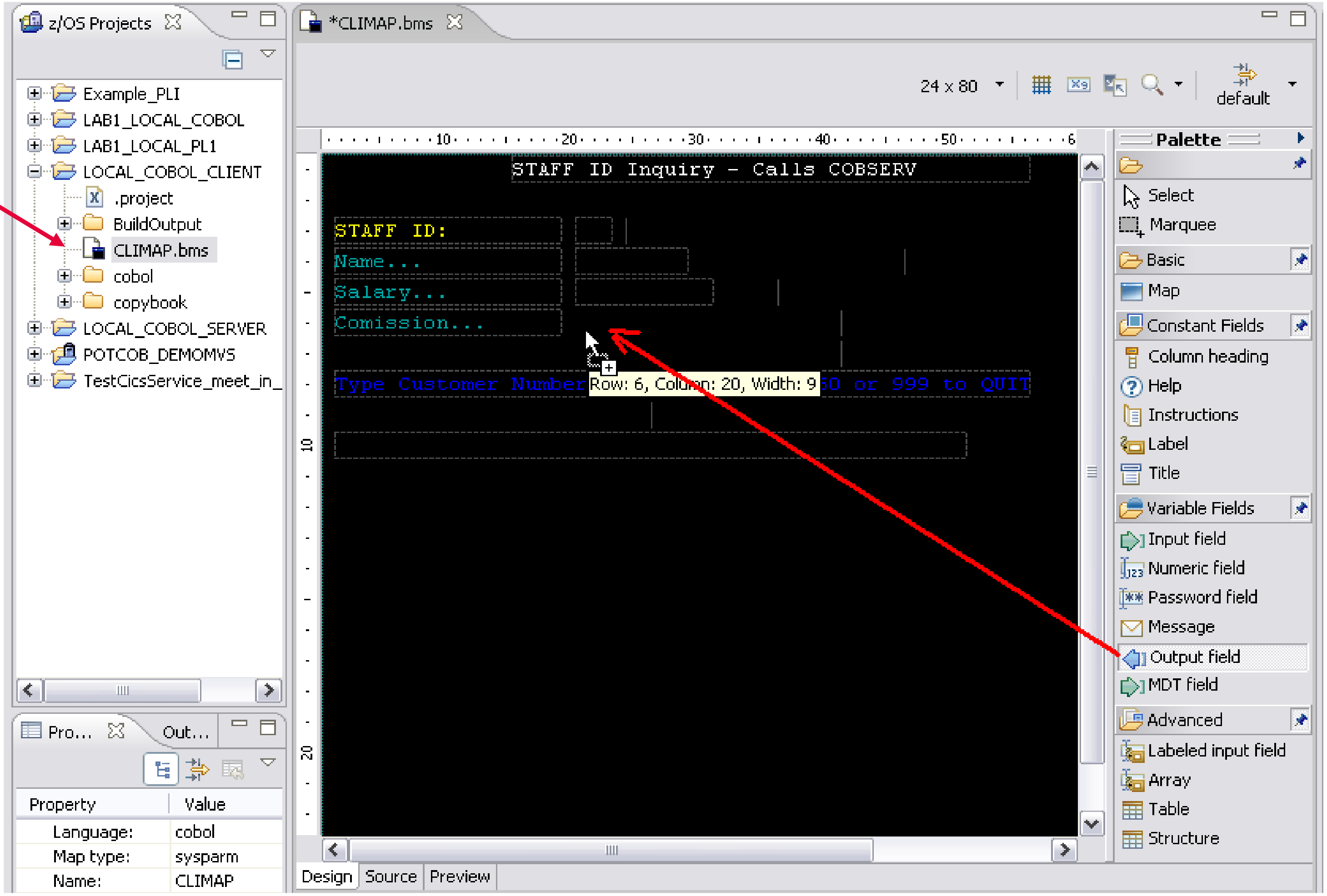
Built-in function

(SDF II - $$$)

CICS BMS Map Support

BMS file

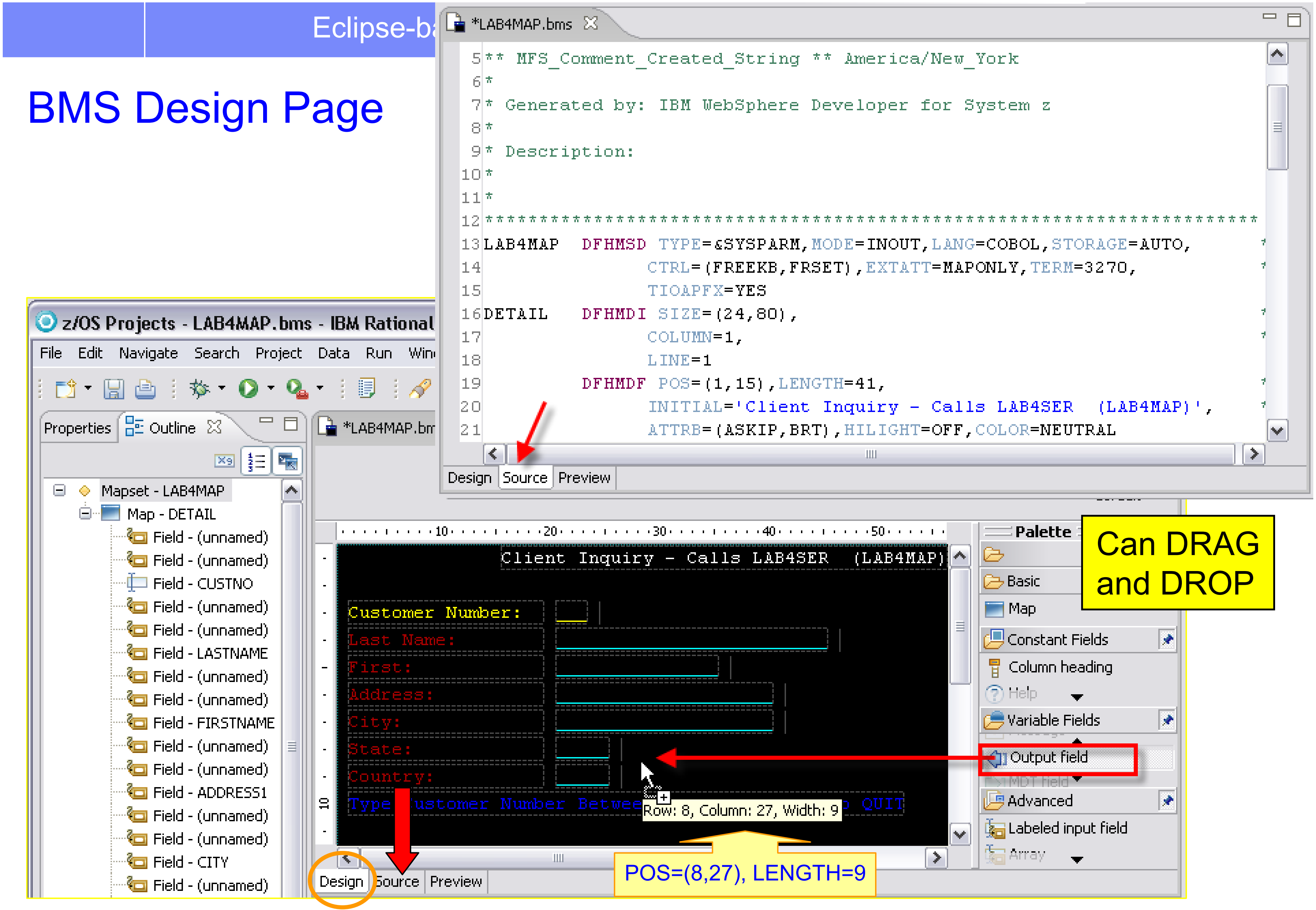
- Wizard for creating new BMS map set files
- Drag & Drop BMS editor
- Design, Source and Preview views
- Create new or import/edit existing BMS maps
- Works with local and remote scenarios



```
STAFF ID Inquiry - Calls COBSERV

STAFF ID:
Name...
Salary...
Comission...

Type Customer Number Row: 6, Column: 20, Width: 9 0 or 999 to QUIT
```

Property	Value
Language:	cobol
Map type:	sysparm
Name:	CLIMAP

BMS Design Page



*LAB4MAP.bms

```
** MFS_Comment_Created_String ** America/New_York
*
* Generated by: IBM WebSphere Developer for System z
*
* Description:
*
*
***********************************************************************
LAB4MAP  DFHMSD TYPE=&SYSPARM,MODE=INOUT,LANG=COBOL,STORAGE=AUTO,      *
               CTRL=(FREEKB,FRSET),EXTATT=MAPONLY,TERM=3270,           *
               TIOAPFX=YES
DETAIL   DFHMDI SIZE=(24,80),                                          *
               COLUMN=1,                                               *
               LINE=1
         DFHMDF POS=(1,15),LENGTH=41,                                  *
               INITIAL='Client Inquiry - Calls LAB4SER  (LAB4MAP)',    *
               ATTRB=(ASKIP,BRT),HILIGHT=OFF,COLOR=NEUTRAL
```

z/OS Projects - LAB4MAP.bms - IBM Rational

- Mapset - LAB4MAP
  - Map - DETAIL
    - Field - (unnamed)
    - Field - (unnamed)
    - Field - CUSTNO
    - Field - (unnamed)
    - Field - (unnamed)
    - Field - LASTNAME
    - Field - (unnamed)
    - Field - (unnamed)
    - Field - FIRSTNAME
    - Field - (unnamed)
    - Field - (unnamed)
    - Field - ADDRESS1
    - Field - (unnamed)
    - Field - (unnamed)
    - Field - CITY
    - Field - (unnamed)

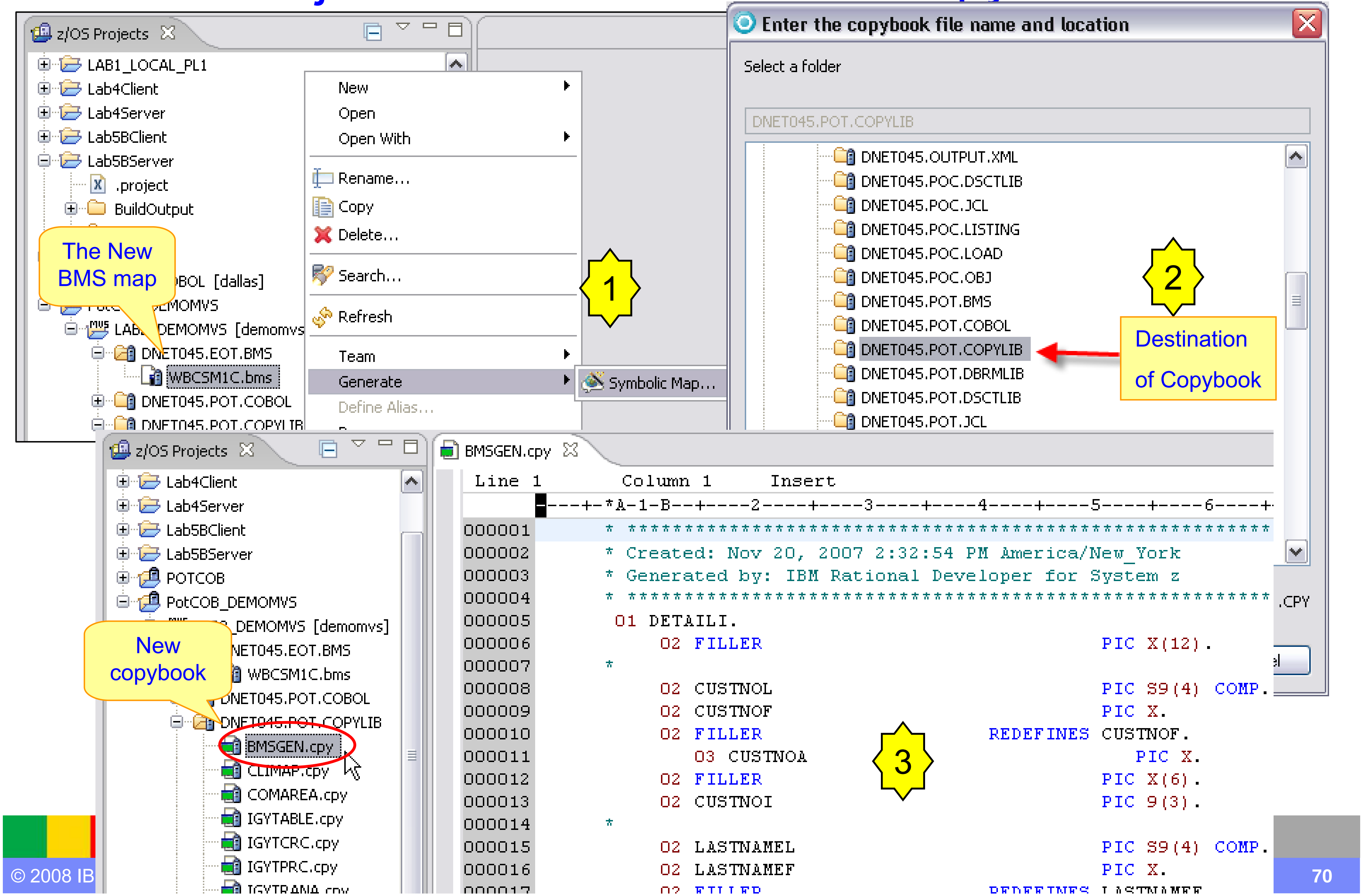
```
                  Client Inquiry - Calls LAB4SER  (LAB4MAP)

Customer Number:
Last Name:
First:
Address:
City:
State:
Country:
Type Customer Number Betwee                         QUIT
```

Row: 8, Column: 27, Width: 9

Can DRAG and DROP

POS=(8,27), LENGTH=9

Remote Projects: Generate COBOL Copybook



The New BMS map

1

2

Destination of Copybook

New copybook

3

```
 Line 1       Column 1      Insert
     ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+
      * ****************************************************************
      * Created: Nov 20, 2007 2:32:54 PM America/New_York
      * Generated by: IBM Rational Developer for System z
      * ****************************************************************
       01 DETAILI.
          02 FILLER                                 PIC X(12).
      *
          02 CUSTNOL                                PIC S9(4) COMP.
          02 CUSTNOF                                PIC X.
          02 FILLER                       REDEFINES CUSTNOF.
             03 CUSTNOA                               PIC X.
          02 FILLER                                 PIC X(6).
          02 CUSTNOI                                PIC 9(3).
      *
          02 LASTNAMEL                              PIC S9(4) COMP.
          02 LASTNAMEF                              PIC X.
          02 FILLER                       REDEFINES LASTNAMEF
```

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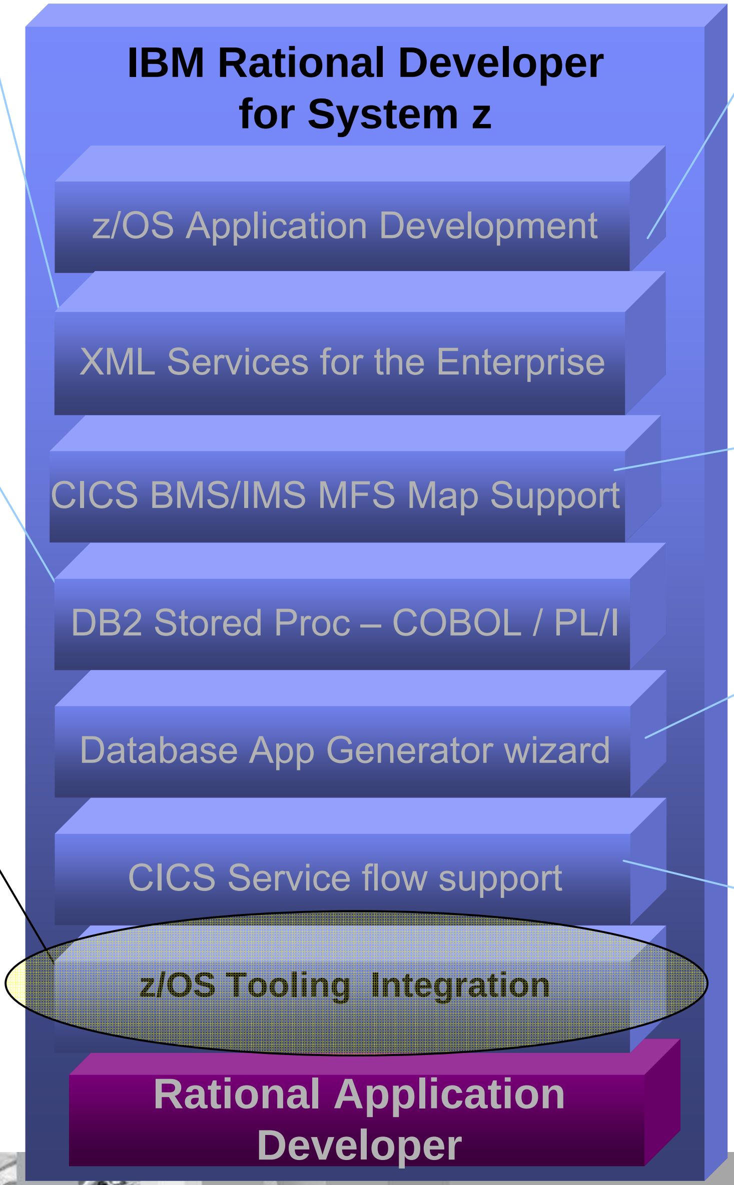
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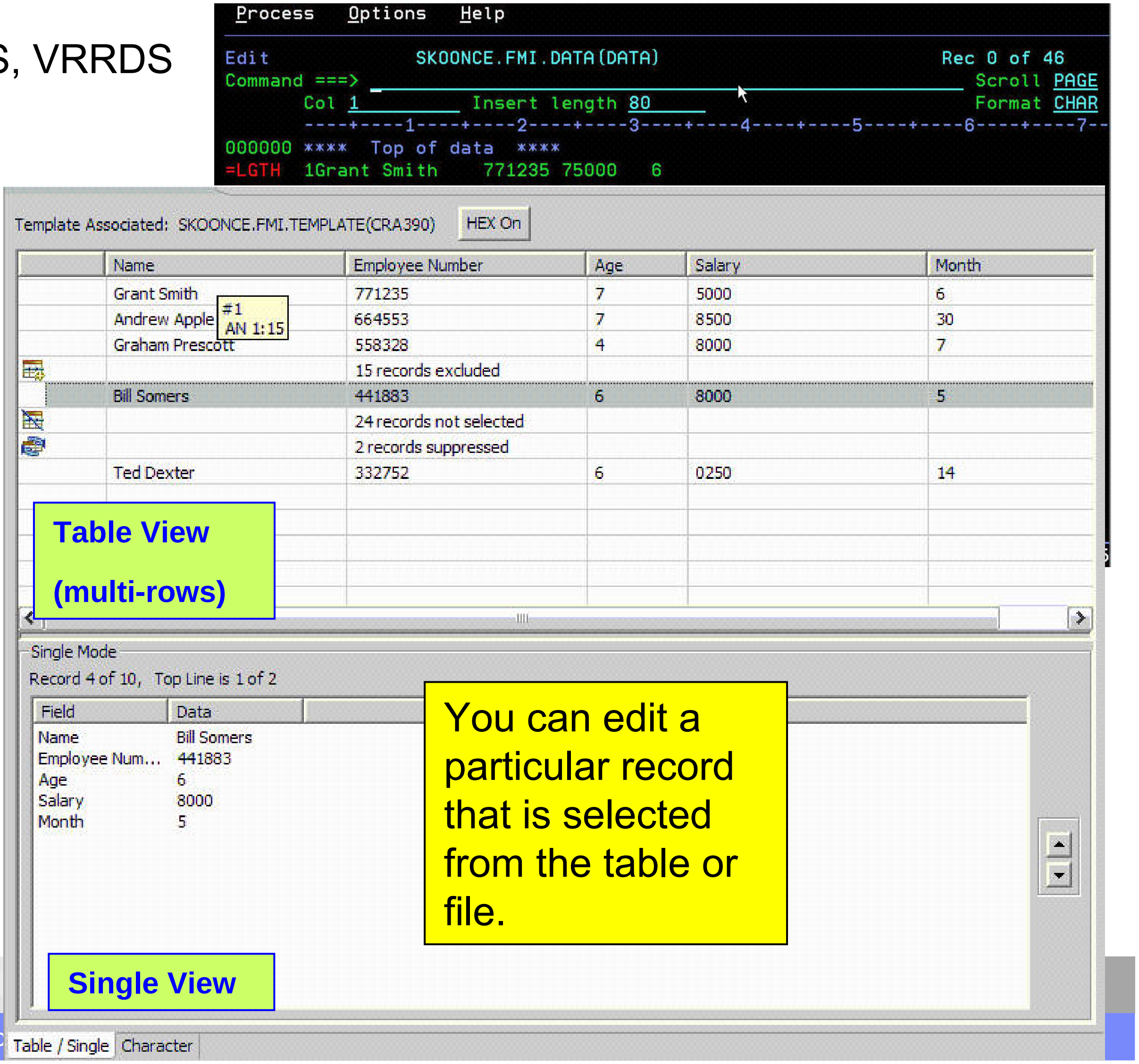
RDz and File Manager Integration

- Allows for a formatted edit session of many dataset types. Among the options are:
  - VSAM - KSDS, ESDS, RRDS, VRRDS
  - QSAM – PDS, SDS

- Multiple views of the data within the formatted edit session:
  - Table
  - Single Character

- **Browse** and **alter** VSAM data easily without having to leave your development environment

→ Depends on IBM File Manager installed on z/OS



```
 Process   Options   Help
Edit             SKOONCE.FMI.DATA(DATA)                          Rec 0 of 46
Command ===>                                                     Scroll PAGE
      Col 1          Insert length 80                            Format CHAR
      ----+----1----+----2----+----3----+----4----+----5----+----6----+----7--
000000 ****  Top of data  ****
=LGTH  1Grant Smith     771235 75000    6
```

Template Associated: SKOONCE.FMI.TEMPLATE(CRA390)

	Name	Employee Number	Age	Salary	Month
	Grant Smith	771235	7	5000	6
	Andrew Apple	664553	7	8500	30
	Graham Prescott	558328	4	8000	7
		15 records excluded			
	Bill Somers	441883	6	8000	5
		24 records not selected			
		2 records suppressed			
	Ted Dexter	332752	6	0250	14

Table View (multi-rows)

Single Mode

Record 4 of 10, Top Line is 1 of 2

Field	Data
Name	Bill Somers
Employee Num...	441883
Age	6
Salary	8000
Month	5

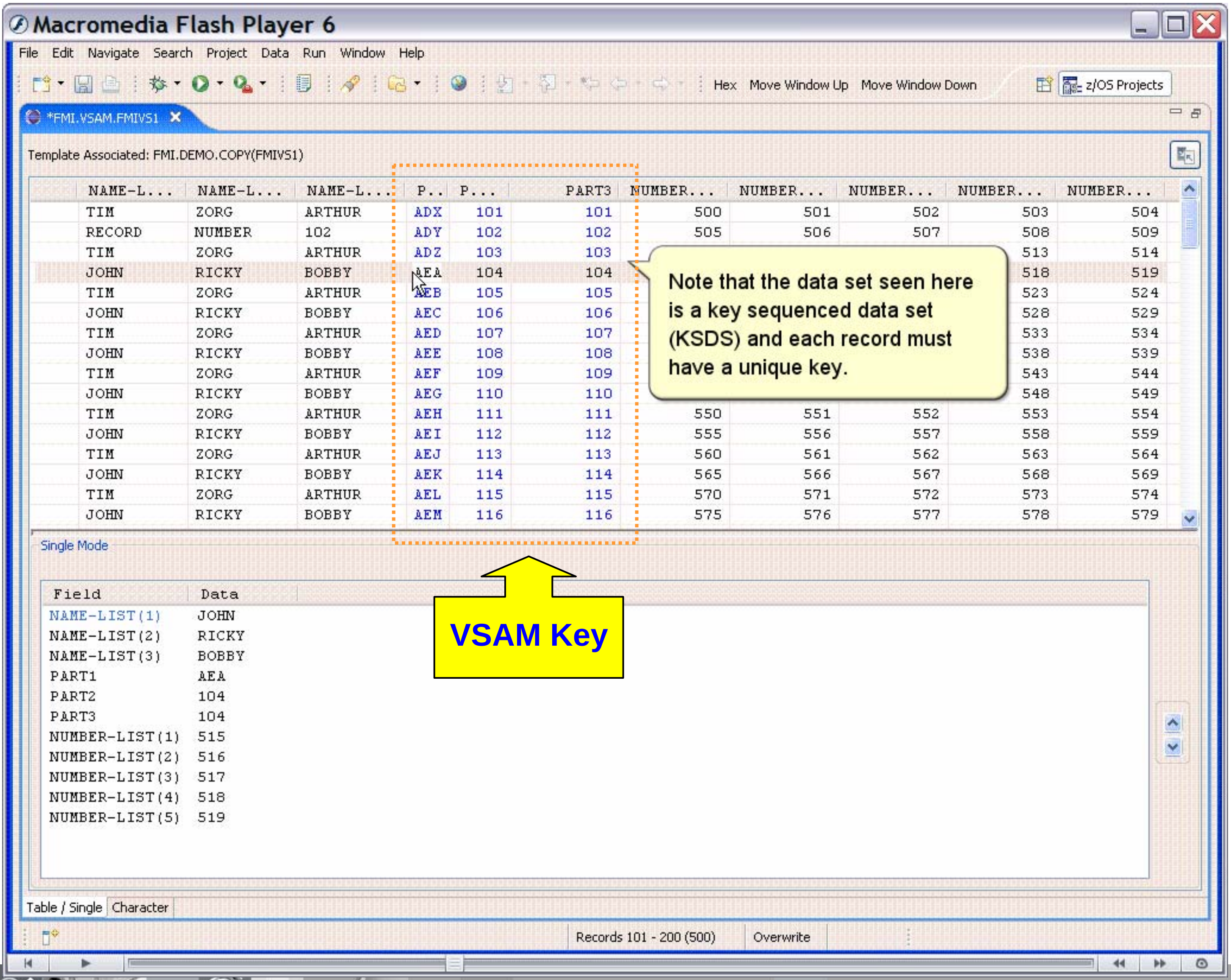
You can edit a particular record that is selected from the table or file.

Single View

File Manager Integration

Table View

Single View


Macromedia Flash Player 6
File Edit Navigate Search Project Data Run Window Help
Hex Move Window Up Move Window Down
z/OS Projects
*FMI.VSAM.FMIVS1
Single Mode
Table / Single Character
Records 101 - 200 (500)
Overwrite

Template Associated: FMI.DEMO.COPY(FMIVS1)

NAME-L...	NAME-L...	NAME-L...	P..	P...	PART3	NUMBER...	NUMBER...	NUMBER...	NUMBER...	NUMBER...
TIM	ZORG	ARTHUR	ADX	101	101	500	501	502	503	504
RECORD	NUMBER	102	ADY	102	102	505	506	507	508	509
TIM	ZORG	ARTHUR	ADZ	103	103				513	514
JOHN	RICKY	BOBBY	AEA	104	104				518	519
TIM	ZORG	ARTHUR	AEB	105	105				523	524
JOHN	RICKY	BOBBY	AEC	106	106				528	529
TIM	ZORG	ARTHUR	AED	107	107				533	534
JOHN	RICKY	BOBBY	AEE	108	108				538	539
TIM	ZORG	ARTHUR	AEF	109	109				543	544
JOHN	RICKY	BOBBY	AEG	110	110				548	549
TIM	ZORG	ARTHUR	AEH	111	111	550	551	552	553	554
JOHN	RICKY	BOBBY	AEI	112	112	555	556	557	558	559
TIM	ZORG	ARTHUR	AEJ	113	113	560	561	562	563	564
JOHN	RICKY	BOBBY	AEK	114	114	565	566	567	568	569
TIM	ZORG	ARTHUR	AEL	115	115	570	571	572	573	574
JOHN	RICKY	BOBBY	AEM	116	116	575	576	577	578	579

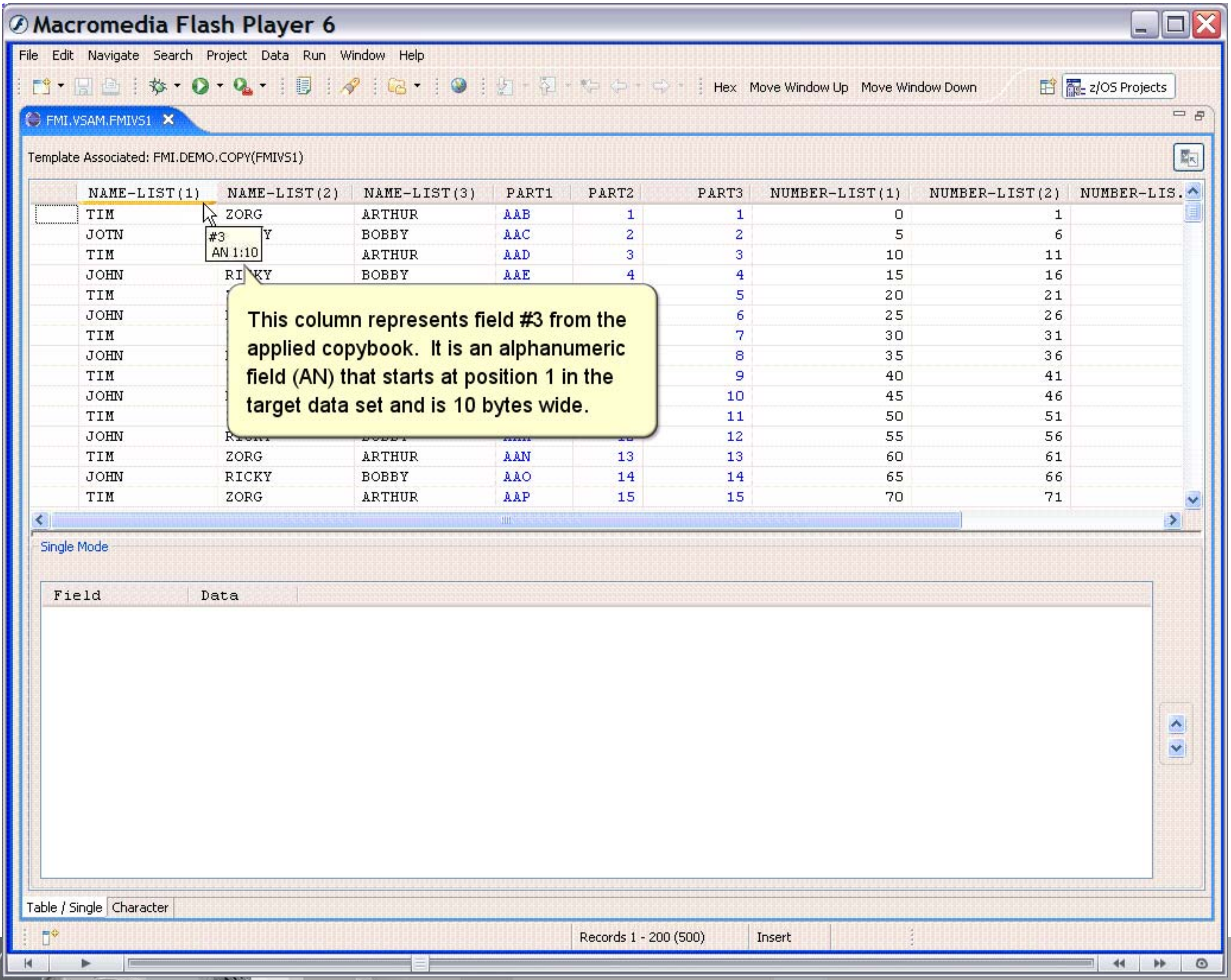
Note that the data set seen here is a key sequenced data set (KSDS) and each record must have a unique key.

Field	Data
NAME-LIST(1)	JOHN
NAME-LIST(2)	RICKY
NAME-LIST(3)	BOBBY
PART1	AEA
PART2	104
PART3	104
NUMBER-LIST(1)	515
NUMBER-LIST(2)	516
NUMBER-LIST(3)	517
NUMBER-LIST(4)	518
NUMBER-LIST(5)	519

VSAM Key

File Manager Integration

Field attribute


Macromedia Flash Player 6
File Edit Navigate Search Project Data Run Window Help
Hex Move Window Up Move Window Down
z/OS Projects
FMI.VSAM.FMIVS1
#3
AN 1:10
Single Mode
Table / Single Character
Records 1 - 200 (500)
Insert

Template Associated: FMI.DEMO.COPY(FMIVS1)

NAME-LIST(1)	NAME-LIST(2)	NAME-LIST(3)	PART1	PART2	PART3	NUMBER-LIST(1)	NUMBER-LIST(2)	NUMBER-LIS.
TIM	ZORG	ARTHUR	AAB	1	1	0	1	
JOTN	Y	BOBBY	AAC	2	2	5	6	
TIM		ARTHUR	AAD	3	3	10	11	
JOHN	RI KY	BOBBY	AAE	4	4	15	16	
TIM					5	20	21	
JOHN					6	25	26	
TIM					7	30	31	
JOHN					8	35	36	
TIM					9	40	41	
JOHN					10	45	46	
TIM					11	50	51	
JOHN	RICKY	BOBBY	AAM	12	12	55	56	
TIM	ZORG	ARTHUR	AAN	13	13	60	61	
JOHN	RICKY	BOBBY	AAO	14	14	65	66	
TIM	ZORG	ARTHUR	AAP	15	15	70	71	

This column represents field #3 from the applied copybook. It is an alphanumeric field (AN) that starts at position 1 in the target data set and is 10 bytes wide.

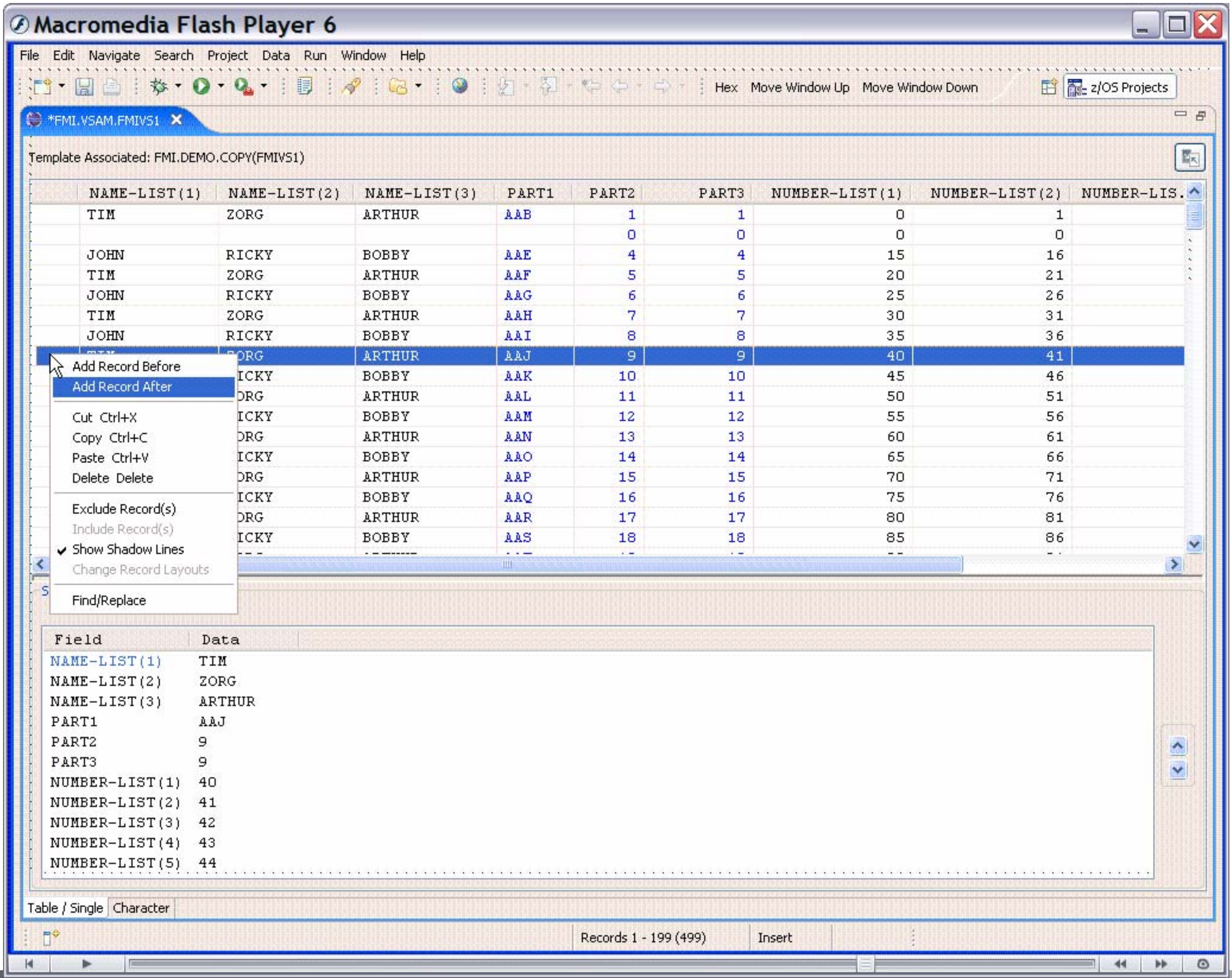
Field	Data

File Manager Integration

Add

Delete

records



Template Associated: FMI.DEMO.COPY(FMIVS1)

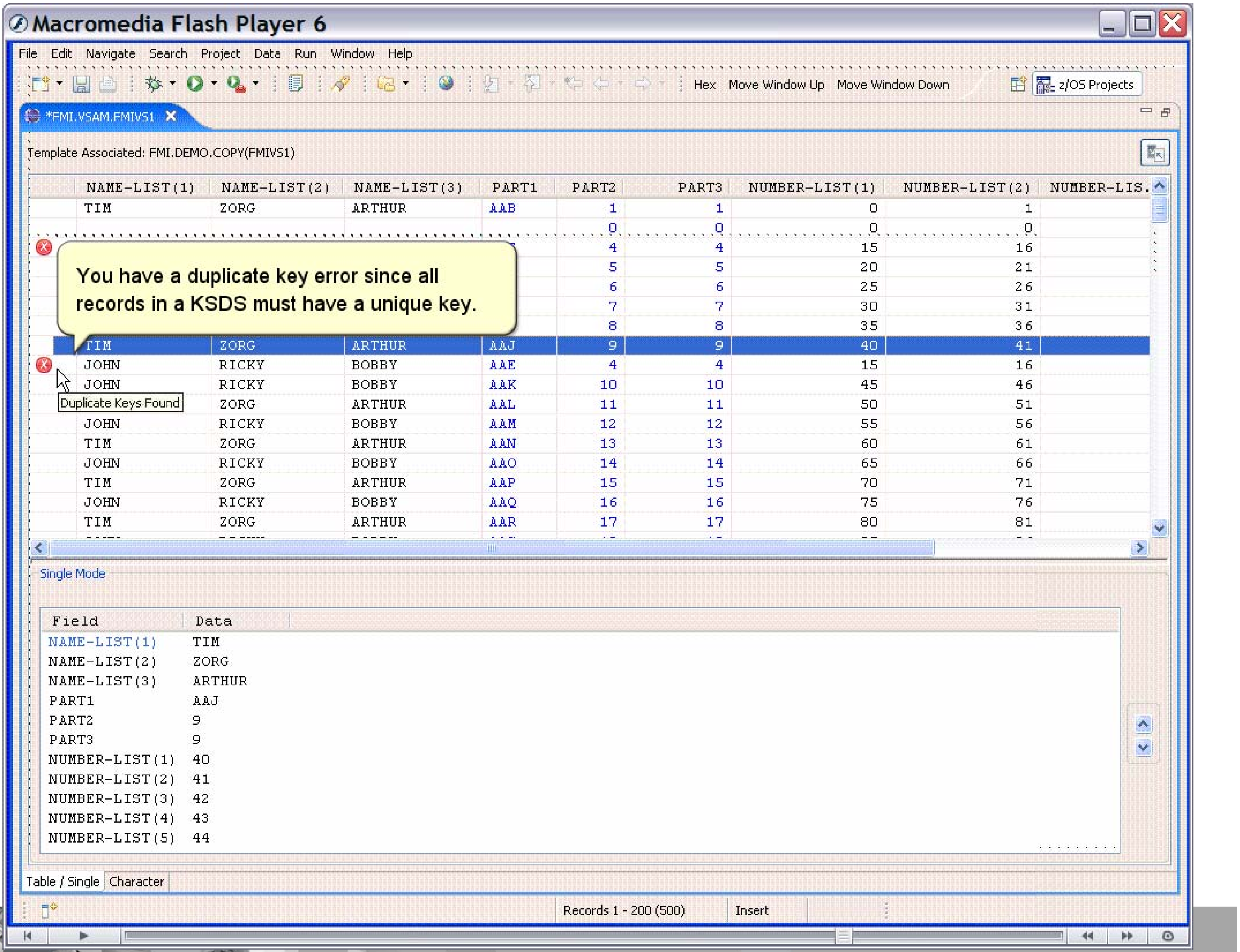
NAME-LIST(1)	NAME-LIST(2)	NAME-LIST(3)	PART1	PART2	PART3	NUMBER-LIST(1)	NUMBER-LIST(2)	NUMBER-LIS.
TIM	ZORG	ARTHUR	AAB	1	1	0	1	
				0	0	0	0	
JOHN	RICKY	BOBBY	AAE	4	4	15	16	
TIM	ZORG	ARTHUR	AAF	5	5	20	21	
JOHN	RICKY	BOBBY	AAG	6	6	25	26	
TIM	ZORG	ARTHUR	AAH	7	7	30	31	
JOHN	RICKY	BOBBY	AAI	8	8	35	36	
	ORG	ARTHUR	AAJ	9	9	40	41	
	ICKY	BOBBY	AAK	10	10	45	46	
	ORG	ARTHUR	AAL	11	11	50	51	
	ICKY	BOBBY	AAM	12	12	55	56	
	ORG	ARTHUR	AAN	13	13	60	61	
	ICKY	BOBBY	AAO	14	14	65	66	
	ORG	ARTHUR	AAP	15	15	70	71	
	ICKY	BOBBY	AAQ	16	16	75	76	
	ORG	ARTHUR	AAR	17	17	80	81	
	ICKY	BOBBY	AAS	18	18	85	86	

Field	Data
NAME-LIST(1)	TIM
NAME-LIST(2)	ZORG
NAME-LIST(3)	ARTHUR
PART1	AAJ
PART2	9
PART3	9
NUMBER-LIST(1)	40
NUMBER-LIST(2)	41
NUMBER-LIST(3)	42
NUMBER-LIST(4)	43
NUMBER-LIST(5)	44

Records 1 - 199 (499)   Insert

File Manager Integration

Copy error



Macromedia Flash Player 6
File Edit Navigate Search Project Data Run Window Help
Hex Move Window Up Move Window Down
z/OS Projects
*FMI.VSAM.FMIVS1

Template Associated: FMI.DEMO.COPY(FMIVS1)

NAME-LIST(1)	NAME-LIST(2)	NAME-LIST(3)	PART1	PART2	PART3	NUMBER-LIST(1)	NUMBER-LIST(2)	NUMBER-LIS.
TIM	ZORG	ARTHUR	AAB	1	1	0	1	
				0	0	0	0	
				4	4	15	16	
				5	5	20	21	
				6	6	25	26	
				7	7	30	31	
				8	8	35	36	
TIM	ZORG	ARTHUR	AAJ	9	9	40	41	
JOHN	RICKY	BOBBY	AAE	4	4	15	16	
JOHN	RICKY	BOBBY	AAK	10	10	45	46	
	ZORG	ARTHUR	AAL	11	11	50	51	
JOHN	RICKY	BOBBY	AAM	12	12	55	56	
TIM	ZORG	ARTHUR	AAN	13	13	60	61	
JOHN	RICKY	BOBBY	AAO	14	14	65	66	
TIM	ZORG	ARTHUR	AAP	15	15	70	71	
JOHN	RICKY	BOBBY	AAQ	16	16	75	76	
TIM	ZORG	ARTHUR	AAR	17	17	80	81	

You have a duplicate key error since all records in a KSDS must have a unique key.

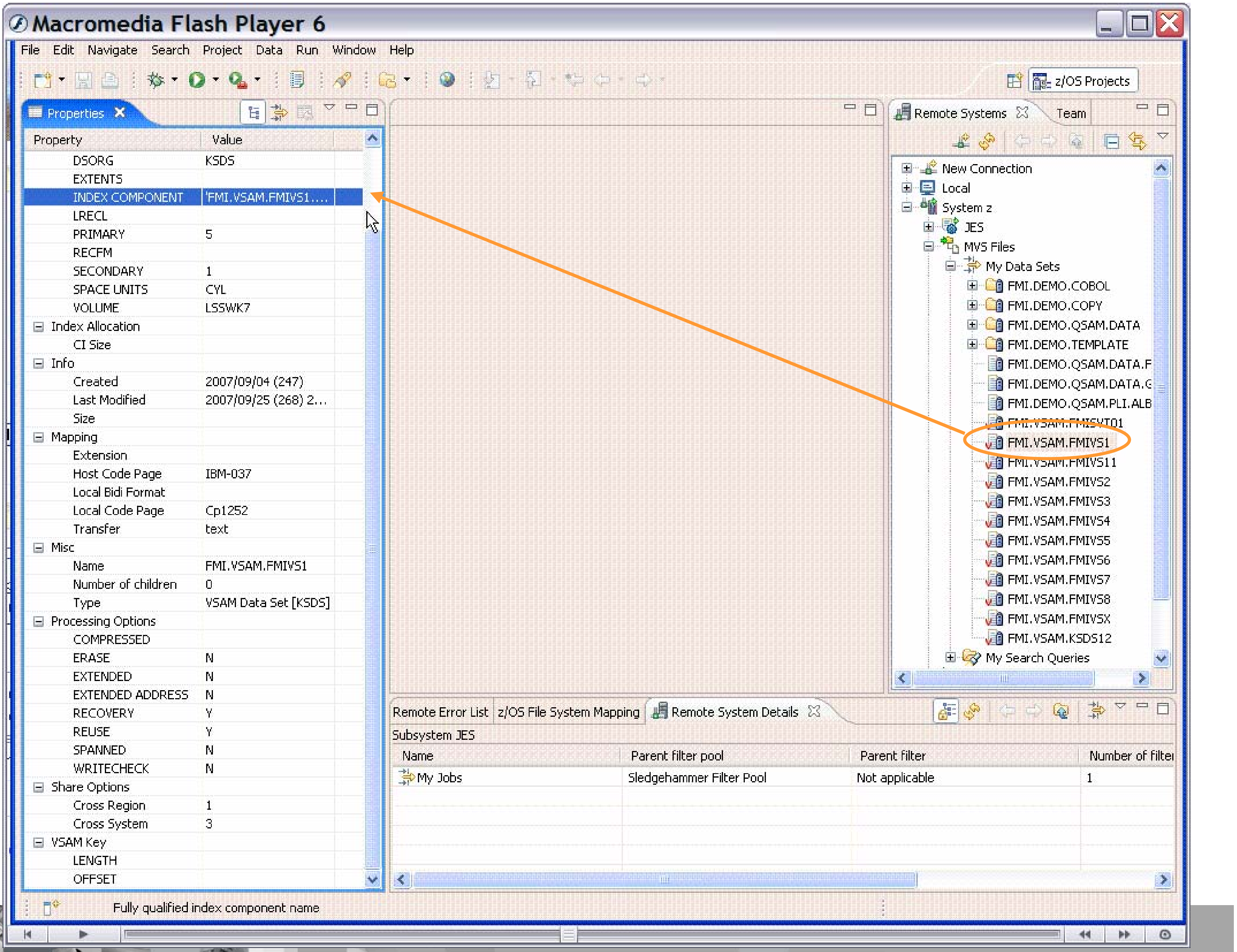
Duplicate Keys Found

Single Mode

Field	Data
NAME-LIST(1)	TIM
NAME-LIST(2)	ZORG
NAME-LIST(3)	ARTHUR
PART1	AAJ
PART2	9
PART3	9
NUMBER-LIST(1)	40
NUMBER-LIST(2)	41
NUMBER-LIST(3)	42
NUMBER-LIST(4)	43
NUMBER-LIST(5)	44

File Manager Integration

VSAM attributes


Macromedia Flash Player 6
File Edit Navigate Search Project Data Run Window Help
z/OS Projects
Properties
Remote Systems
Team

Property	Value
DSORG	KSDS
EXTENTS	
INDEX COMPONENT	'FMI.VSAM.FMIVS1....
LRECL	
PRIMARY	5
RECFM	
SECONDARY	1
SPACE UNITS	CYL
VOLUME	LSSWK7
⊟ Index Allocation	
CI Size	
⊟ Info	
Created	2007/09/04 (247)
Last Modified	2007/09/25 (268) 2...
Size	
⊟ Mapping	
Extension	
Host Code Page	IBM-037
Local Bidi Format	
Local Code Page	Cp1252
Transfer	text
⊟ Misc	
Name	FMI.VSAM.FMIVS1
Number of children	0
Type	VSAM Data Set [KSDS]
⊟ Processing Options	
COMPRESSED	
ERASE	N
EXTENDED	N
EXTENDED ADDRESS	N
RECOVERY	Y
REUSE	Y
SPANNED	N
WRITECHECK	N
⊟ Share Options	
Cross Region	1
Cross System	3
⊟ VSAM Key	
LENGTH	
OFFSET	

Fully qualified index component name

- ⊞ New Connection
- ⊞ Local
- ⊟ System z
  - ⊞ JES
  - ⊟ MVS Files
    - ⊟ My Data Sets
      - ⊞ FMI.DEMO.COBOL
      - ⊞ FMI.DEMO.COPY
      - ⊞ FMI.DEMO.QSAM.DATA
      - ⊞ FMI.DEMO.TEMPLATE
      - FMI.DEMO.QSAM.DATA.F
      - FMI.DEMO.QSAM.DATA.G
      - FMI.DEMO.QSAM.PLI.ALB
      - FMI.VSAM.FMISVT01
      - FMI.VSAM.FMIVS1
      - FMI.VSAM.FMIVS11
      - FMI.VSAM.FMIVS2
      - FMI.VSAM.FMIVS3
      - FMI.VSAM.FMIVS4
      - FMI.VSAM.FMIVS5
      - FMI.VSAM.FMIVS6
      - FMI.VSAM.FMIVS7
      - FMI.VSAM.FMIVS8
      - FMI.VSAM.FMIVSX
      - FMI.VSAM.KSDS12
    - ⊞ My Search Queries

Remote Error List | z/OS File System Mapping | Remote System Details

Subsystem JES

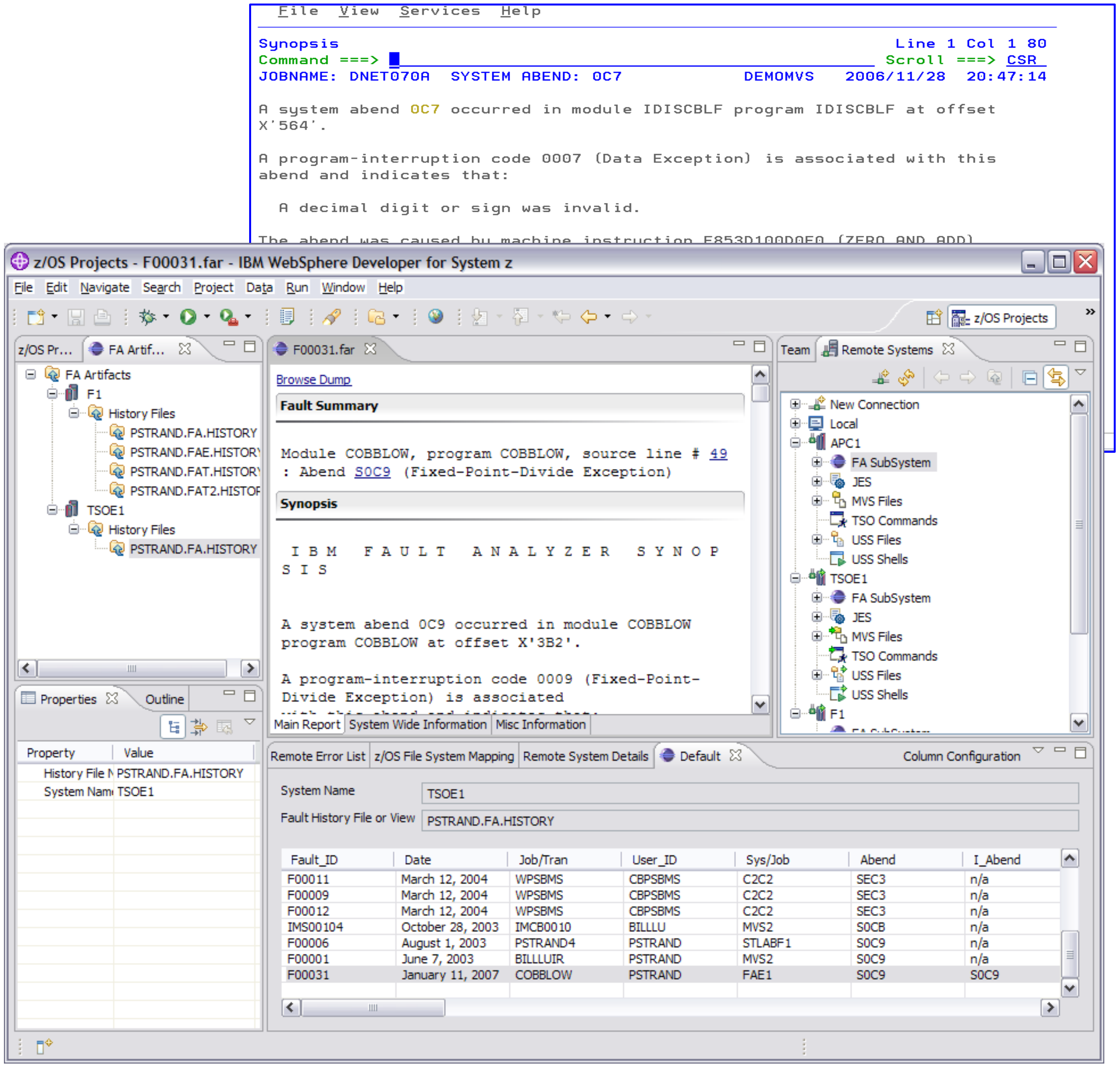
Name	Parent filter pool	Parent filter	Number of filte
My Jobs	Sledgehammer Filter Pool	Not applicable	1

RDz and Fault Analyzer integration

- Fault Analyzer **gathers information** about an application and the surrounding environment **at the time of the abend**

- Integration allows Rational Developer for System z user to access and view Fault Analyzer history files

- Requires Fault Analyzer



```
  File  View  Services  Help

Synopsis                                                       Line 1 Col 1 80
Command ===>                                                   Scroll ===> CSR
JOBNAME: DNET070A  SYSTEM ABEND: 0C7             DEMOMVS  2006/11/28  20:47:14

A system abend 0C7 occurred in module IDISCBLF program IDISCBLF at offset
X'564'.

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

  A decimal digit or sign was invalid.

The abend was caused by machine instruction F853D100D0E0 (ZERO AND ADD)
```

Fault Summary

```
Module COBBLOW, program COBBLOW, source line # 49
: Abend S0C9 (Fixed-Point-Divide 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 0C9 occurred in module COBBLOW
program COBBLOW at offset X'3B2'.

A program-interruption code 0009 (Fixed-Point-
Divide Exception) is associated
```

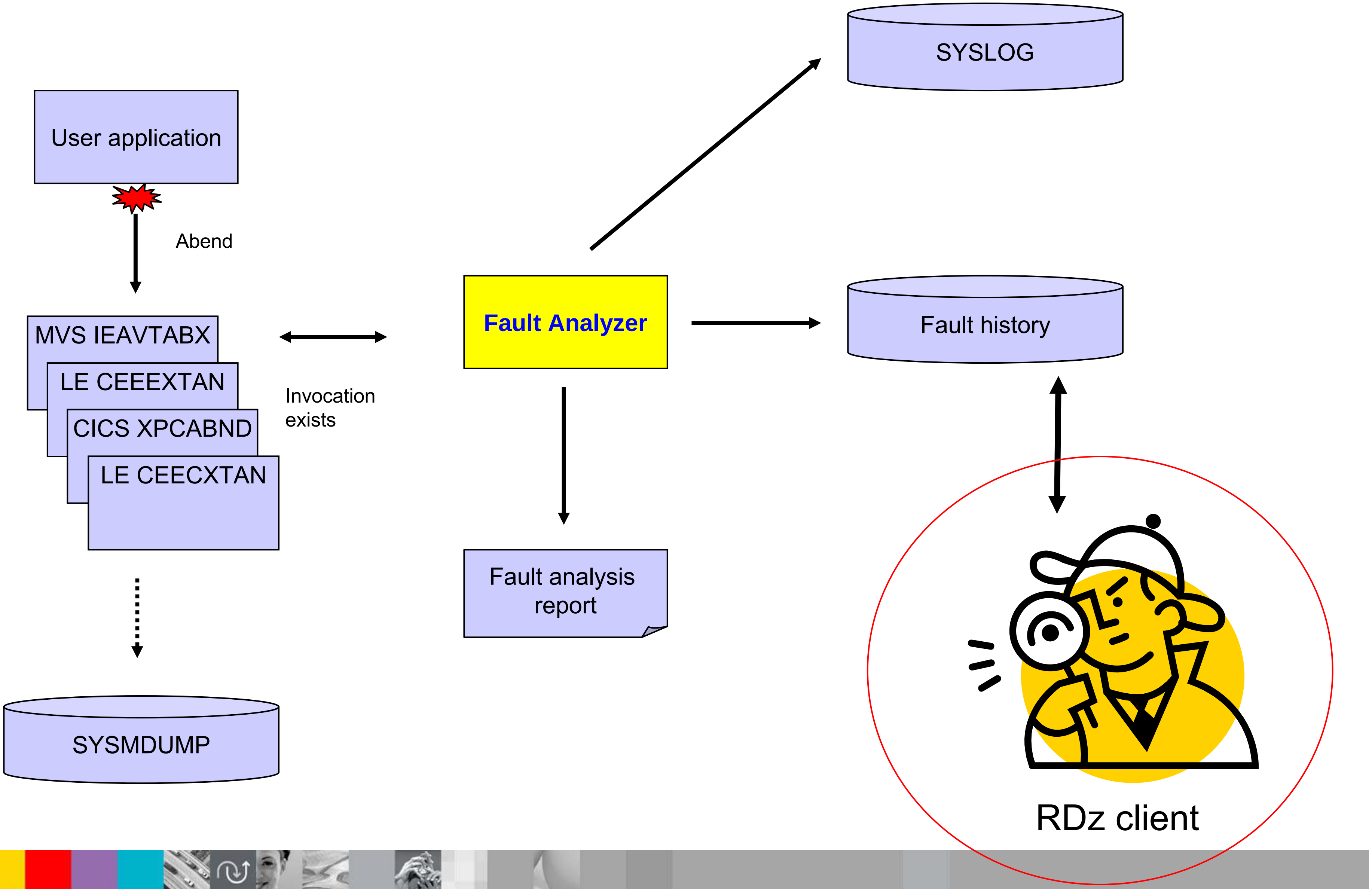
Property	Value
History File N	PSTRAND.FA.HISTORY
System Nam	TSOE1

System Name: TSOE1

Fault History File or View: PSTRAND.FA.HISTORY

Fault_ID	Date	Job/Tran	User_ID	Sys/Job	Abend	I_Abend
F00011	March 12, 2004	WPSBMS	CBPSBMS	C2C2	SEC3	n/a
F00009	March 12, 2004	WPSBMS	CBPSBMS	C2C2	SEC3	n/a
F00012	March 12, 2004	WPSBMS	CBPSBMS	C2C2	SEC3	n/a
IMS00104	October 28, 2003	IMCB0010	BILLLU	MVS2	S0CB	n/a
F00006	August 1, 2003	PSTRAND4	PSTRAND	STLABF1	S0C9	n/a
F00001	June 7, 2003	BILLLUIR	PSTRAND	MVS2	S0C9	n/a
F00031	January 11, 2007	COBBLOW	PSTRAND	FAE1	S0C9	S0C9

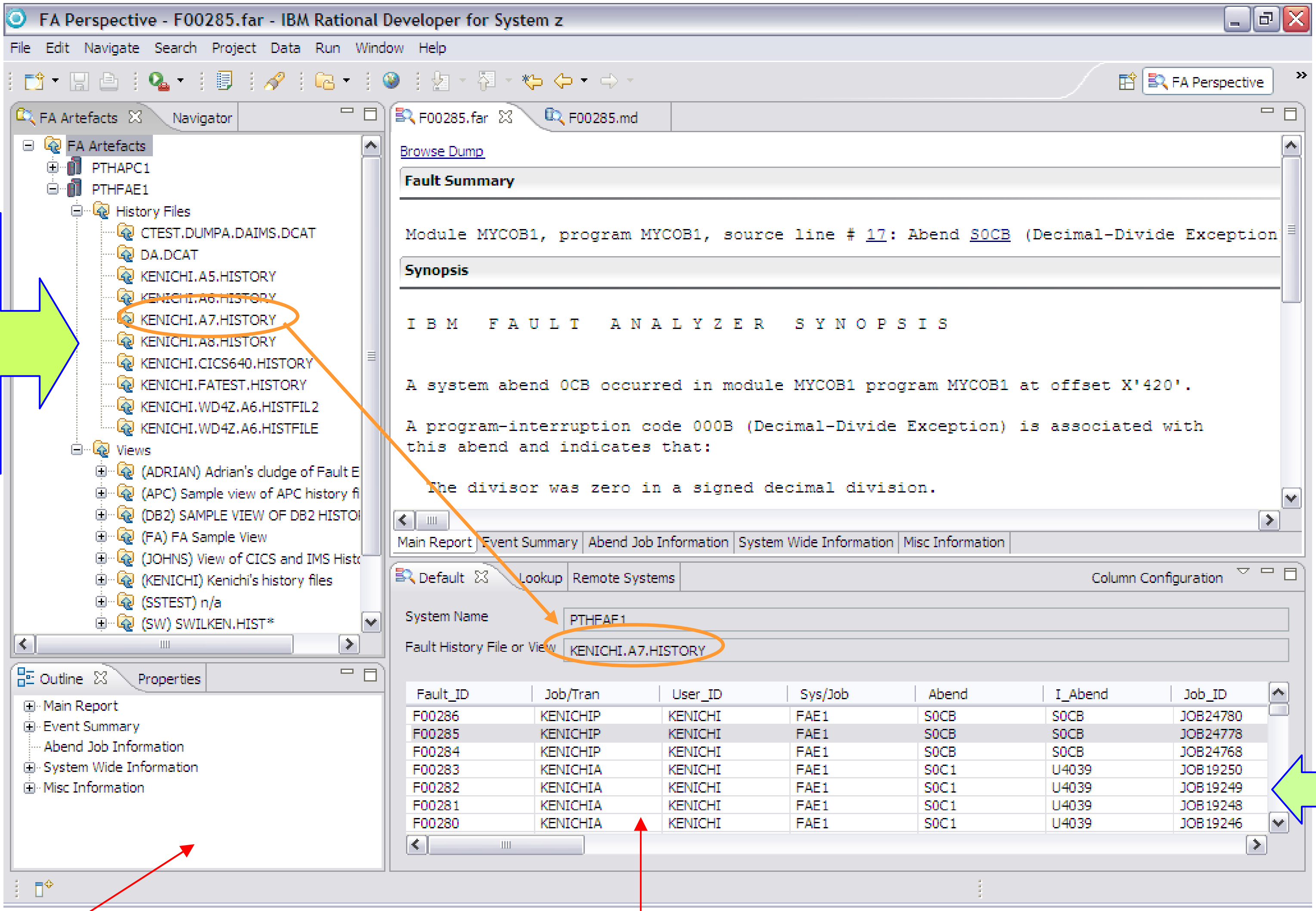
Fault Analyzer for z/OS overview



Fault Analyzer perspective

Browsers

Grouping of Abend history



Fault Summary

```
Module MYCOB1, program MYCOB1, source line # 17: Abend S0CB (Decimal-Divide 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 0CB occurred in module MYCOB1 program MYCOB1 at offset X'420'.

A program-interruption code 000B (Decimal-Divide Exception) is associated with
this abend and indicates that:

  The divisor was zero in a signed decimal division.
```

System Name: PTHFAE1

Fault History File or View: KENICHI.A7.HISTORY

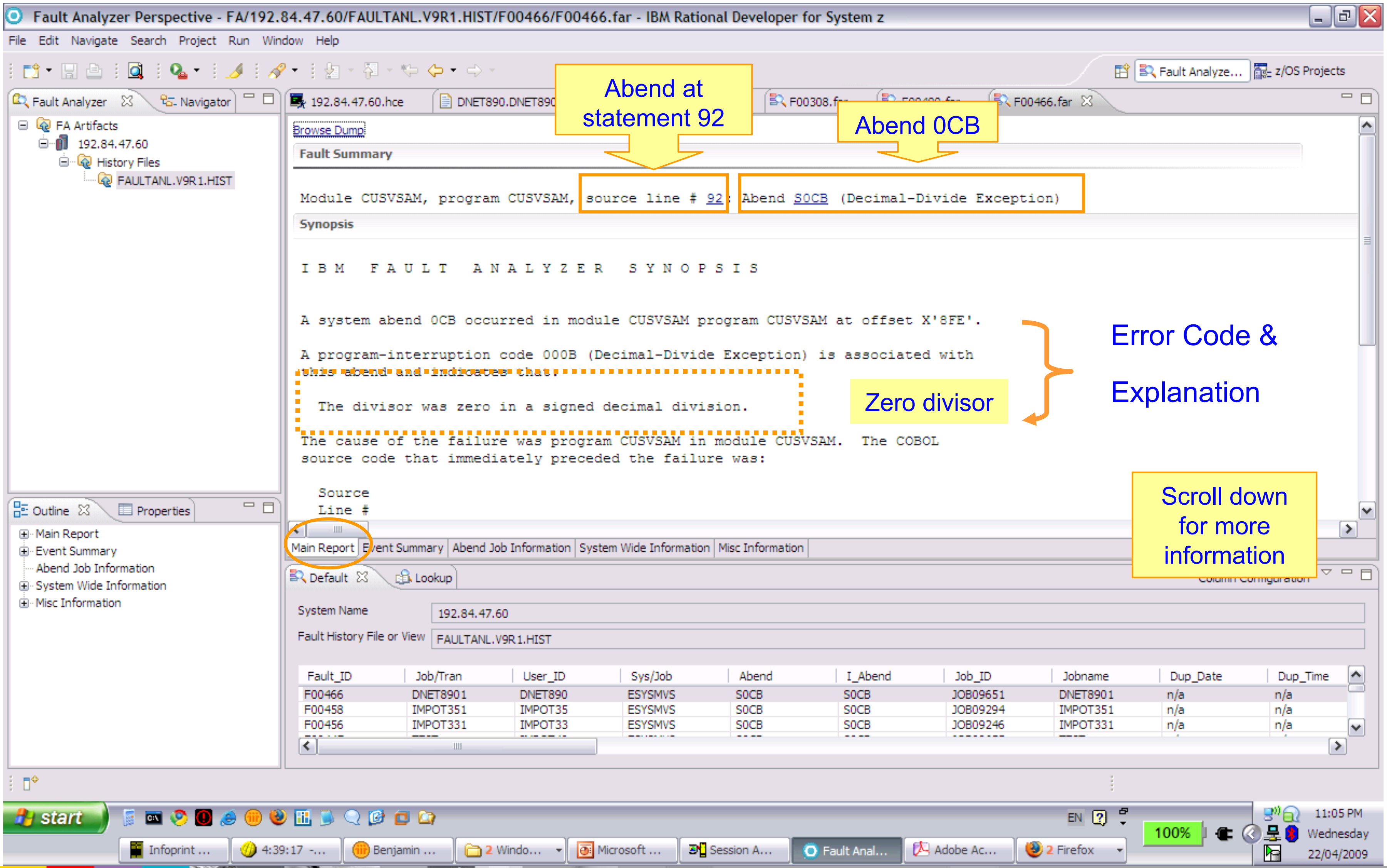
Fault_ID	Job/Tran	User_ID	Sys/Job	Abend	I_Abend	Job_ID
F00286	KENICHIP	KENICHI	FAE1	S0CB	S0CB	JOB24780
F00285	KENICHIP	KENICHI	FAE1	S0CB	S0CB	JOB24778
F00284	KENICHIP	KENICHI	FAE1	S0CB	S0CB	JOB24768
F00283	KENICHIA	KENICHI	FAE1	S0C1	U4039	JOB19250
F00282	KENICHIA	KENICHI	FAE1	S0C1	U4039	JOB19249
F00281	KENICHIA	KENICHI	FAE1	S0C1	U4039	JOB19248
F00280	KENICHIA	KENICHI	FAE1	S0C1	U4039	JOB19246

Abend job

Outline view

Detailed view

Fault Analyzer Main Report (1)



Abend at statement 92

Abend 0CB

Fault Summary

```
Module CUSVSAM, program CUSVSAM, source line # 92: Abend S0CB (Decimal-Divide 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 0CB occurred in module CUSVSAM program CUSVSAM at offset X'8FE'.

A program-interruption code 000B (Decimal-Divide Exception) is associated with
this abend and indicates that:

  The divisor was zero in a signed decimal division.

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

  Source
  Line #
```

Zero divisor

Error Code & Explanation

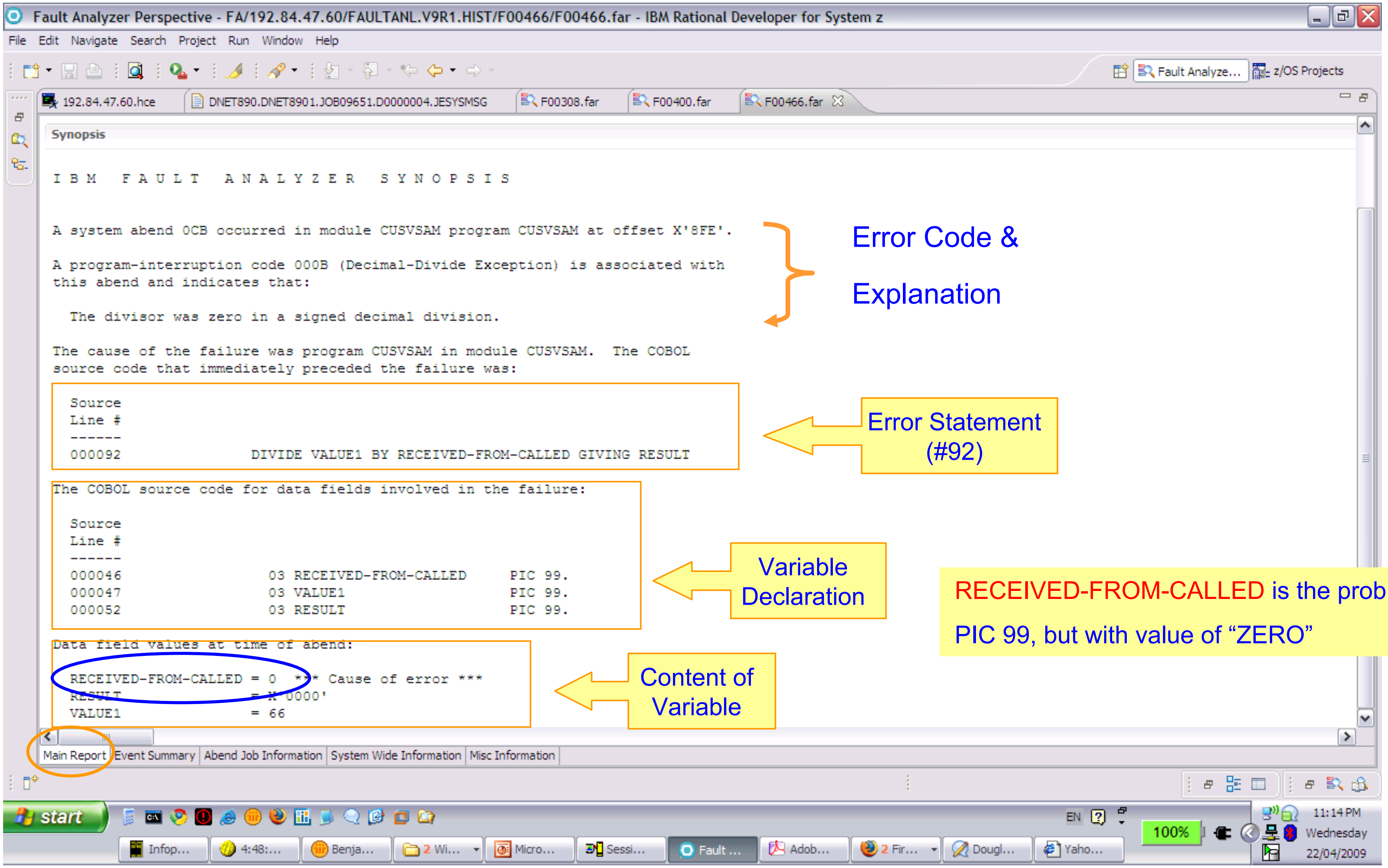
Scroll down for more information

System Name: 192.84.47.60

Fault History File or View: FAULTANL.V9R1.HIST

Fault_ID	Job/Tran	User_ID	Sys/Job	Abend	I_Abend	Job_ID	Jobname	Dup_Date	Dup_Time
F00466	DNET8901	DNET890	ESYSMVS	S0CB	S0CB	JOB09651	DNET8901	n/a	n/a
F00458	IMPOT351	IMPOT35	ESYSMVS	S0CB	S0CB	JOB09294	IMPOT351	n/a	n/a
F00456	IMPOT331	IMPOT33	ESYSMVS	S0CB	S0CB	JOB09246	IMPOT331	n/a	n/a

Fault Analyzer Main Report (2) … more information



```
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 0CB occurred in module CUSVSAM program CUSVSAM at offset X'8FE'.

A program-interruption code 000B (Decimal-Divide Exception) is associated with
this abend and indicates that:

  The divisor was zero in a signed decimal division.

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

  Source
  Line #
  ------
  000092                DIVIDE VALUE1 BY RECEIVED-FROM-CALLED GIVING RESULT

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

  Source
  Line #
  ------
  000046                  03 RECEIVED-FROM-CALLED     PIC 99.
  000047                  03 VALUE1                   PIC 99.
  000052                  03 RESULT                   PIC 99.

Data field values at time of abend:

  RECEIVED-FROM-CALLED = 0   *** Cause of error ***
  RESULT               = X'0000'
  VALUE1               = 66
```

Error Code &

Explanation

Error Statement (#92)

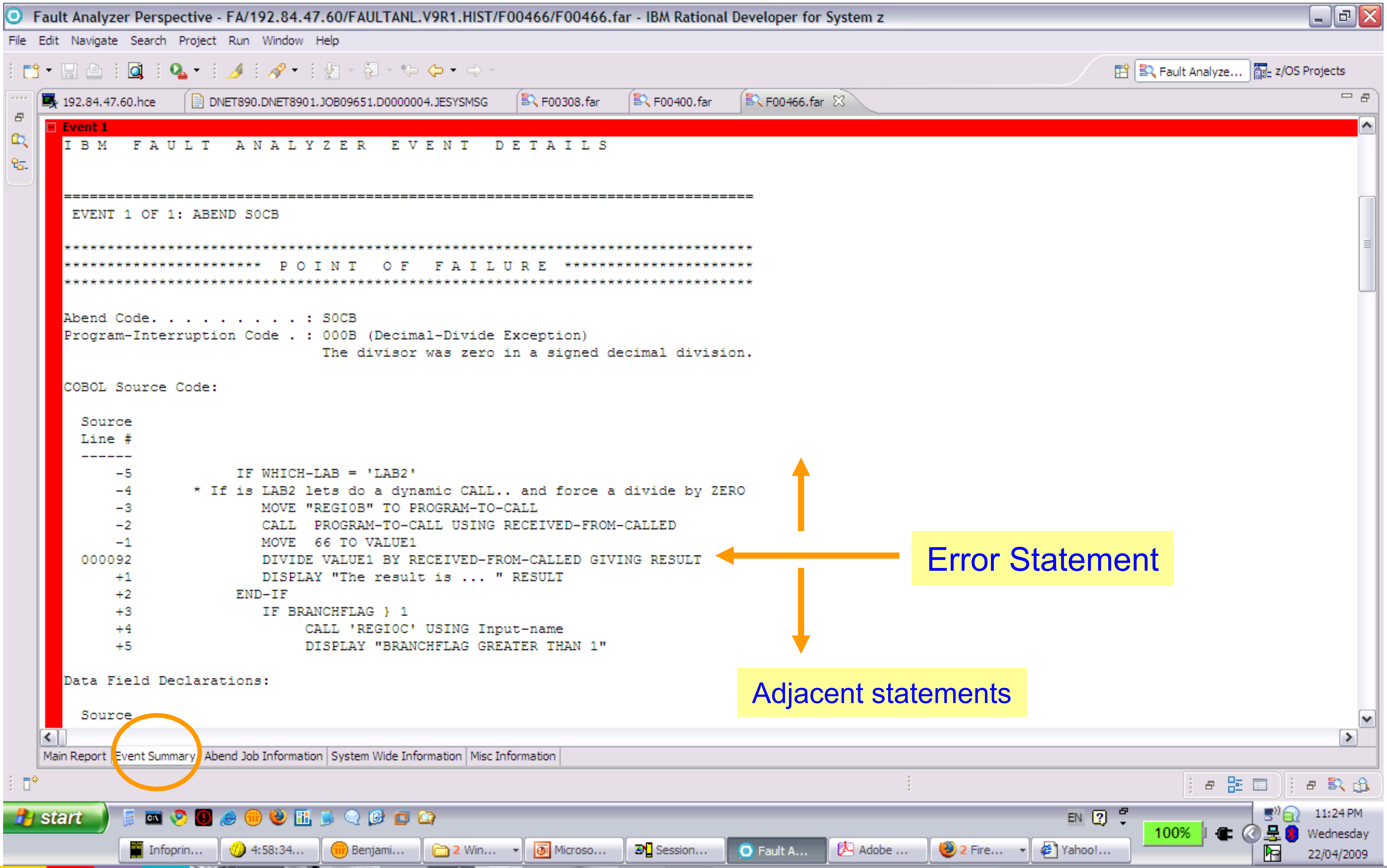
Variable Declaration

Content of Variable

RECEIVED-FROM-CALLED is the problem

PIC 99, but with value of “ZERO”

Event Summary (1)

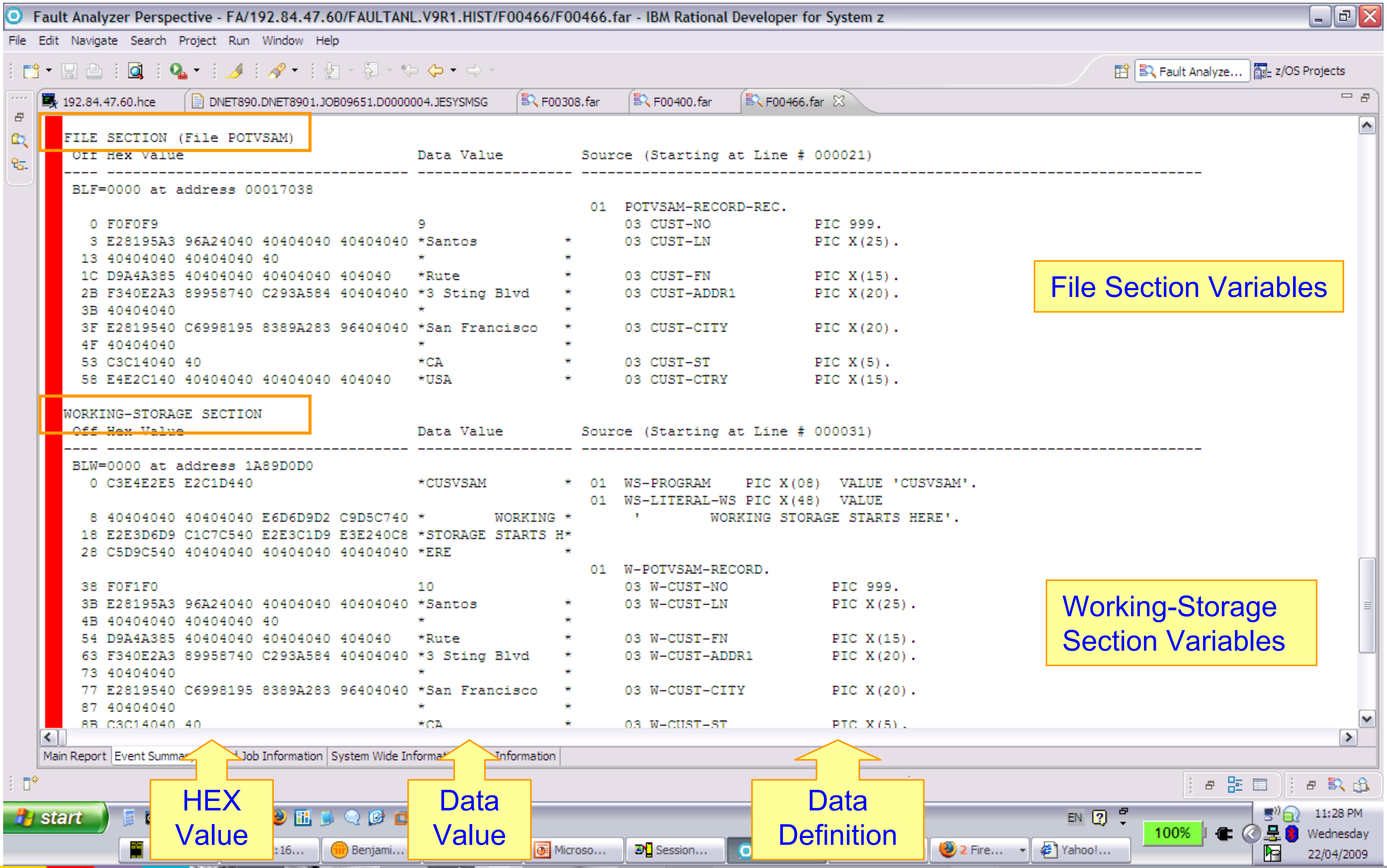

Fault Analyzer Perspective - FA/192.84.47.60/FAULTANL.V9R1.HIST/F00466/F00466.far - IBM Rational Developer for System z
File Edit Navigate Search Project Run Window Help
Fault Analyze...
z/OS Projects
192.84.47.60.hce
DNET890.DNET8901.JOB09651.D0000004.JESYSMSG
F00308.far
F00400.far
F00466.far
Event 1
Main Report
Event Summary
Abend Job Information
System Wide Information
Misc Information
start
11:24 PM
Wednesday
22/04/2009

```
I B M   F A U L T   A N A L Y Z E R   E V E N T   D E T A I L S


================================================================================
 EVENT 1 OF 1: ABEND S0CB

********************************************************************************
***********************  P O I N T   O F   F A I L U R E  **********************
********************************************************************************

Abend Code. . . . . . . . . : S0CB
Program-Interruption Code . : 000B (Decimal-Divide Exception)
                              The divisor was zero in a signed decimal division.

COBOL Source Code:

  Source
  Line #
  ------
      -5            IF WHICH-LAB = 'LAB2'
      -4         * If is LAB2 lets do a dynamic CALL.. and force a divide by ZERO
      -3               MOVE "REGIOB" TO PROGRAM-TO-CALL
      -2               CALL  PROGRAM-TO-CALL USING RECEIVED-FROM-CALLED
      -1               MOVE  66 TO VALUE1
  000092               DIVIDE VALUE1 BY RECEIVED-FROM-CALLED GIVING RESULT
      +1               DISPLAY "The result is ... " RESULT
      +2            END-IF
      +3               IF BRANCHFLAG } 1
      +4                    CALL 'REGIOC' USING Input-name
      +5                    DISPLAY "BRANCHFLAG GREATER THAN 1"

Data Field Declarations:

  Source
```

Error Statement

Adjacent statements

Event Summary (2)



Fault Analyzer Perspective - FA/192.84.47.60/FAULTANL.V9R1.HIST/F00466/F00466.far - IBM Rational Developer for System z

```
FILE SECTION (File POTVSAM)
 Off Hex Value                           Data Value         Source (Starting at Line # 000021)
---- ----------------------------------- ------------------ ------------------------------------------------------------------------
 BLF=0000 at address 00017038

                                                             01  POTVSAM-RECORD-REC.
   0 F0F0F9                              9                       03 CUST-NO            PIC 999.
   3 E28195A3 96A24040 40404040 40404040 *Santos          *      03 CUST-LN            PIC X(25).
  13 40404040 40404040 40                *                *
  1C D9A4A385 40404040 40404040 404040   *Rute            *      03 CUST-FN            PIC X(15).
  2B F340E2A3 89958740 C293A584 40404040 *3 Sting Blvd    *      03 CUST-ADDR1         PIC X(20).
  3B 40404040                            *                *
  3F E2819540 C6998195 8389A283 96404040 *San Francisco   *      03 CUST-CITY          PIC X(20).
  4F 40404040                            *                *
  53 C3C14040 40                         *CA              *      03 CUST-ST            PIC X(5).
  58 E4E2C140 40404040 40404040 404040   *USA             *      03 CUST-CTRY          PIC X(15).

WORKING-STORAGE SECTION
 Off Hex Value                           Data Value         Source (Starting at Line # 000031)
---- ----------------------------------- ------------------ ------------------------------------------------------------------------
 BLW=0000 at address 1A89D0D0
   0 C3E4E2E5 E2C1D440                   *CUSVSAM         *  01  WS-PROGRAM    PIC X(08)  VALUE 'CUSVSAM'.
                                                             01  WS-LITERAL-WS PIC X(48)  VALUE
   8 40404040 40404040 E6D6D9D2 C9D5C740 *        WORKING *       '        WORKING STORAGE STARTS HERE'.
  18 E2E3D6D9 C1C7C540 E2E3C1D9 E3E240C8 *STORAGE STARTS H*
  28 C5D9C540 40404040 40404040 40404040 *ERE             *

                                                             01  W-POTVSAM-RECORD.
  38 F0F1F0                              10                      03 W-CUST-NO            PIC 999.
  3B E28195A3 96A24040 40404040 40404040 *Santos          *      03 W-CUST-LN            PIC X(25).
  4B 40404040 40404040 40                *                *
  54 D9A4A385 40404040 40404040 404040   *Rute            *      03 W-CUST-FN            PIC X(15).
  63 F340E2A3 89958740 C293A584 40404040 *3 Sting Blvd    *      03 W-CUST-ADDR1         PIC X(20).
  73 40404040                            *                *
  77 E2819540 C6998195 8389A283 96404040 *San Francisco   *      03 W-CUST-CITY          PIC X(20).
  87 40404040                            *                *
  8B C3C14040 40                         *CA              *      03 W-CUST-ST            PIC X(5).
```

File Section Variables

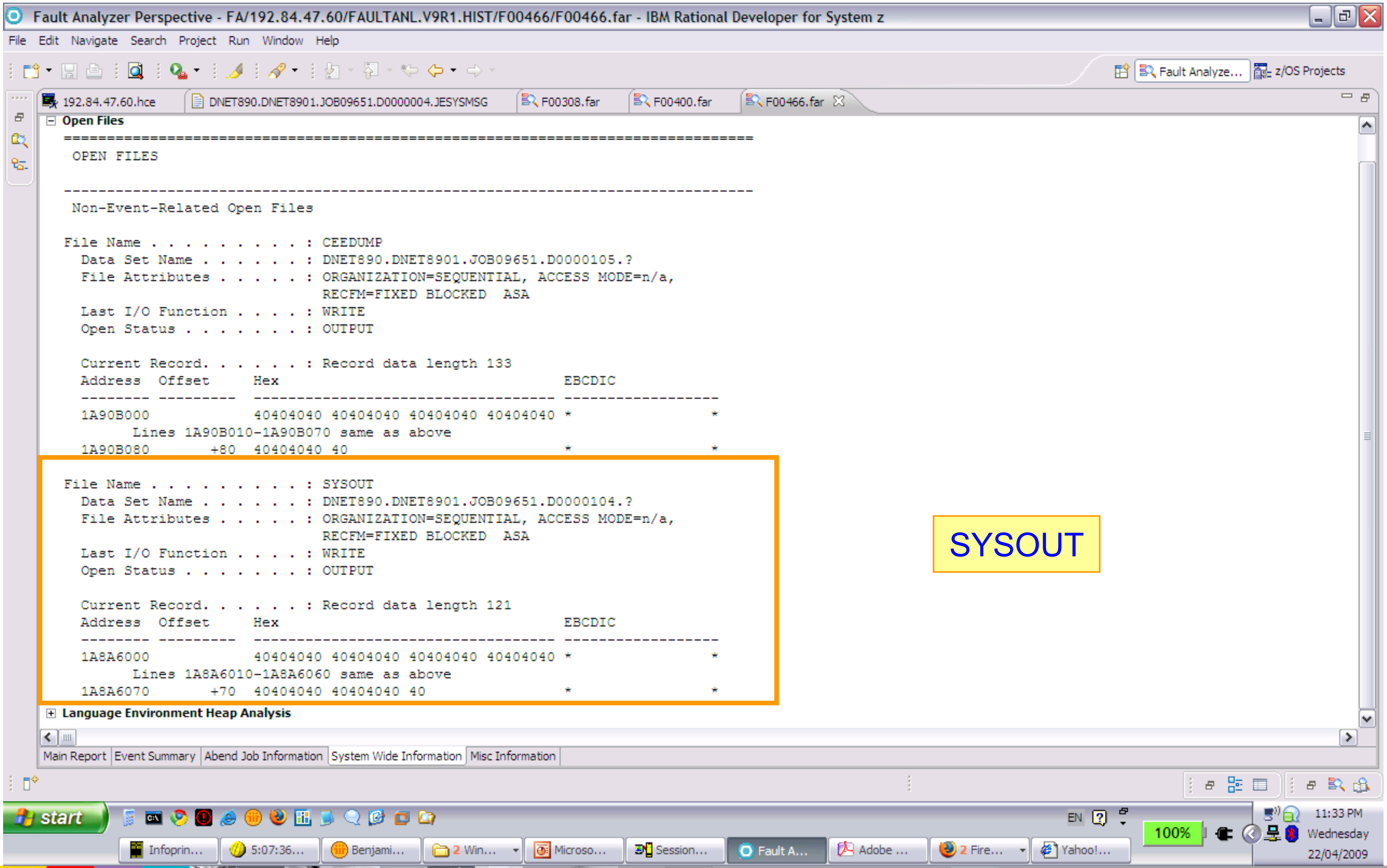
Working-Storage Section Variables

HEX Value

Data Value

Data Definition

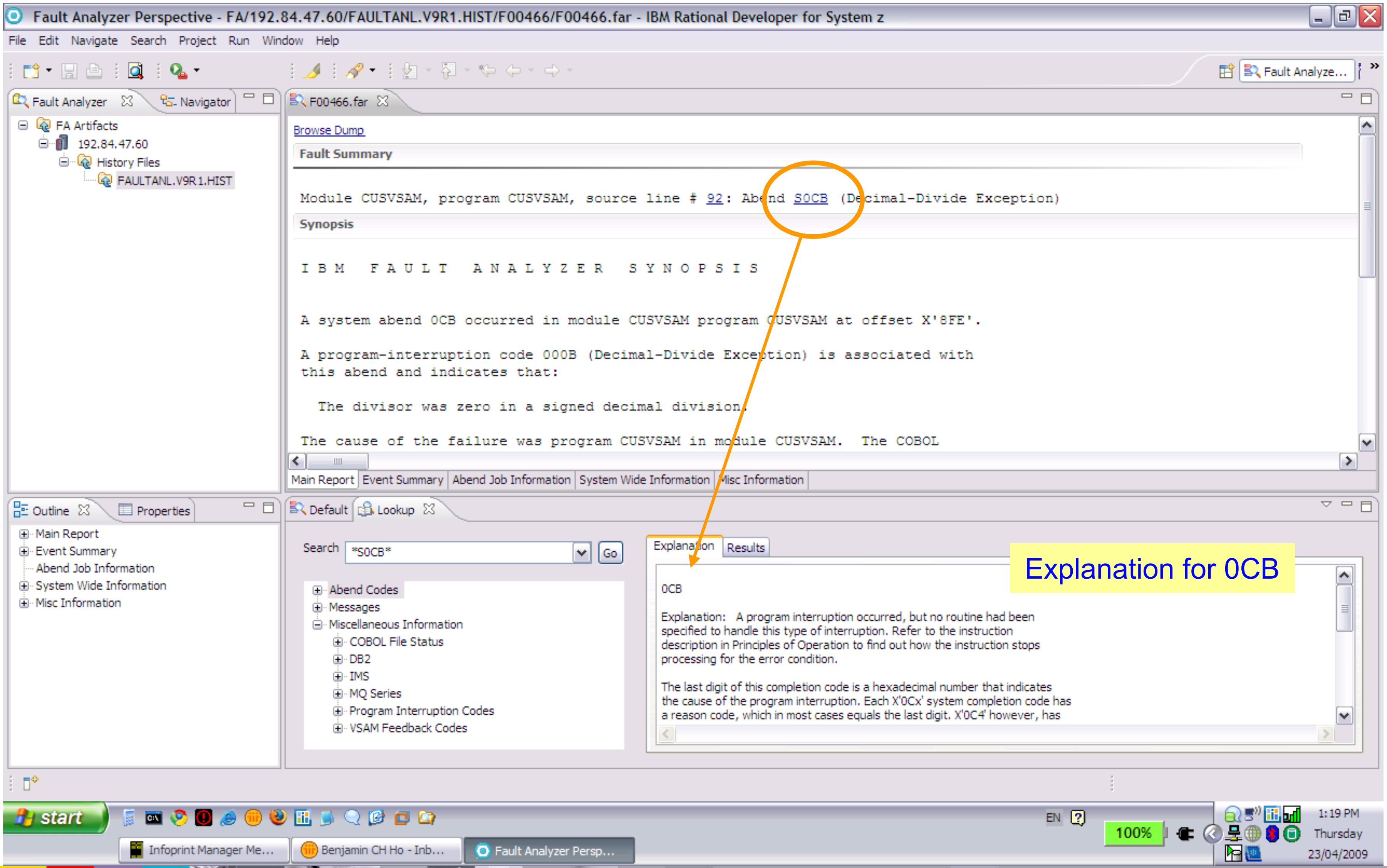
Associated Files



```
 ================================================================================
  OPEN FILES

 --------------------------------------------------------------------------------
  Non-Event-Related Open Files

 File Name . . . . . . . . . : CEEDUMP
   Data Set Name . . . . . . : DNET890.DNET8901.JOB09651.D0000105.?
   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
   -------- ---------  ----------------------------------- ------------------
   1A90B000            40404040 40404040 40404040 40404040 *                *
         Lines 1A90B010-1A90B070 same as above
   1A90B080       +80  40404040 40                         *                *

 File Name . . . . . . . . . : SYSOUT
   Data Set Name . . . . . . : DNET890.DNET8901.JOB09651.D0000104.?
   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
   -------- ---------  ----------------------------------- ------------------
   1A8A6000            40404040 40404040 40404040 40404040 *                *
         Lines 1A8A6010-1A8A6060 same as above
   1A8A6070       +70  40404040 40404040 40                *                *
```

SYSOUT

Lookup Functions



Fault Summary

```
Module CUSVSAM, program CUSVSAM, source line # 92: Abend S0CB (Decimal-Divide 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 0CB occurred in module CUSVSAM program CUSVSAM at offset X'8FE'.

A program-interruption code 000B (Decimal-Divide Exception) is associated with
this abend and indicates that:

  The divisor was zero in a signed decimal division.

The cause of the failure was program CUSVSAM in module CUSVSAM.  The COBOL
```

Search: *S0CB*

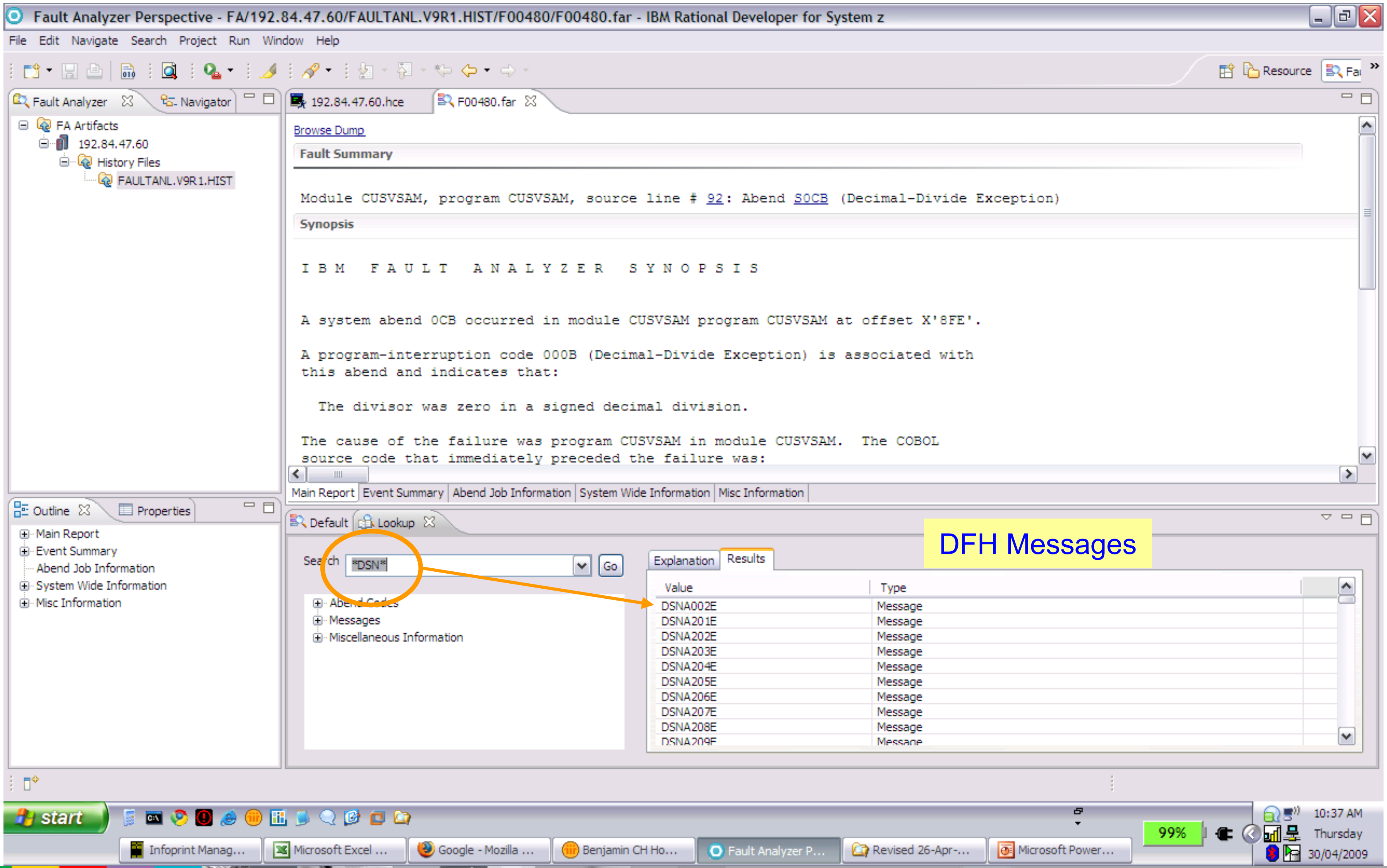
0CB

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 a reason code, which in most cases equals the last digit. X'0C4' however, has

Explanation for 0CB

Lookup Functions



Fault Summary

```
Module CUSVSAM, program CUSVSAM, source line # 92: Abend S0CB (Decimal-Divide Exception)
```

Synopsis

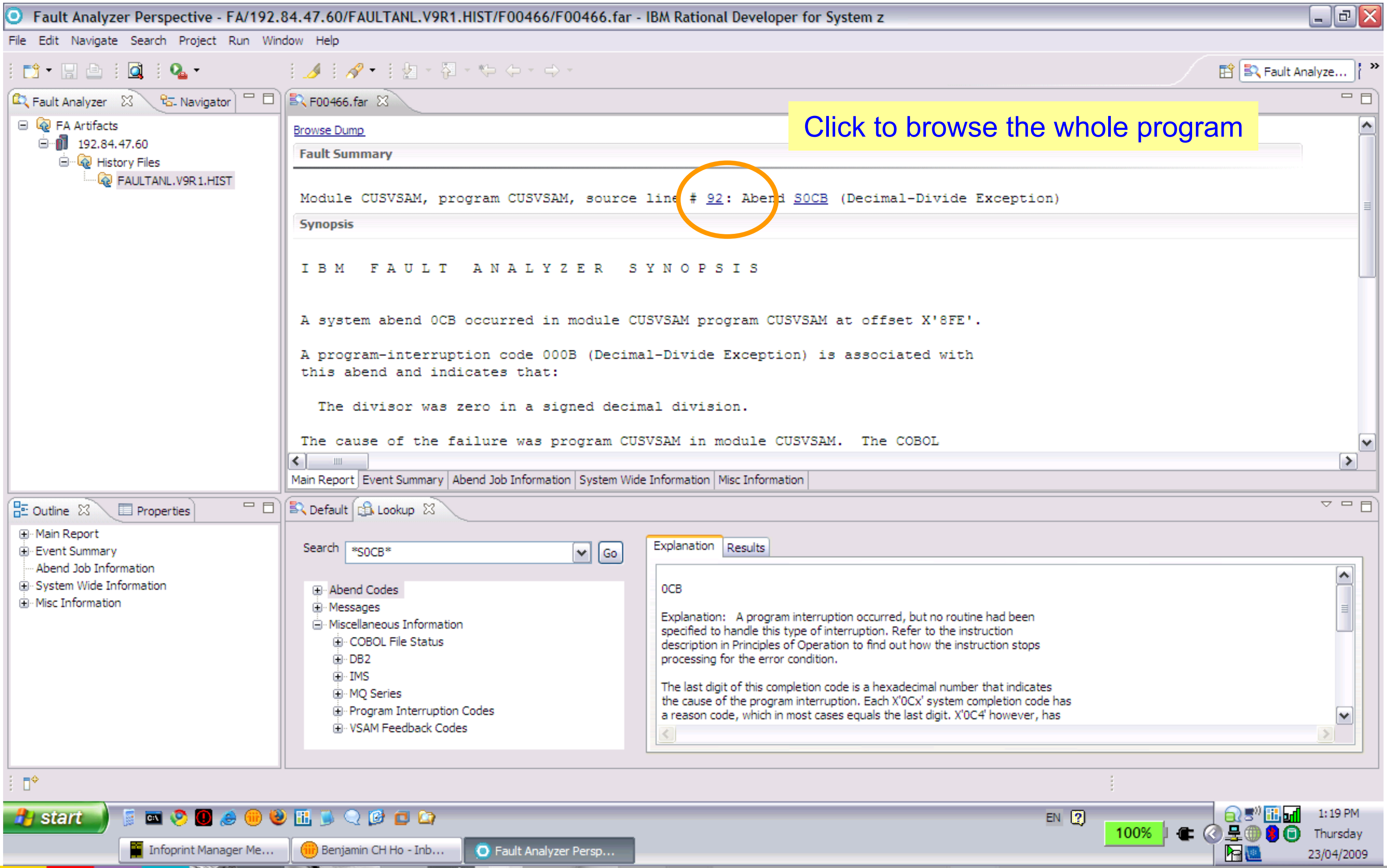
```
I B M   F A U L T   A N A L Y Z E R   S Y N O P S I S


A system abend 0CB occurred in module CUSVSAM program CUSVSAM at offset X'8FE'.

A program-interruption code 000B (Decimal-Divide Exception) is associated with
this abend and indicates that:

  The divisor was zero in a signed decimal division.

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

Search: *DSN*

Value	Type
DSNA002E	Message
DSNA201E	Message
DSNA202E	Message
DSNA203E	Message
DSNA204E	Message
DSNA205E	Message
DSNA206E	Message
DSNA207E	Message
DSNA208E	Message
DSNA209E	Message

DFH Messages

Browse Program … (1)



```
Module CUSVSAM, program CUSVSAM, source line # 92: Abend S0CB (Decimal-Divide Exception)
```

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


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  The divisor was zero in a signed decimal division.

The cause of the failure was program CUSVSAM in module CUSVSAM.  The COBOL
```
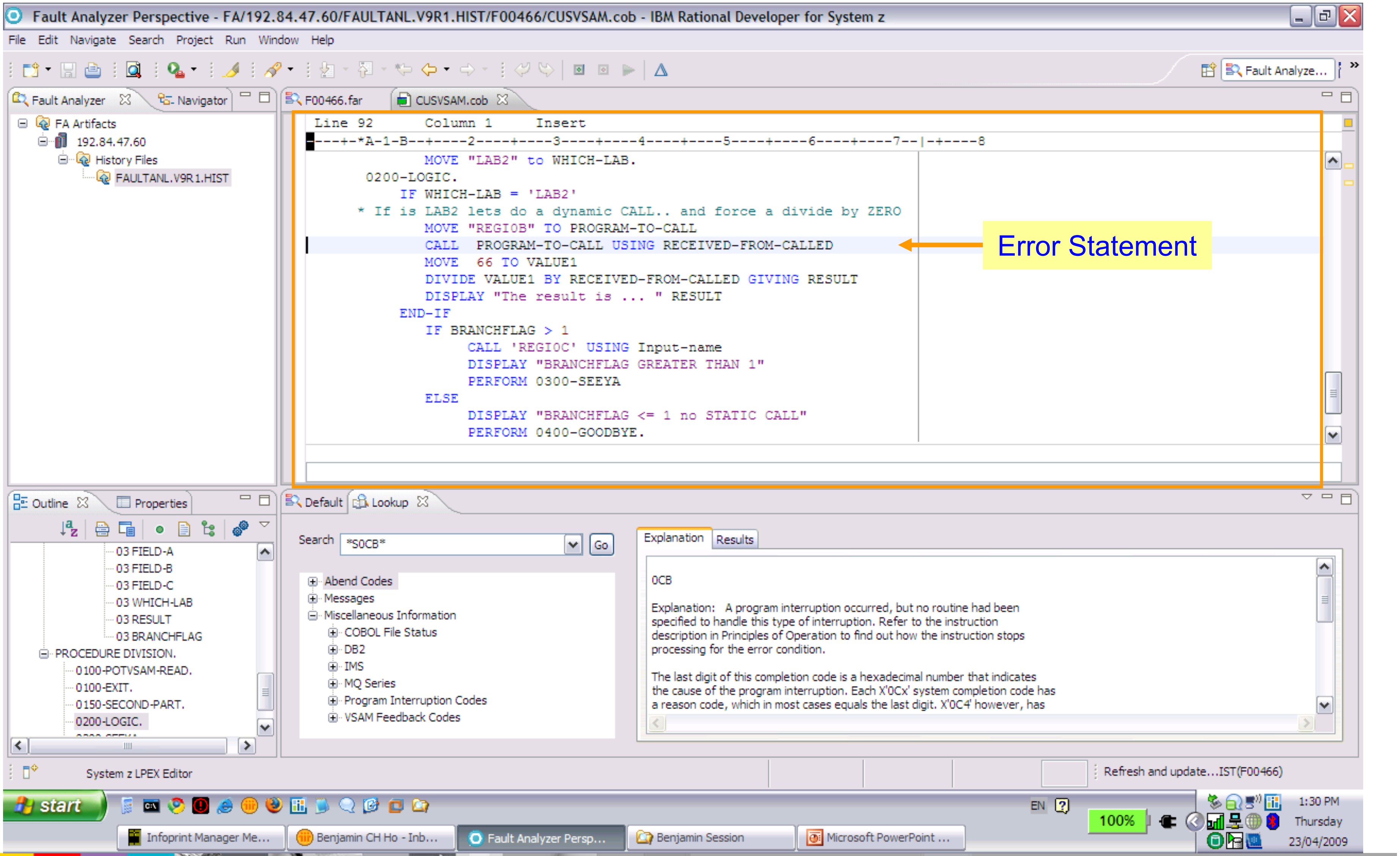

0CB

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 a reason code, which in most cases equals the last digit. X'0C4' however, has

Click to browse the whole program

Browse Program … (2)



```
 Line 92      Column 1      Insert
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----8
              MOVE "LAB2" to WHICH-LAB.
       0200-LOGIC.
           IF WHICH-LAB = 'LAB2'
      * If is LAB2 lets do a dynamic CALL.. and force a divide by ZERO
              MOVE "REGIOB" TO PROGRAM-TO-CALL
              CALL  PROGRAM-TO-CALL USING RECEIVED-FROM-CALLED
              MOVE  66 TO VALUE1
              DIVIDE VALUE1 BY RECEIVED-FROM-CALLED GIVING RESULT
              DISPLAY "The result is ... " RESULT
           END-IF
              IF BRANCHFLAG > 1
                   CALL 'REGIOC' USING Input-name
                   DISPLAY "BRANCHFLAG GREATER THAN 1"
                   PERFORM 0300-SEEYA
              ELSE
                   DISPLAY "BRANCHFLAG <= 1 no STATIC CALL"
                   PERFORM 0400-GOODBYE.
```

Error Statement

0CB

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 a reason code, which in most cases equals the last digit. X'0C4' however, has

IBM Rational Developer for System z

XML Services for the Enterprise (XSE)

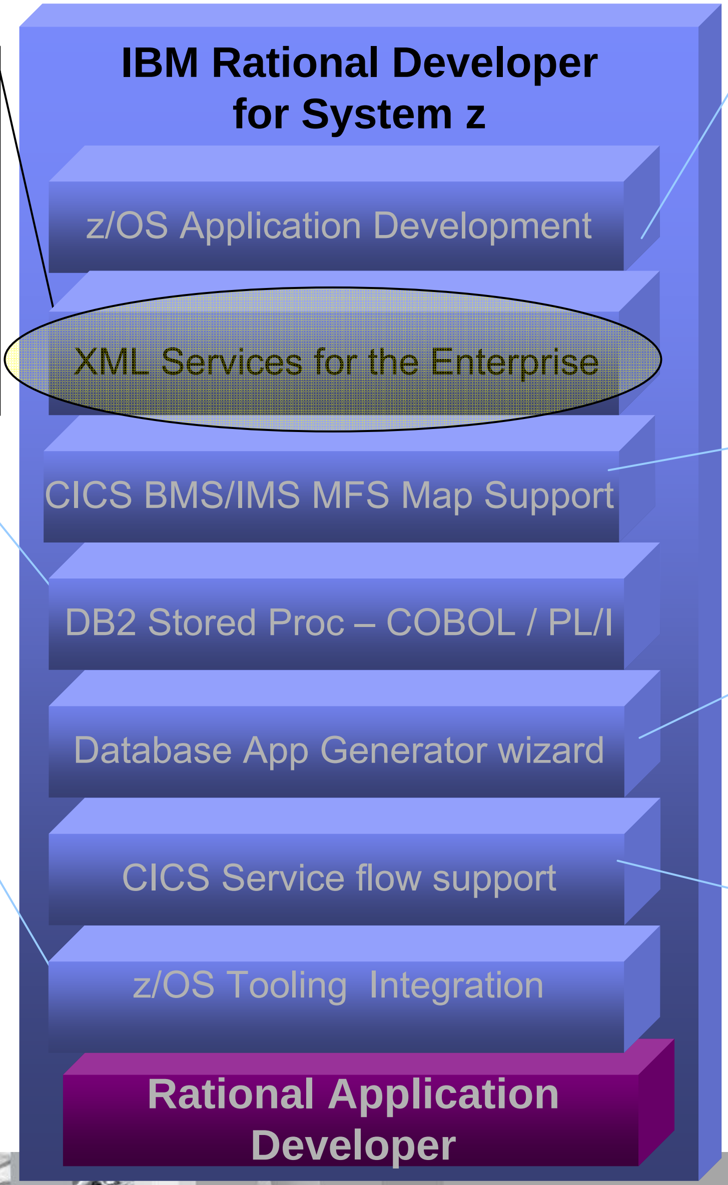
- SOA access to CICS V3.x and IMS V9 or V10 COBOL/PLI applications
- Bottom-up/Top-down or meet-in-the-middle COBOL/PLI to XML mapping support
- meet-in-the-middle development scenario tooling wizards. for CICS, IMS, and batch applications

DB2 Stored Procedure for COBOL and PL/I

- Create DB2 stored procedures on z/OS in either COBOL or PL/I
- Build and catalog support for the DB2 stored procedure
- Debug z/OS based stored procedures from workstation

z/OS Tooling Integration

- Read/Write/Update VSAM datasets via integration with IBM File Manager
- Access IBM Fault analyzer reports for analyzing ABENDS and associating back to source code


IBM Rational Developer for System z
z/OS Application Development
XML Services for the Enterprise
CICS BMS/IMS MFS Map Support
DB2 Stored Proc – COBOL / PL/I
Database App Generator wizard
CICS Service flow support
z/OS Tooling Integration
Rational Application Developer

z/OS Application Development

- Connect to z/OS remote systems
- Work with z/OS resources like COBOL, PL/I , C, C++, JCL, etc.
- Interact with the Job Entry Subsystem (JES) to submit jobs, monitor jobs, and review job output
- Perform dataset management actions like allocating datasets and migrating datasets
- Perform typical edit, compile, and debug tasks on remote z/OS resources from the workstation

CICS BMS/ IMS MFS Map Support

- Visually create and modify BMS Map sets or IMS/MFS
- Generates JCL
- Work with local or remote maps

Database App Generator wizard

- Ability to generate WSDL and CICS COBOL program to access DB2
- Generate CRUD DB2 program code from UML, which can also be integrated into web service applications

CICS Service Flow Feature

- Implements SOA and Web Services
- Service Flow is a tool to build service flows out of your existing COMMAREA and Terminal based CICS applications.

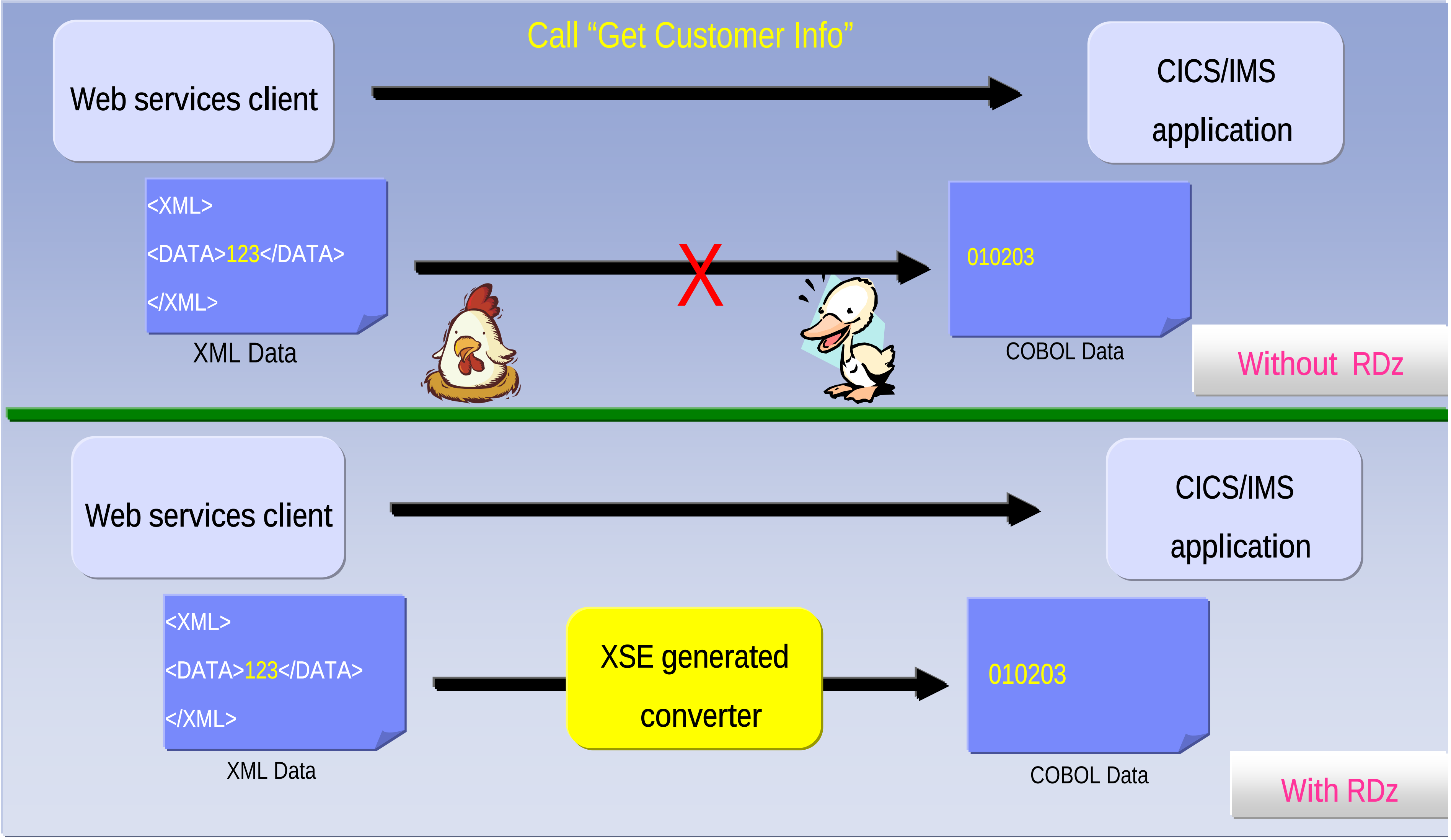
Why Web Services?

Web services provide standardized access to assets for **different software applications** residing on **disparate platforms**

Web service definitions provide abstract interfaces which allow for **loose coupling** between business components – implementation can vary without affecting consumers

You can **reuse applications exposed as Web services** in a variety of service-oriented architecture frameworks, such as a process choreographer or an enterprise service bus**.**

We need interfaces to talk “XML” ….



Call “Get Customer Info”

Web services client

CICS/IMS application

<XML>
<DATA>123</DATA>
</XML>

XML Data

X

010203

COBOL Data

Without RDz

Web services client

CICS/IMS application

<XML>
<DATA>123</DATA>
</XML>

XML Data

XSE generated converter

010203

COBOL Data

With RDz

XML Services for the Enterprise (XSE):

Web Services Enablement wizard (bottom-up)

Rational Developer for System z Generates Web Service interface **from existing COBOL or PL/I program**

Bottom-up approach since COBOL or PL/I (*) at the bottom (base) of the creation process

Web Services Enablement wizard (top-down)

Rational Developer for System z Generates COBOL Program and copybooks **from existing WSDL**

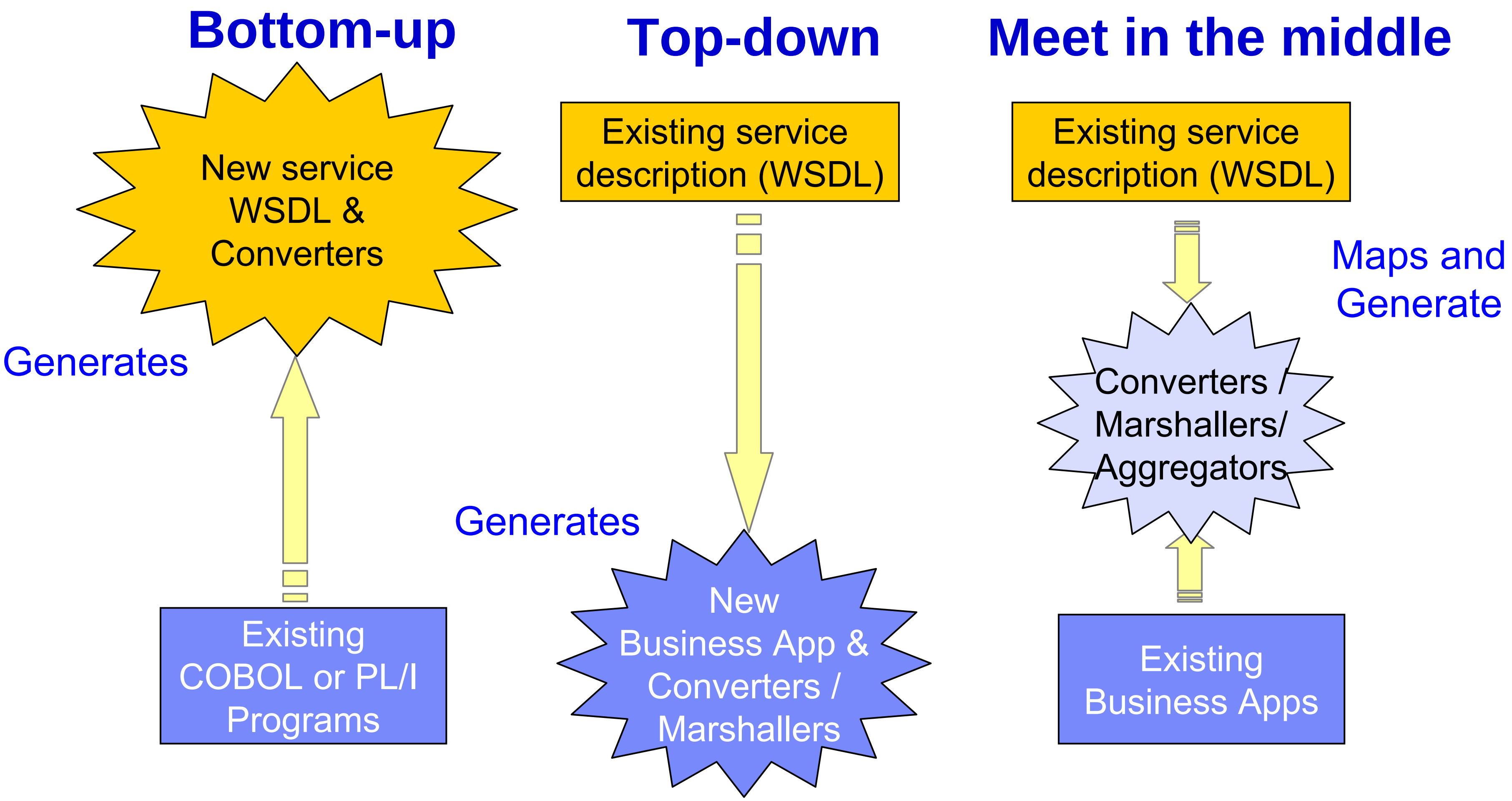
Web Services Enablement wizard (meet-in-the-middle)

Rational Developer for System z **Maps existing WSDL or XML to existing COBOL app.**

Meet-in-the-middle since Web Services/XML definition “meets” or maps to the existing COBOL interface

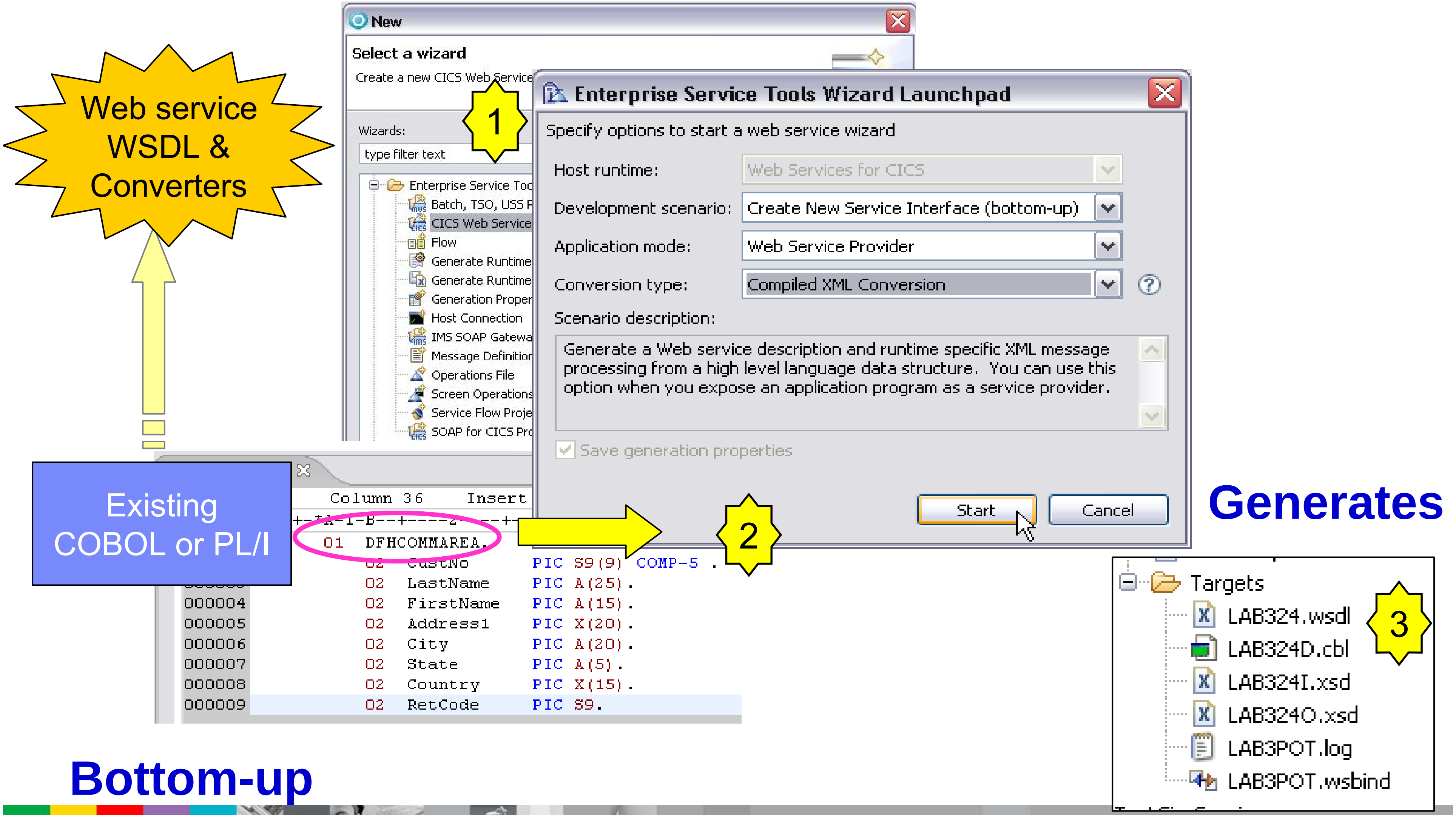
* PL/I is new on V 7.1 NEW!

XML Services for the Enterprise (XSE)
Web Service Enablement Styles


Bottom-up
Top-down
Meet in the middle
New service WSDL & Converters
Generates
Existing COBOL or PL/I Programs
Existing service description (WSDL)
Generates
New Business App & Converters / Marshallers
Existing service description (WSDL)
Maps and Generate
Converters / Marshallers/ Aggregators
Existing Business Apps

XML Services for the Enterprise (XSE)

Example Bottom-up



Enterprise Service Tools Wizard Launchpad

Specify options to start a web service wizard

- Host runtime: Web Services for CICS
- Development scenario: Create New Service Interface (bottom-up)
- Application mode: Web Service Provider
- Conversion type: Compiled XML Conversion

Scenario description:

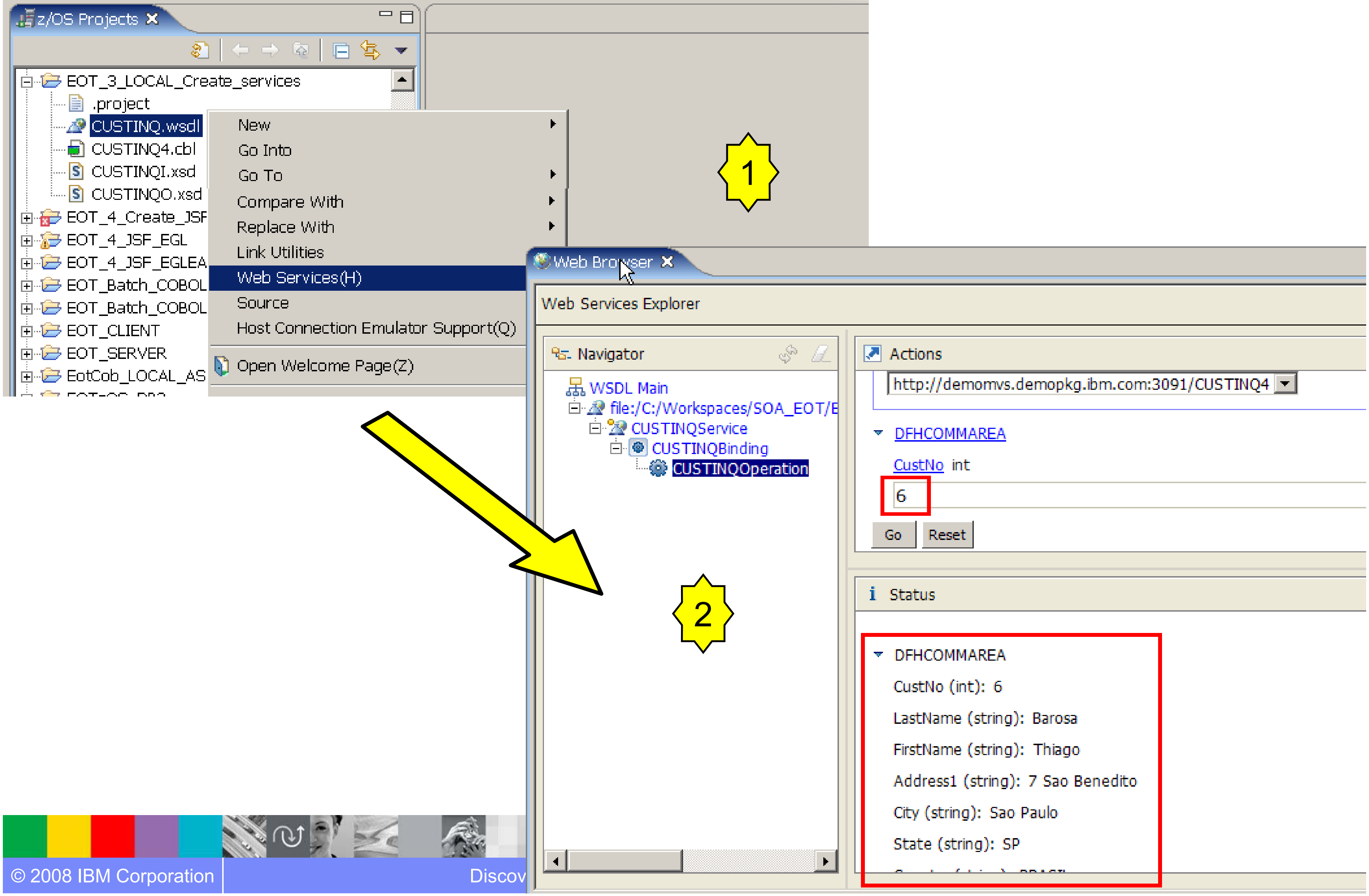
Generate a Web service description and runtime specific XML message processing from a high level language data structure. You can use this option when you expose an application program as a service provider.

☑ Save generation properties

```
       01  DFHCOMMAREA.
           02  CustNo       PIC S9(9)  COMP-5 .
           02  LastName     PIC A(25).
           02  FirstName    PIC A(15).
           02  Address1     PIC X(20).
           02  City         PIC A(20).
           02  State        PIC A(5).
           02  Country      PIC X(15).
           02  RetCode      PIC S9.
```

Bottom-up

Example: Testing using Rational Developer for System z



http://demomvs.demopkg.ibm.com:3091/CUSTINQ4

DFHCOMMAREA

CustNo int

6

DFHCOMMAREA

CustNo (int): 6

LastName (string): Barosa

FirstName (string): Thiago

Address1 (string): 7 Sao Benedito

City (string): Sao Paulo

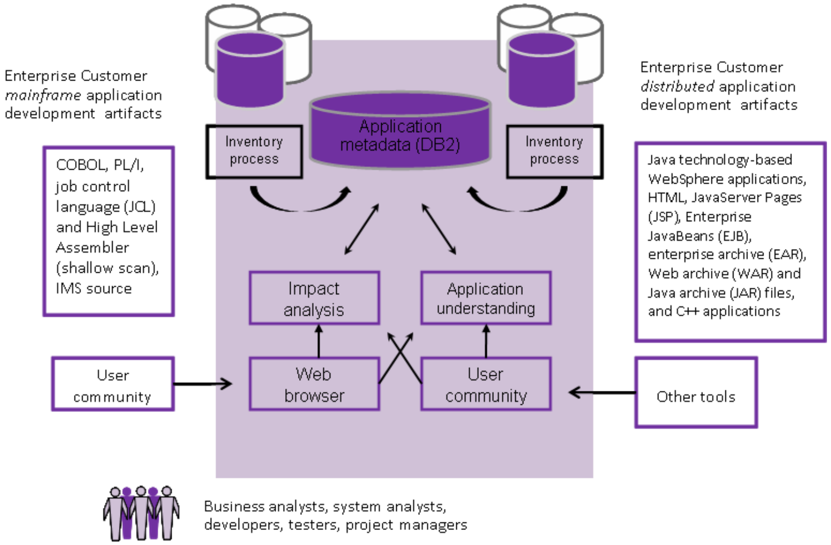
State (string): SP

Other Eclipse Tools …

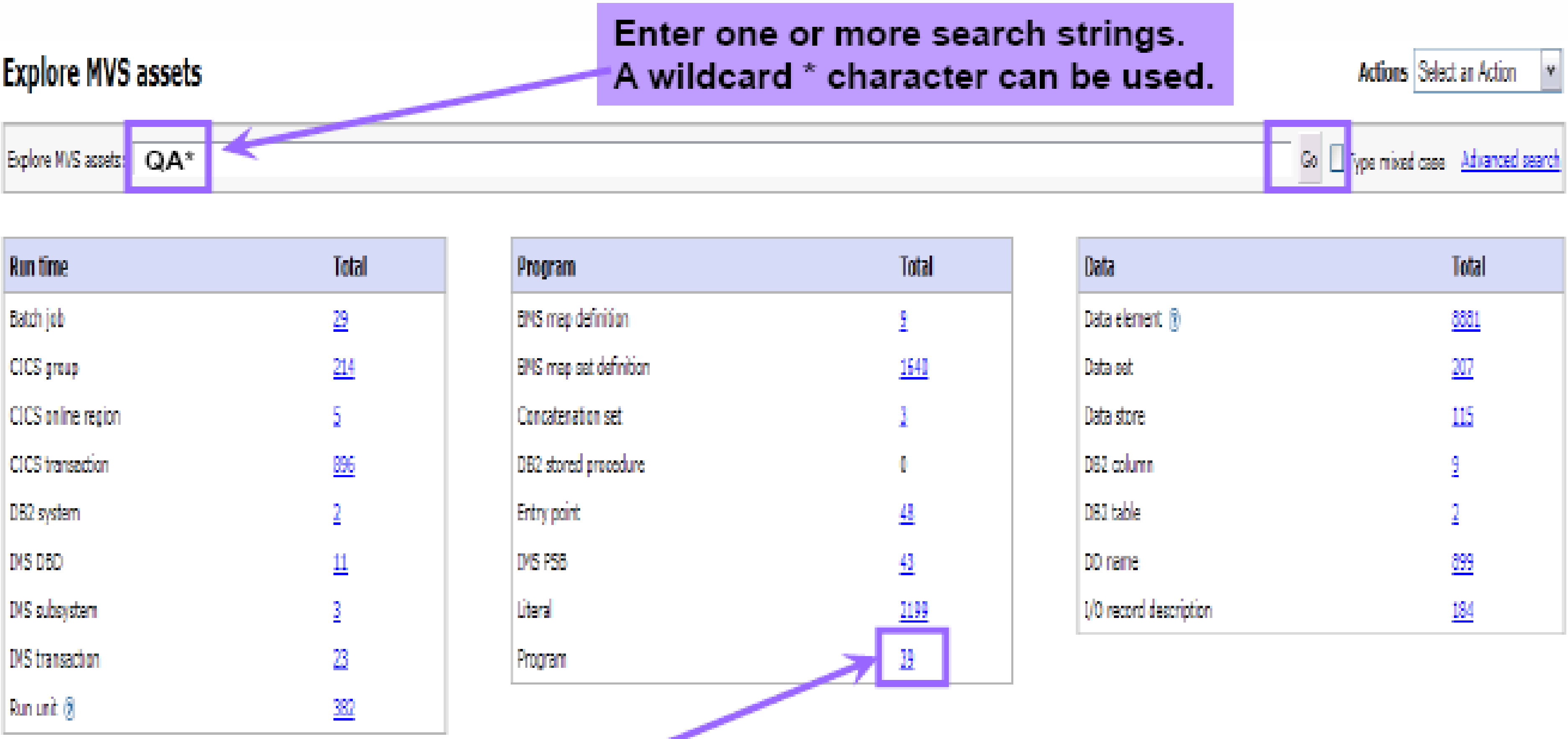
Impact Analysis

Rational Asset Analyzer (RAA)

- RAA provides an enterprise-wide view of software artifacts and the relationships between them, and provides sophisticated analysis of the impact of changes to software artifacts.
- RAA handles mainframe artifacts (source code, JCL, DB2, etc.)
- RAA also handles workstation artifacts (Java, servlets, WSDL, etc.)
- RAA scans artifacts and populates a DB2 database with information about them.
- RAA runs on mainframes and workstations.


Enterprise Customer
mainframe application
development artifacts
COBOL, PL/I, job control language (JCL) and High Level Assembler (shallow scan), IMS source
Inventory process
Application metadata (DB2)
Inventory process
Enterprise Customer
distributed application
development artifacts
Java technology-based WebSphere applications, HTML, JavaServer Pages (JSP), Enterprise JavaBeans (EJB), enterprise archive (EAR), Web archive (WAR) and Java archive (JAR) files, and C++ applications
Impact analysis
Application understanding
User community
Web browser
User community
Other tools
Business analysts, system analysts,
developers, testers, project managers

Asset Analyzer – Rapid MVS application understanding



Explore MVS assets

Run time	Total
Batch job	29
CICS group	214
CICS online region	5
CICS transaction	896
DB2 system	2
IMS DBD	11
IMS subsystem	3
IMS transaction	23
Run unit	382

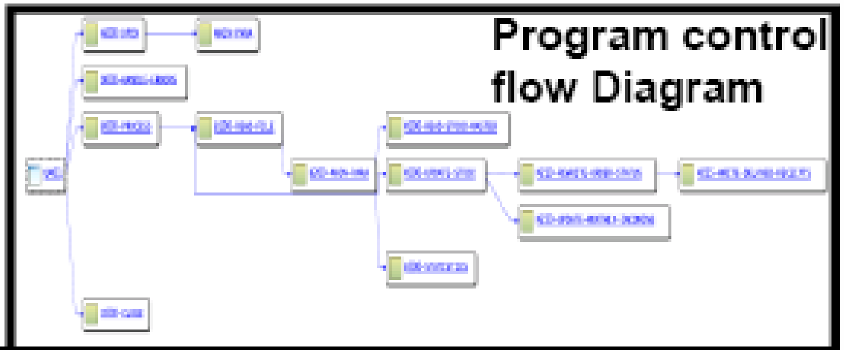
Program	Total
BMS map definition	9
BMS map set definition	1640
Concatenation set	1
DB2 stored procedure	0
Entry point	48
IMS PSB	43
Literal	2199
Program	33

Data	Total
Data element	8881
Data set	207
Data store	115
DB2 column	9
DB2 table	2
DD name	899
I/O record description	184

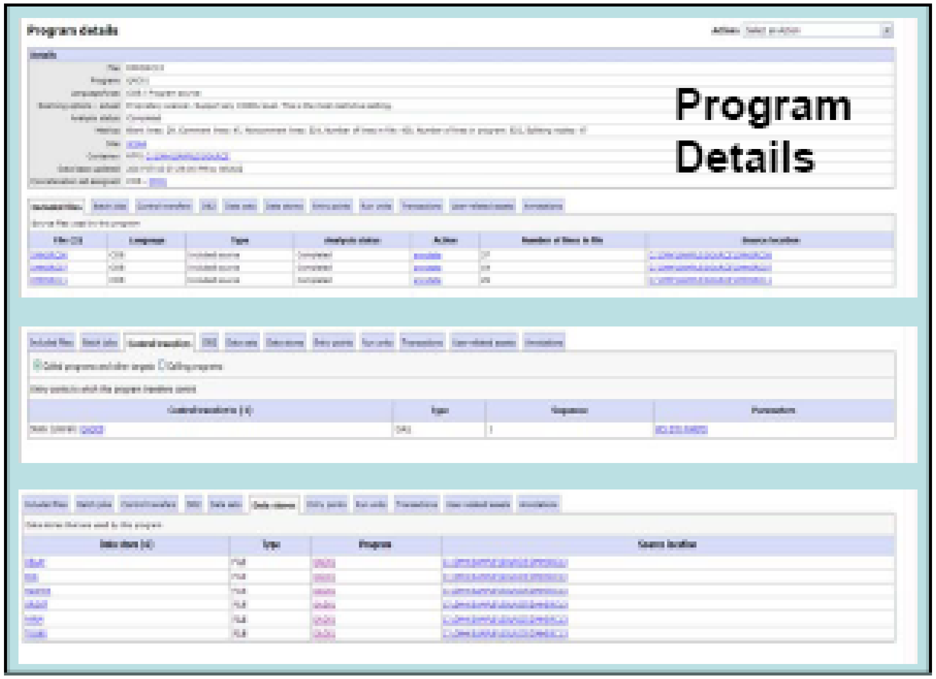
Enter one or more search strings.
A wildcard * character can be used.

Or just click on any counter to see the full list of items

Asset Analyzer - Program insight

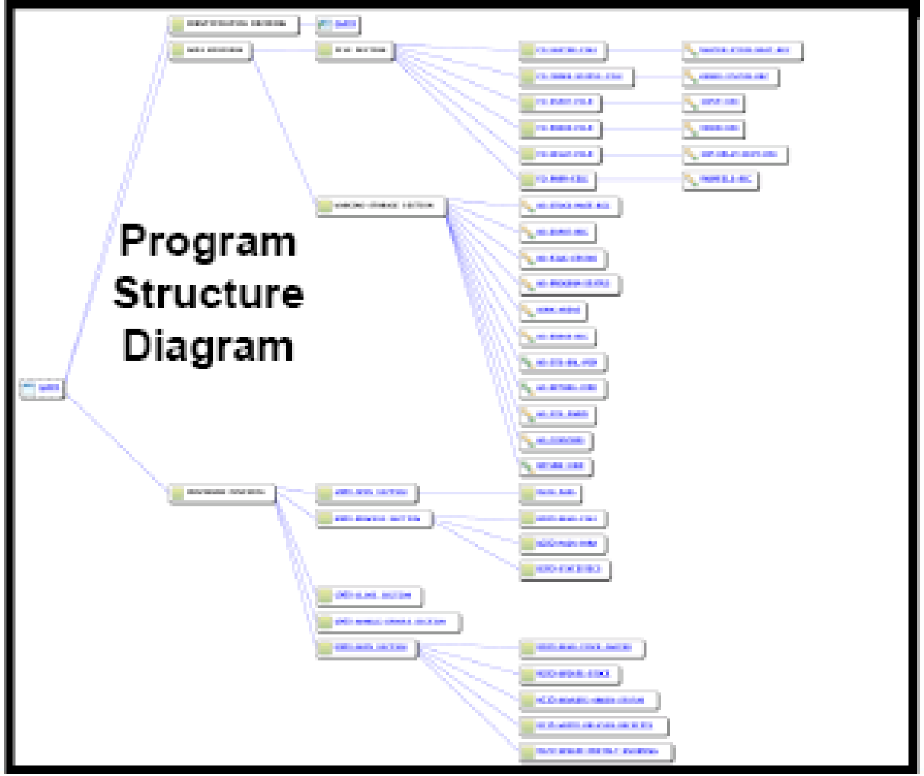


Program control flow Diagram

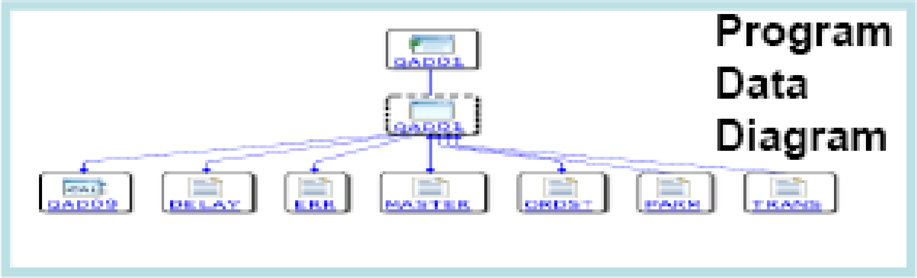


Program details

Program Details

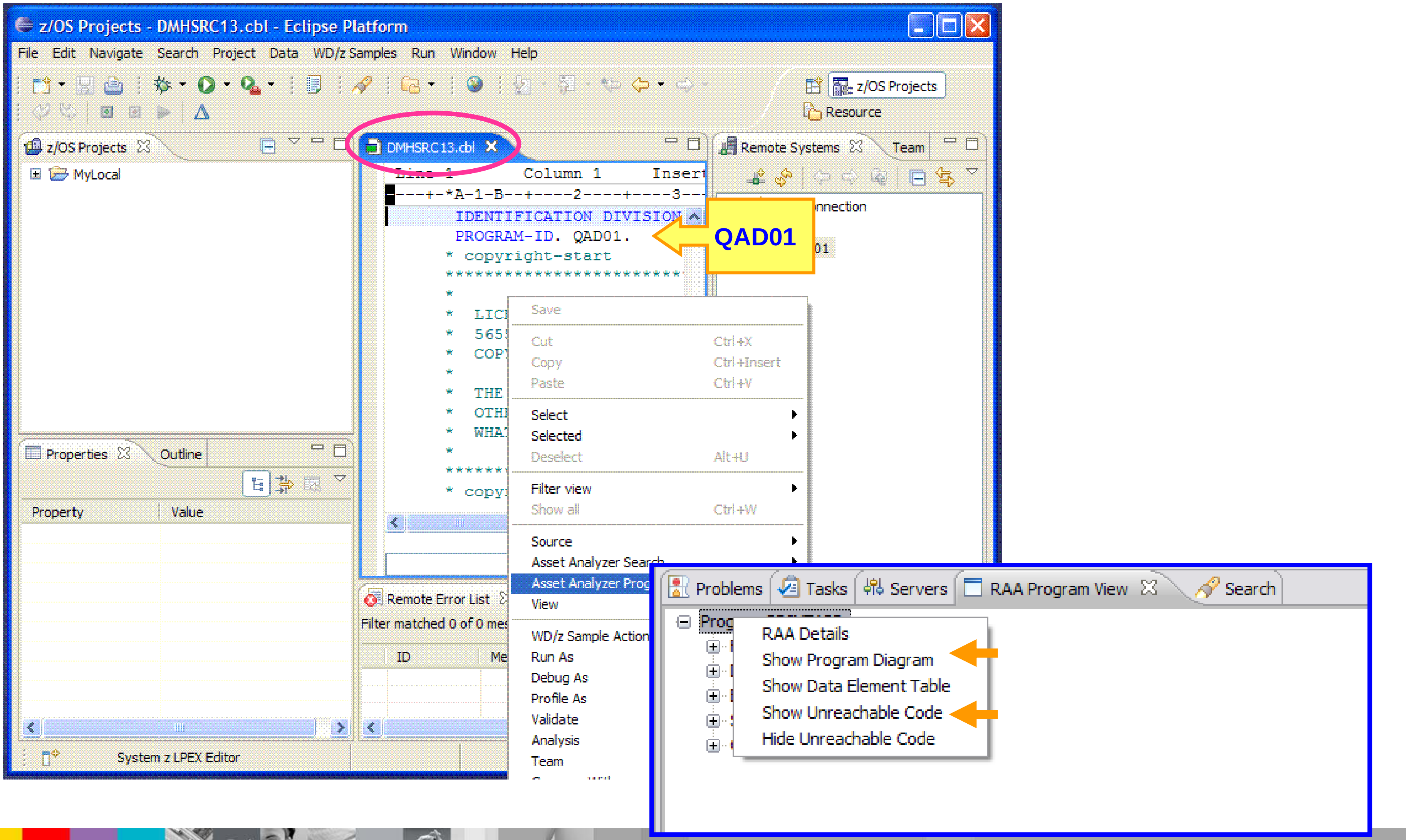


Program Structure Diagram



Program Data Diagram

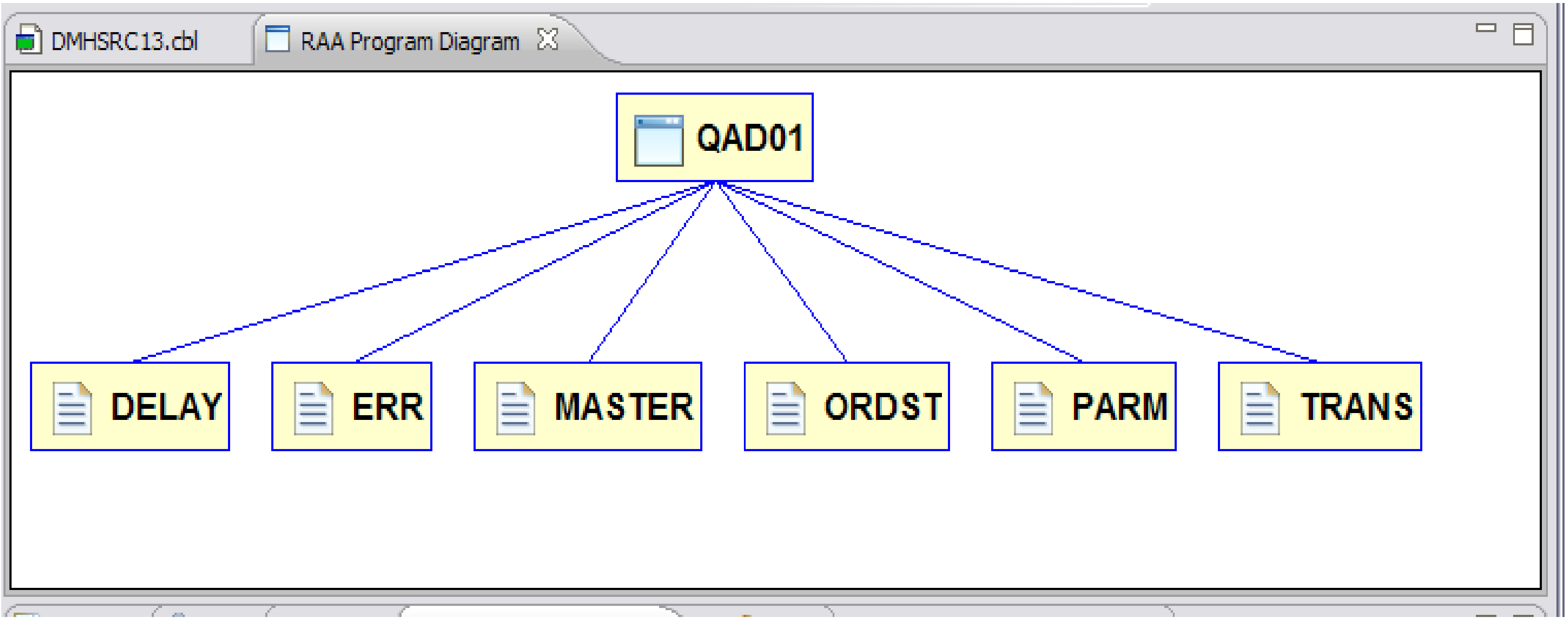
Display program view



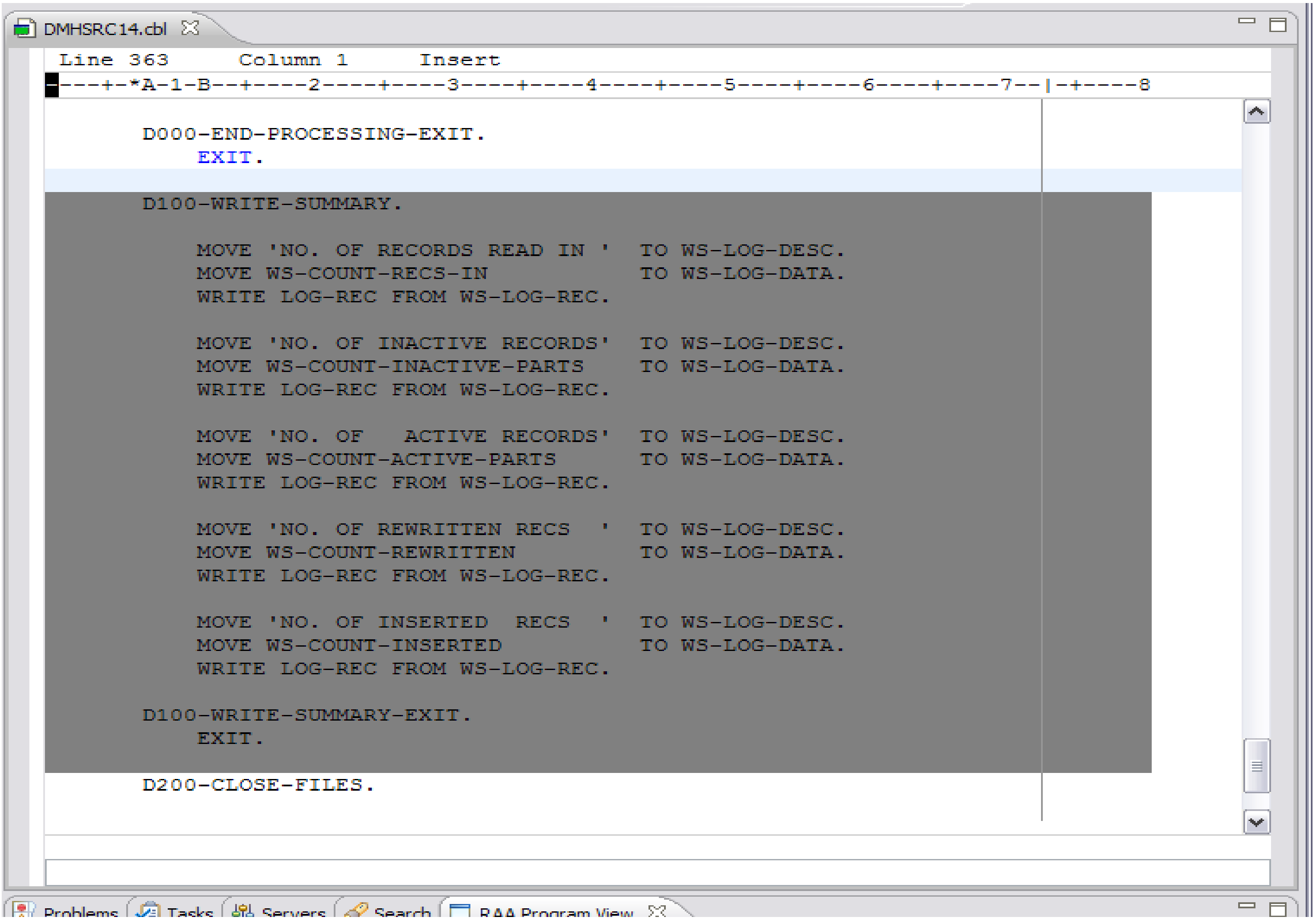
```
  Line 1       Column 1       Insert
----+-*A-1-B--+----2----+----3---
           IDENTIFICATION DIVISION.
           PROGRAM-ID. QAD01.
          * copyright-start
          ************************
          *
          *  LICI
          *  565
          *  COPY
          *
          *  THE
          *  OTHI
          *  WHA
          *
          ******
          * copy
```

QAD01

Program diagram

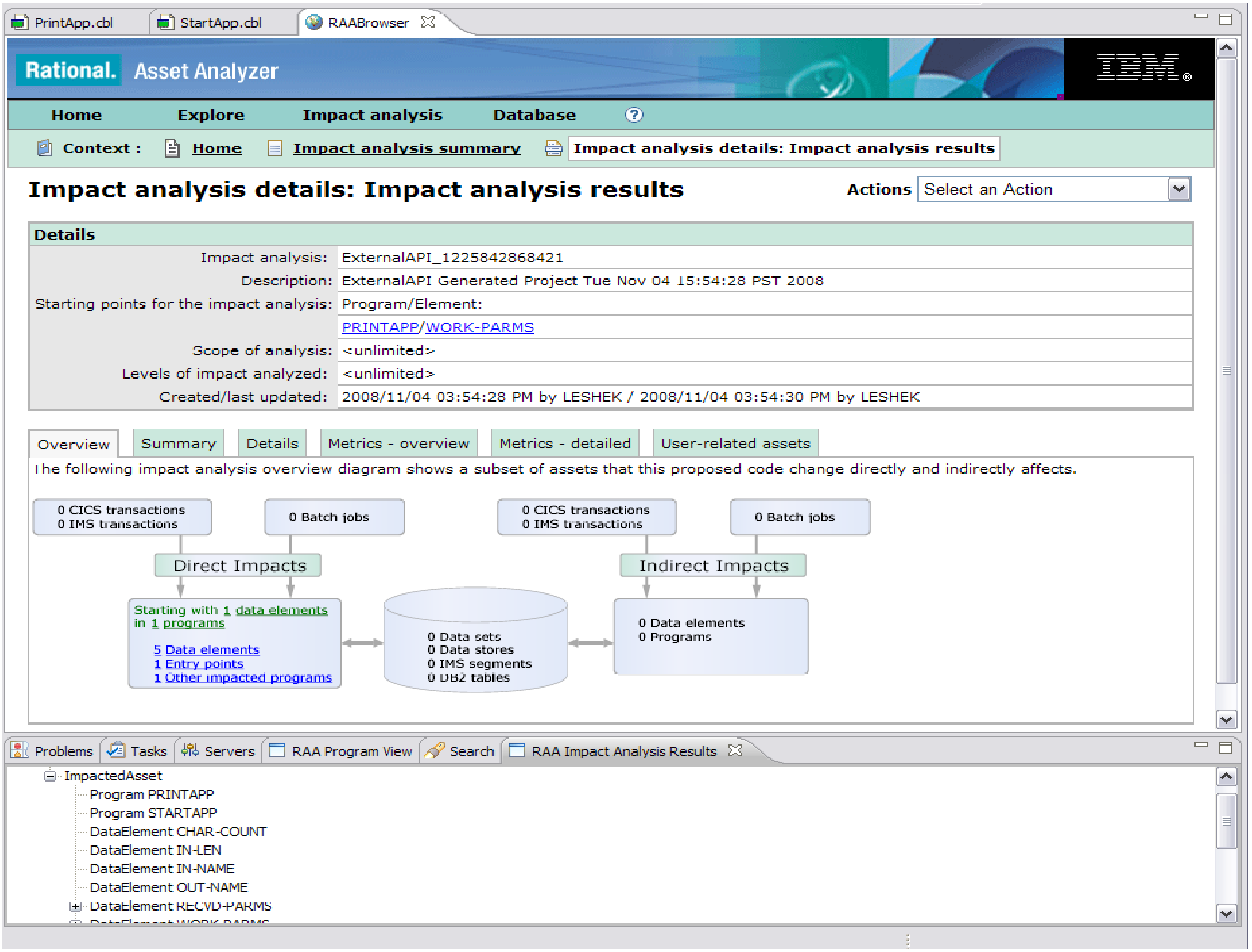


Unreachable Code



```
 Line 363      Column 1      Insert
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--|-+----8

       D000-END-PROCESSING-EXIT.
           EXIT.

       D100-WRITE-SUMMARY.

           MOVE 'NO. OF RECORDS READ IN '  TO WS-LOG-DESC.
           MOVE WS-COUNT-RECS-IN           TO WS-LOG-DATA.
           WRITE LOG-REC FROM WS-LOG-REC.

           MOVE 'NO. OF INACTIVE RECORDS'  TO WS-LOG-DESC.
           MOVE WS-COUNT-INACTIVE-PARTS    TO WS-LOG-DATA.
           WRITE LOG-REC FROM WS-LOG-REC.

           MOVE 'NO. OF   ACTIVE RECORDS'  TO WS-LOG-DESC.
           MOVE WS-COUNT-ACTIVE-PARTS      TO WS-LOG-DATA.
           WRITE LOG-REC FROM WS-LOG-REC.

           MOVE 'NO. OF REWRITTEN RECS   '  TO WS-LOG-DESC.
           MOVE WS-COUNT-REWRITTEN         TO WS-LOG-DATA.
           WRITE LOG-REC FROM WS-LOG-REC.

           MOVE 'NO. OF INSERTED  RECS   '  TO WS-LOG-DESC.
           MOVE WS-COUNT-INSERTED          TO WS-LOG-DATA.
           WRITE LOG-REC FROM WS-LOG-REC.

       D100-WRITE-SUMMARY-EXIT.
           EXIT.

       D200-CLOSE-FILES.
```

Impact analysis results



Impact analysis details: Impact analysis results

Details

Impact analysis:	ExternalAPI_1225842868421
Description:	ExternalAPI Generated Project Tue Nov 04 15:54:28 PST 2008
Starting points for the impact analysis:	Program/Element:
	PRINTAPP/WORK-PARMS
Scope of analysis:	<unlimited>
Levels of impact analyzed:	<unlimited>
Created/last updated:	2008/11/04 03:54:28 PM by LESHEK / 2008/11/04 03:54:30 PM by LESHEK

The following impact analysis overview diagram shows a subset of assets that this proposed code change directly and indirectly affects.

0 CICS transactions
0 IMS transactions

0 Batch jobs

Direct Impacts

Starting with 1 data elements in 1 programs

5 Data elements
1 Entry points
1 Other impacted programs

0 Data sets
0 Data stores
0 IMS segments
0 DB2 tables

0 CICS transactions
0 IMS transactions

0 Batch jobs

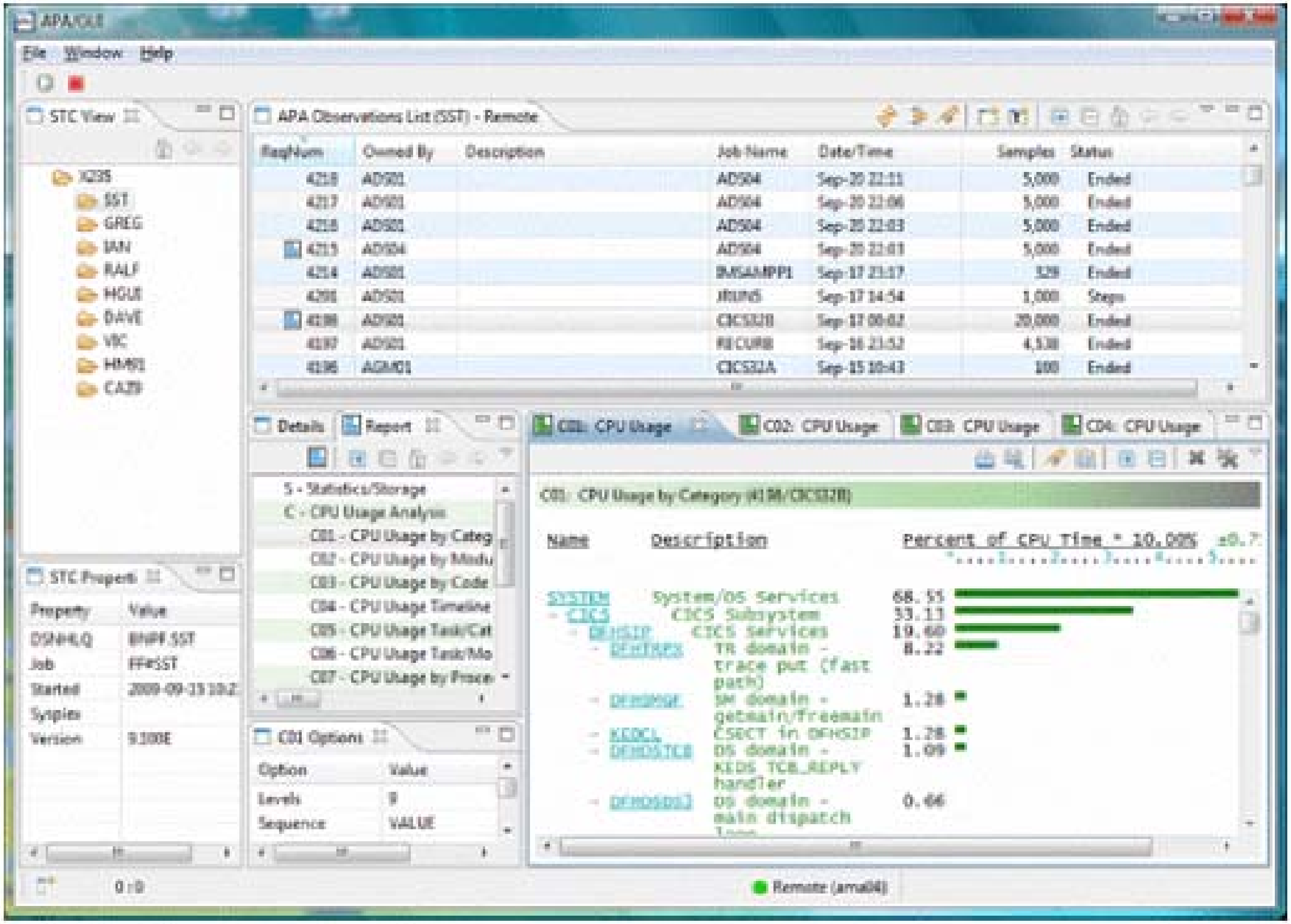
Indirect Impacts

0 Data elements
0 Programs

```
ImpactedAsset
    Program PRINTAPP
    Program STARTAPP
    DataElement CHAR-COUNT
    DataElement IN-LEN
    DataElement IN-NAME
    DataElement OUT-NAME
  + DataElement RECVD-PARMS
  + DataElement WORK-PARMS
```

Application Performance Analyzer

- ❑ Identify inefficient COBOL codes, for Application Performance Tuning



Property	Value
DSNHLQ	BNPF.SST
Job	FF#SST
Started	2009-09-15 10:2
Sysplex	
Version	9.100E

Option	Value
Levels	9
Sequence	VALUE

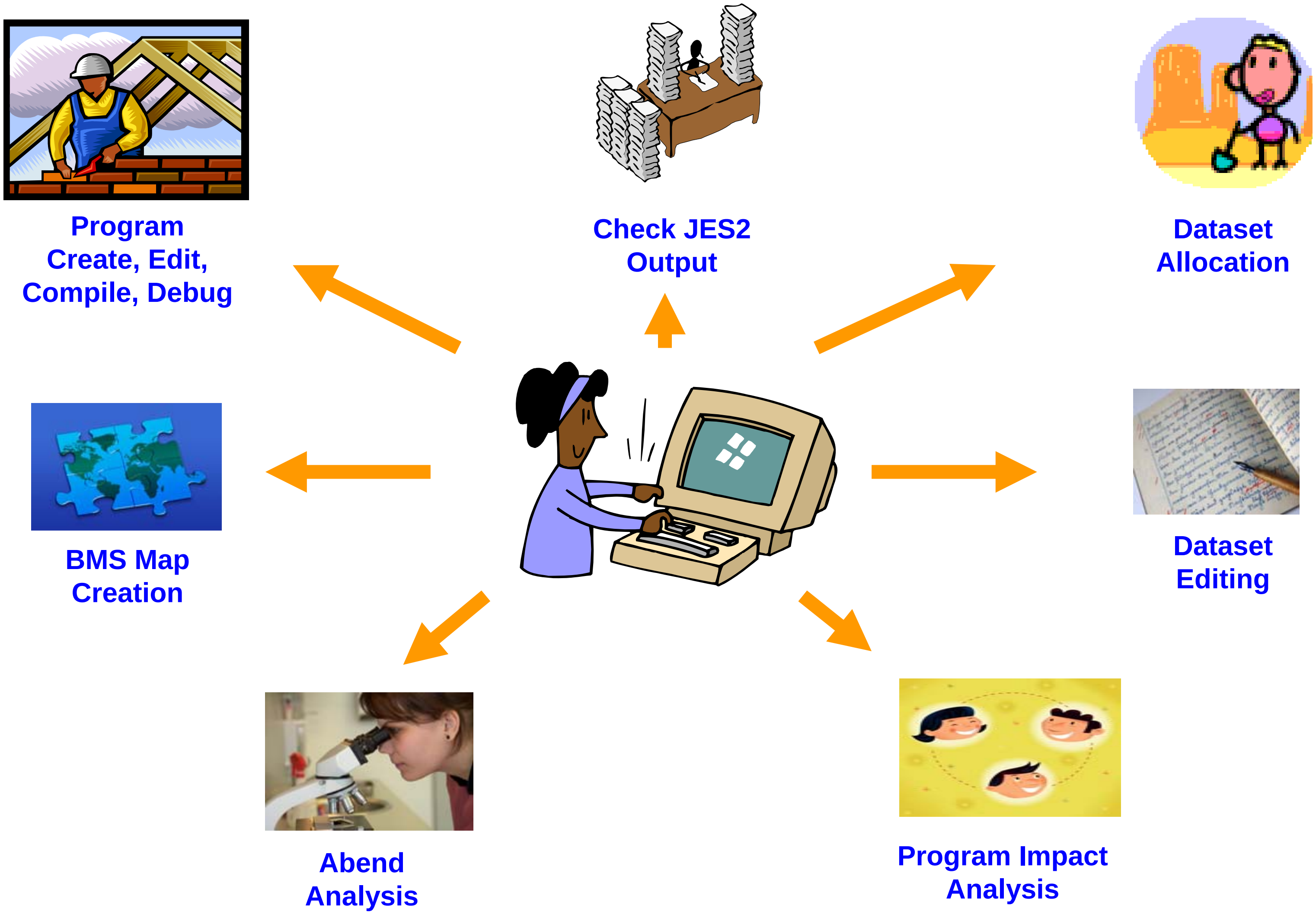
APA Observations List (SST) - Remote

ReqNum	Owned By	Description	Job Name	Date/Time	Samples	Status
4218	ADS01		ADS04	Sep-20 22:11	5,000	Ended
4217	ADS01		ADS04	Sep-20 22:06	5,000	Ended
4216	ADS01		ADS04	Sep-20 22:03	5,000	Ended
4215	ADS04		ADS04	Sep-20 22:01	5,000	Ended
4214	ADS01		IMSAMPP1	Sep-17 23:17	329	Ended
4201	ADS01		JRUN5	Sep-17 14:54	1,000	Steps
4198	ADS01		CICS32B	Sep-17 00:02	20,000	Ended
4197	ADS01		RECURB	Sep-16 23:52	4,538	Ended
4196	AGM01		CICS32A	Sep-15 10:43	100	Ended

C01: CPU Usage by Category (4198/CICS32B)

```
Name          Description              Percent of CPU Time * 10.00% ±0.7
                                       *....1....2....3....4....5....

SYSTEM        System/OS Services       68.55 ================================
- CICS          CICS Subsystem         33.13 ================
  - DFHSIP        CICS Services        19.60 =========
    - DFHTRPX       TR domain -         8.22 ====
                    trace put (fast
                    path)
    - DFHSMGF       SM domain -         1.28 =
                    getmain/freemain
    - KEDCL         CSECT in DFHSIP     1.28 =
    - DFHDSTCB      DS domain -         1.09 =
                    KEDS_TCB_REPLY
                    handler
    - DFHDSDS3      DS domain -         0.66
                    main dispatch
                    loop
```

Program Development Life-cycle



Program
Create, Edit,
Compile, Debug

Check JES2
Output

Dataset
Allocation

BMS Map
Creation

Dataset
Editing

Abend
Analysis

Program Impact
Analysis

Thank You!
Thank You
Merci
Thank you
Thank you