



IBM Software Group

Managing system z Application Development with IBM Rational ClearCase and IBM Rational Developer for system z

An IBM Software Teleconference
February 6, 2008



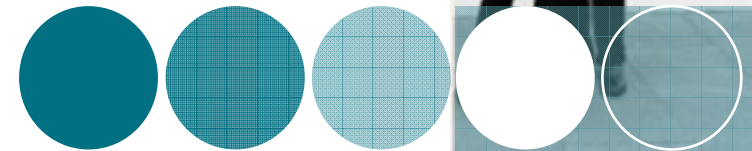
Agenda

- IBM Rational Software - Our unique value
- Application Development for z: The Rational Approach
- IBM Rational Developer for system z: The Enterprise IDE
- IBM Rational ClearCase and ClearQuest: Enterprise-Wide Application Lifecycle Management
- Summary



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IBM Rational Software

Our unique value

IBM Rational software helps organizations automate, integrate, and govern the core business process of software and systems delivery

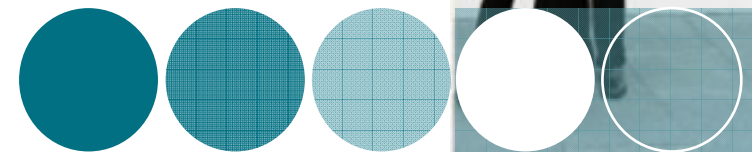
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- 
- *Decades of proven technology leadership*
 - *Revenue strength with strong R&D investments*
 - *Large install base with thousands of customers*
 - *World-wide technical expertise and support*
 - *A complete end-to-end lifecycle solution*

Rational. software



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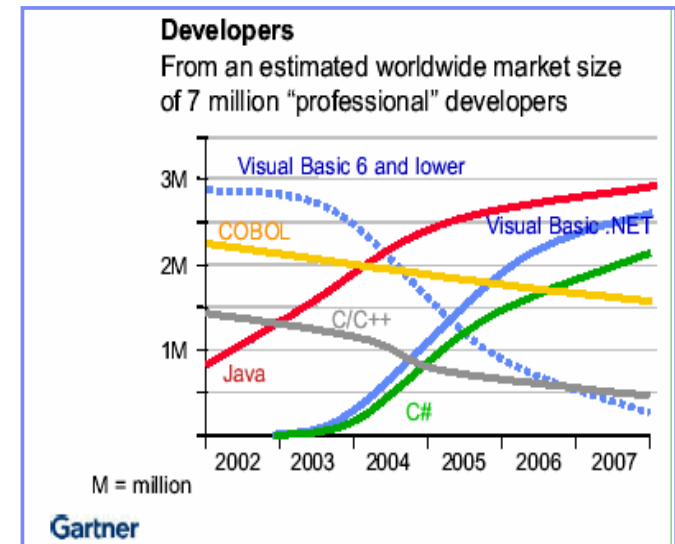


Legacy applications

- Significant business intelligence exists in core systems
 - ▶ "200 Billion lines of COBOL code in existence" *eWeek*
 - ▶ "5 Billion lines of COBOL code added yearly" *Bill Ulrich, TSG Inc.*
 - ▶ "2 Million COBOL developers" *Gartner*
 - ▶ "Majority of customer data still on mainframes" *Computerworld*
 - ▶ "Replacement costs \$20 Trillion" *eWeek*

- Rewriting - is it an option.....

- ▶ How long will it take? (lose strategic benefit)
- ▶ Who will do it? (who has the business knowledge?)
- ▶ How much will it cost?
- ▶ Risk?



A simple Google search..

<http://cwflyris.computerworld.com/t/915781/281087/36897/2/>

Cobol Coders: Going, Going, Gone?

Many IT managers slowly migrating away from Cobol wonder whether they'll run out of Cobol programmers before they run out of Cobol code. By Gary Anthes

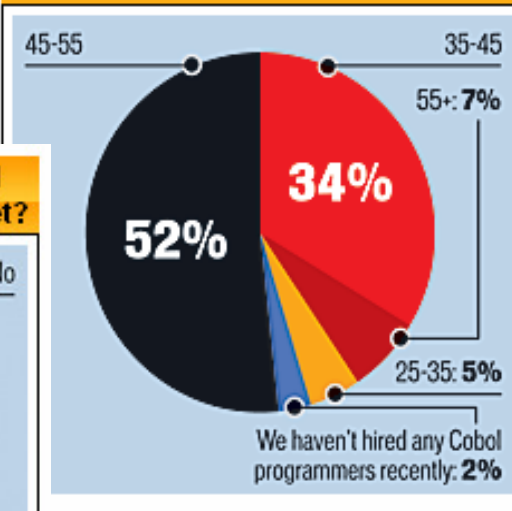
Gary Anthes [Today's Top Stories](#) ▶ or [Other Development Stories](#) ▶

October 09, 2006 (Computerworld) -- Cobol, that mainstay of business programming throughout the 1960s, '70s and '80s, is not going away anytime soon. In a *Computerworld* survey early this year of IT managers at 352 companies, 62% of the respondents reported that they actively use Cobol. Of those, three quarters said they use it "a lot" and 58% said they're using it to develop new applications.

Nevertheless, with a few exceptions, companies aren't enthusiastically expanding their use of Cobol. In the survey, of those who use Cobol, 36% said they are "gradually migrating away" from it, 16% said they will replace it "every chance we get," and 25% said they'd like to replace Cobol with something else but have found that too difficult or too expensive.

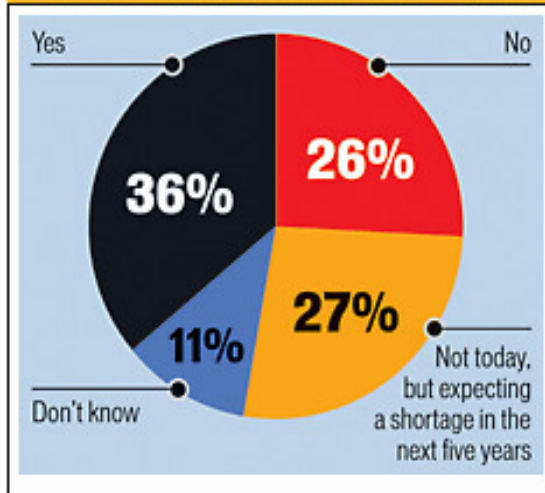
MORE RELATED CONTENT

What's the average age of your Cobol programmers hired in the past 12 months?



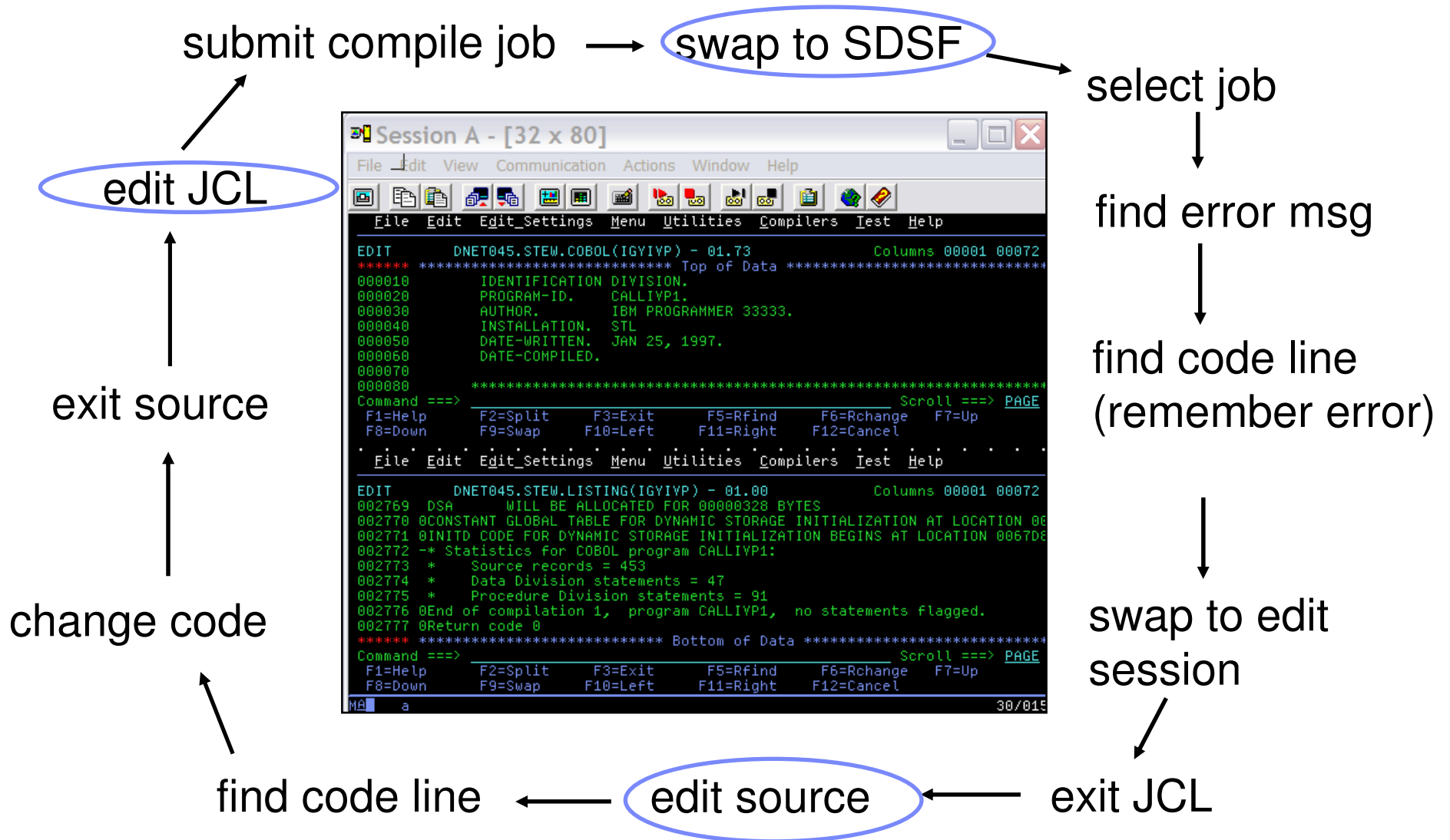
In the *Computerworld* survey, 45% of the respondents whose organizations use Cobol said their ability to hire Cobol programmers was either "worse" or "much worse" than their ability to hire programmers for modern languages such as Visual Basic, C++ and Java.

Are you noticing a shortage of Cobol programming skills in the labor market?



...carefully before rewriting those applications in another language. Cobol is easier to read and manage than C# or Java, says Crego, who calls Visual Basic, C and C# "write-only code." And rewriting some Cobol programs can require four or five times as many program lines in Java or C#, says Vecchio. He describes such projects as "a maintenance nightmare waiting to happen."

ISPF based Development



```

Session A - [32 x 80]
File Edit View Communication Actions Window Help
File Edit Edit_Settings Menu Utilities Compilers Test Help

EDIT DNET045.STEW.COBOL(IGYIYP) - 01.73 Columns 00001 00072
***** Top of Data *****
000010 IDENTIFICATION DIVISION.
000020 PROGRAM-ID. CALLIYP1.
000030 AUTHOR. IBM PROGRAMMER 33333.
000040 INSTALLATION. STL
000050 DATE-WRITTEN. JAN 25, 1997.
000060 DATE-COMPILED.
000070
000080 *****

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

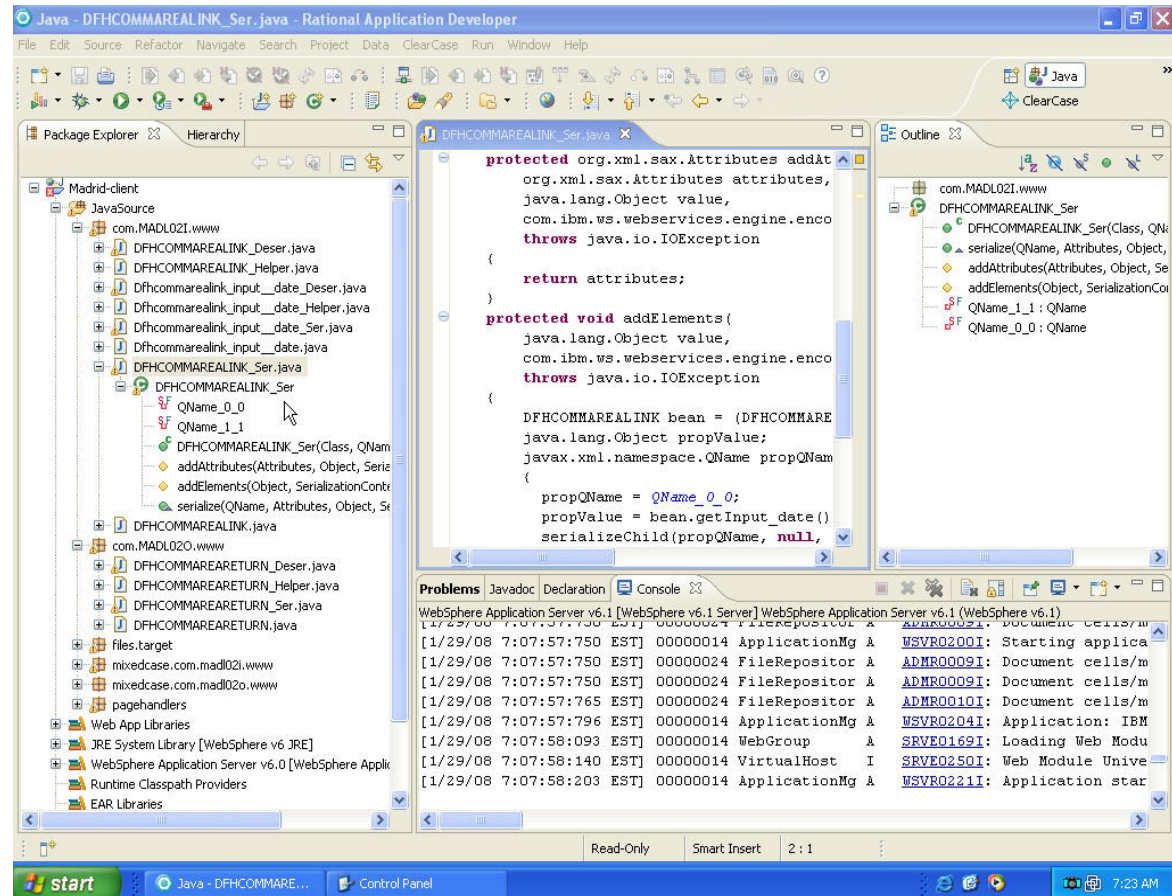
EDIT DNET045.STEW.LISTING(IGYIYP) - 01.00 Columns 00001 00072
002769 DSA WILL BE ALLOCATED FOR 00000328 BYTES
002770 @CONSTANT GLOBAL TABLE FOR DYNAMIC STORAGE INITIALIZATION AT LOCATION 00
002771 @INITD CODE FOR DYNAMIC STORAGE INITIALIZATION BEGINS AT LOCATION 0067D
002772 -* Statistics for COBOL program CALLIYP1:
002773 * Source records = 453
002774 * Data Division statements = 47
002775 * Procedure Division statements = 91
002776 @End of compilation 1, program CALLIYP1, no statements flagged.
002777 @Return code @
***** Bottom of Data *****
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
    
```

- Multiple screens/sessions and multiple disparate tools
- 20 x 80 characters of content



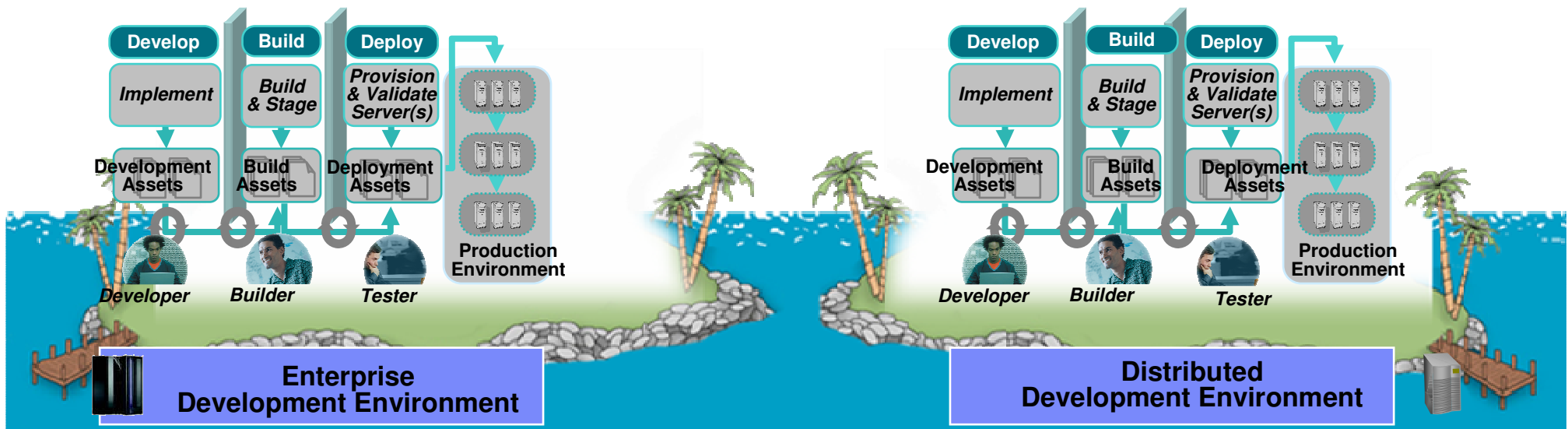
Traditional java Development

- Self-contained environment
- Edit locally
- Compile as you go
- Built-in test environment
- Deploy “over the wall”
- Production host is “somewhere else”

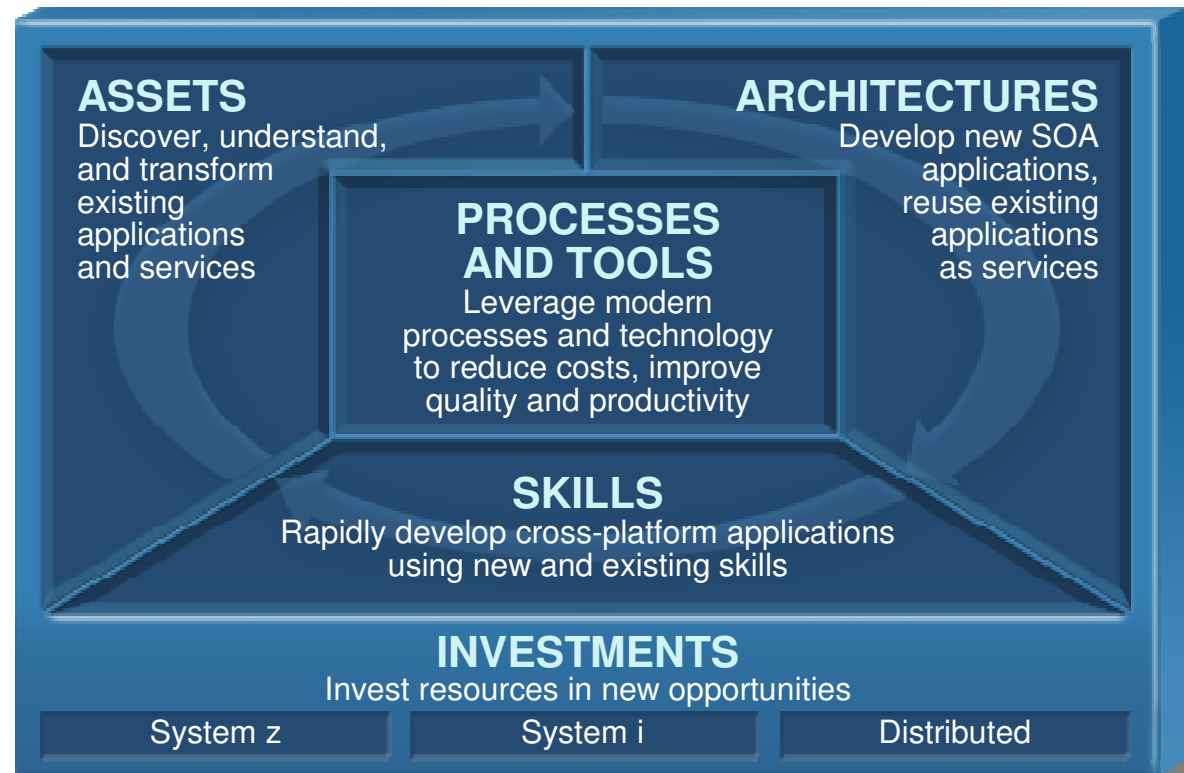


Traditional Enterprise Development

- ▶ “Islands of development”: Duplicate infrastructures, multiple repositories.
- ▶ Limited, communication “across the gulf”
- ▶ Ad hoc release synchronization: Labor intensive, expensive, manual and error-prone
- ▶ No central repository for project meta-data
- ▶ End-to-end governance difficult or impossible
- ▶ Constrained flexibility, increased costs



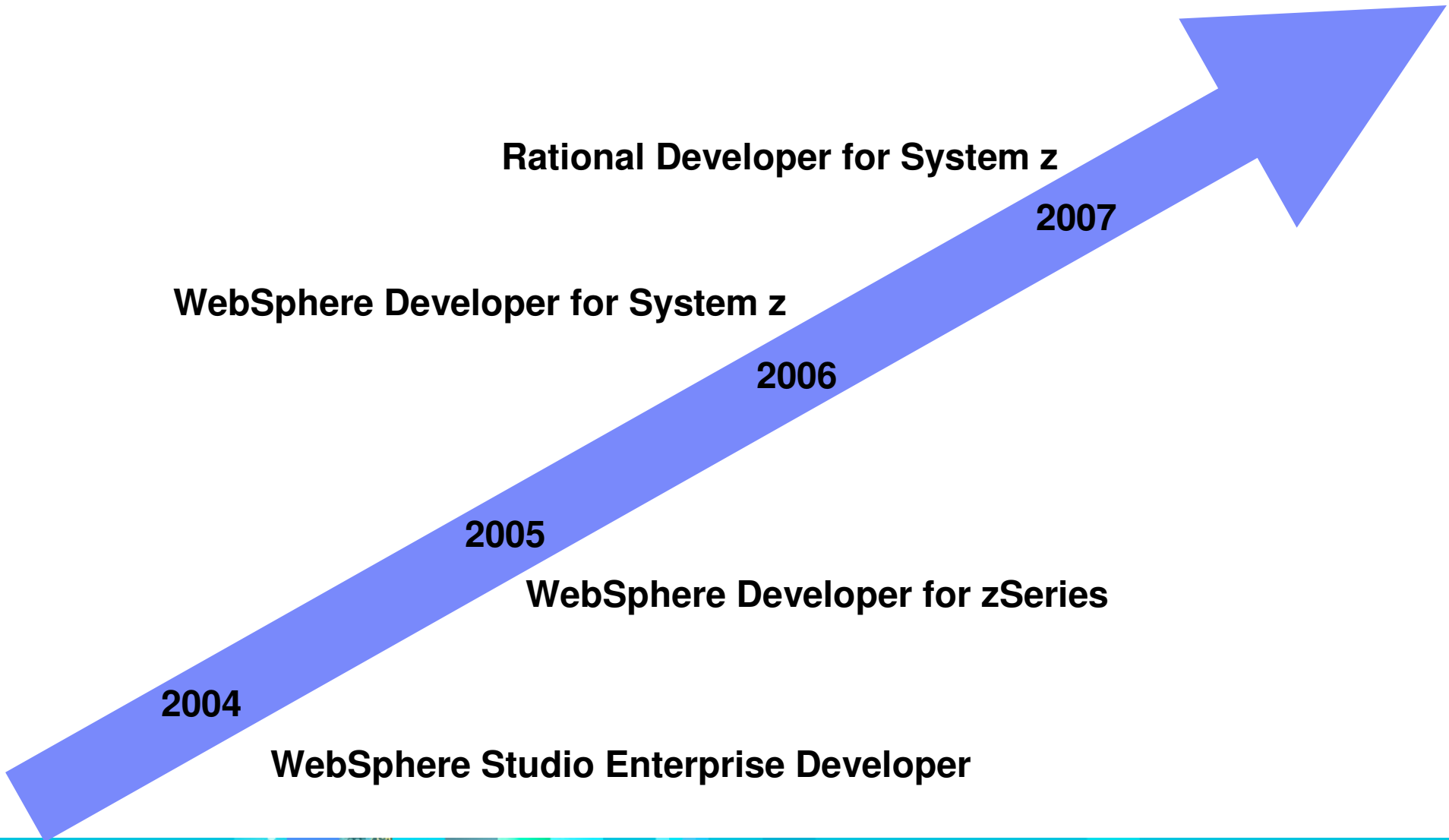
IBM Enterprise Modernization Solutions



- IBM Enterprise Modernization Solutions are designed to address today's critical enterprise modernization issues which make it difficult to implement cross-platform solutions
 - ▶ maintenance costs,
 - ▶ asset reuse
 - ▶ architectural complexity
 - ▶ silos of development teams with different skills

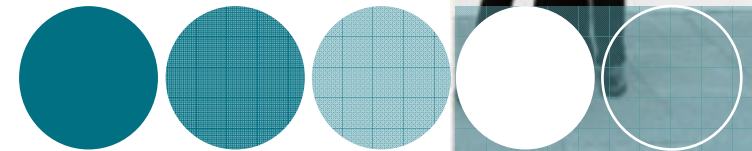


History of Rational Developer for System z



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IBM Rational Developer for System z

JES and PD Tools

- 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
- Interact with the Job Entry Subsystem (JES) to submit jobs, monitor jobs, and review job output
- Debug zOS applications from workstation as they execute live in the remote runtime

Integration with EGL using RBDe

- Quick and easy development of modern enterprise applications for procedural programmers
- Simplify and speed up creation of Web applications and services without having to learn Java or J2EE

Traditional Development

Development Environment

- Connect to z/OS systems
- Work with z/OS resources like COBOL, PL/1, C, C++, JCL, etc.
- 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
- Create, build, and catalog DB2 stored procedures on zOS
- Compile and test programs locally to ensure correctness

Screen design

- Visually create, modify, build, and deploy BMS maps sets or MFS/IMS maps remotely or on the local workstation

Code Generation

- Generate CRUD DB2 program code from UML, which can also be easily integrated into web service applications

IBM Rational Developer for System z

Host Tooling Integration

[JES, FA, FM, Debug Tool]

zOS Application Development

[COBOL, PL/1, C/C++, JCL, Screens, Stored Procedures, etc]

Enterprise Service Tools

[Web Services For CICS/IMS]

Host / Distributed SCM Integration

IBM Rational Application Developer

RBDe

zOS Web Service and Flow Creation

- Implements SOA and Web Services
- SOA access to CICS V3.2 and IMS V9 COBOL applications
- Bottom-up/Top-down or meet-in-the-middle COBOL to XML mapping support
- Integrated COBOL XML converters, XML schemas, and WSDL generation
- Service Flow Modeler to build/deploy service flows out of your existing Commarea, Channel, MQ, and Terminal CICS applications.

SCM Support

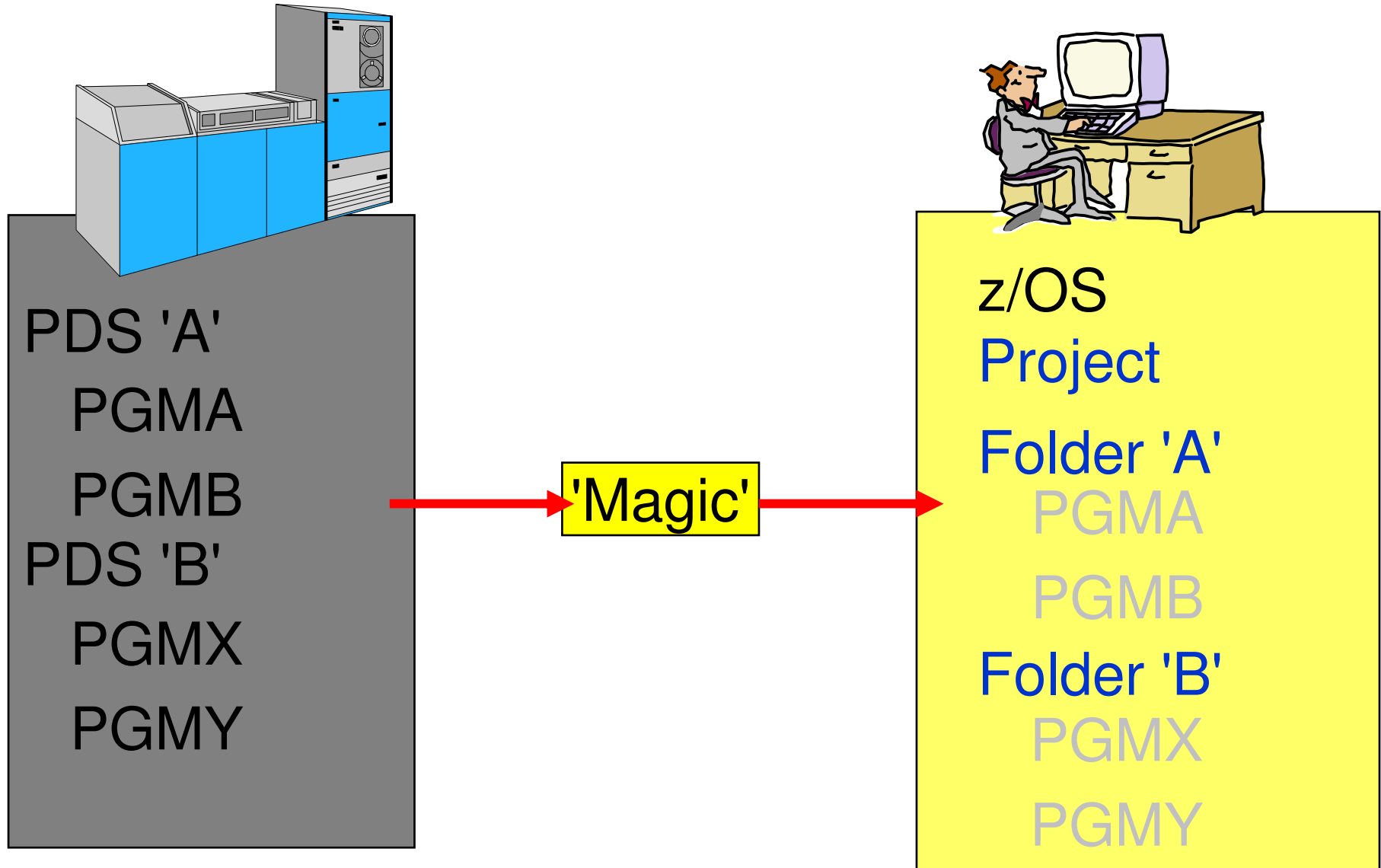
- Access to host SCMs such as SCLM
- Framework for writing/deploying custom SCM integration code
- Support for storing zOS resources in distributed SCMs such as ClearCase

Web and JEE Development

- Create Web Pages / JSF / Struts
- JEE/Java Development
- JCA Connectors
- Distributed debugger
- Web Services and Test environment



Host → Workstation Overview



Files on the host look as though they are workstation files



RDz IDE - Eclipse-based development

- Common development environment for COBOL, PL/I, C/C++, and Java
- Simplified development with more information at your fingertips

Edit Source

Syntax Check

Submit jobs, access job output, or open source members with a single click

Outline view presents COBOL structure

Open and edit multiple source and JCL members simultaneously

Statement in error indicated in source

Double-Click on the Error

Error list in Problems view

z/OS Projects - REGIOA.cbl - IBM Rational

File Edit View Window Help

Pr... Remote ... »1

REGIOA.cbl

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.
    
```

Properties Outline

PROCEDURE DIVISION.

- 010-INITIALIZATION.
- 020-LOGIC.
- 030-SEEYA.
- 040-GOODBYE.

Tasks Problems z/OS File System Mapping Remote System Details

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-name d		

z/OS LPEX Editor is active

Interactive Access to z/OS

The screenshot displays the IBM Rational Software Development Platform interface. On the left, the Remote System Explorer shows a tree view of local files and remote z/OS datasets. A yellow callout box labeled "MVS datasets" points to the "MVS Files" folder. Another yellow callout labeled "Files on workstation" points to the "Local Files" folder. A third yellow callout labeled "Files on remote z/OS" points to the "Local Shells" folder. A fourth yellow callout labeled "COBOL and JCL" points to the "WILBERT.MIXEDBAG.FILES" folder, which contains files like COBSP.cbl, COBTEST.cbl, and IGYIVP.jcl. A fifth yellow callout labeled "Resource (e.g., member) mapping" points to the "Remote System Details" window, which shows a table of file mappings.

The LPEX Editor on the right shows the source code for IGYTSALE.cbl, with a yellow callout box labeled "LPEX Editor" pointing to it. The code includes comments and program identification information.

The Remote System Details window shows the following table:

Mapping Criterion	Workstation File Extension	Transfer Mode	Host Code Page
**LOAD	exe	binary	IBM-037 (Inherited)
**CLIST	cmd	text	IBM-037 (Inherited)
**JCL	jcl	text	IBM-037 (Inherited)
**SIGYCLST	cmd	text	IBM-037 (Inherited)
**CNTL	jcl	text	IBM-037 (Inherited)
**LISTING	lst	text	IBM-037 (Inherited)
**OUTLIST	out	text	IBM-037 (Inherited)
**OBJS	obj	binary	IBM-037 (Inherited)
**INCLUDE	inc	text	IBM-037 (Inherited)
**MACRO	mac	text	IBM-037 (Inherited)
**COPYLIB	cpy	text	IBM-037 (Inherited)
**XML	xml	text	IBM-037 (Inherited)
**BMS	bms	text	IBM-037 (Inherited)
**JCLLIB	jcl	text	IBM-037 (Inherited)
**FILES			
COB**	cbl	text	IBM-037 (Inherited)
JCL**	jcl	text	IBM-037 (Inherited)
**JOB	jcl	text	IBM-037 (Inherited)
PLI**	pli	text	IBM-037 (Inherited)

MVS datasets

LPEX Editor

Resource (e.g., member) mapping



Content Assist for COBOL/PL/1/C or C++

Find all statements and data names

```

Row 37      Column 20      2 changes.
-----*A-1-B-----2-----3-----4-----5-----6-----
000032      PROCEDURE DIVISION.
000033      010-INITIALIZATION.
000034      *      Initialize Program-work-fields, Program-flags,
000035      DISPLAY "Program REGIOA STARTING "
000036      MOVE 2 TO BRANCHFLAG.
000037      move
000038
000039
000040
000041
000042
000043
000044      020-LOGIC.
000045
000046
000047      divide value1 BY received-

010
101 BRANCHFLAG
010
101 FIELD-A
010
101 FIELD-B
010
101 FIELD-C
010
101 Input-name
010
101 Loop-flag
010
101 Output-name
010
101 Program-flags
    
```

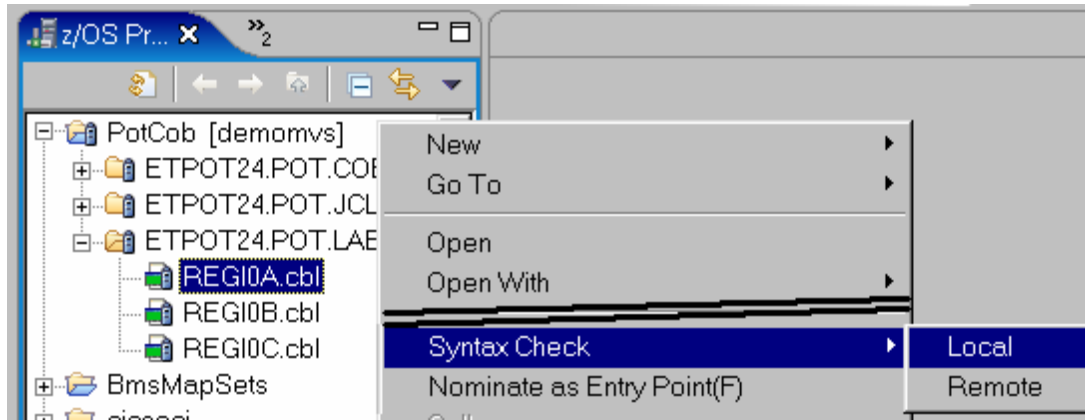
```

Row 37      Column 31      3 changes.
-----*A-1-B-----2-----3-----4-----5-----6-----
000032      PROCEDURE DIVISION.
000033      010-INITIALIZATION.
000034      *      Initialize Program-work-fields, Program-flags,
000035      DISPLAY "Program REGIOA STARTING "
000036      MOVE 2 TO BRANCHFLAG.
000037      move FIELD-A to
000038      MOVE 'AAAA'
000039      MOVE 'BBBB'
000040      MOVE 'CCCC'
000041      MOVE "Ente
000042      MOVE "WSEI
000043      MOVE "REGI
000044      020-LOGIC.
000045      CALL prog
000046      move 66 to
000047      divide value1 BY received-from-called GIVING

010
101 BRANCHFLAG
010
101 FIELD-A
010
101 FIELD-B
010
101 FIELD-C
010
101 Input-name
010
101 Loop-flag
010
101 Output-name
010
101 Program-flags
    
```

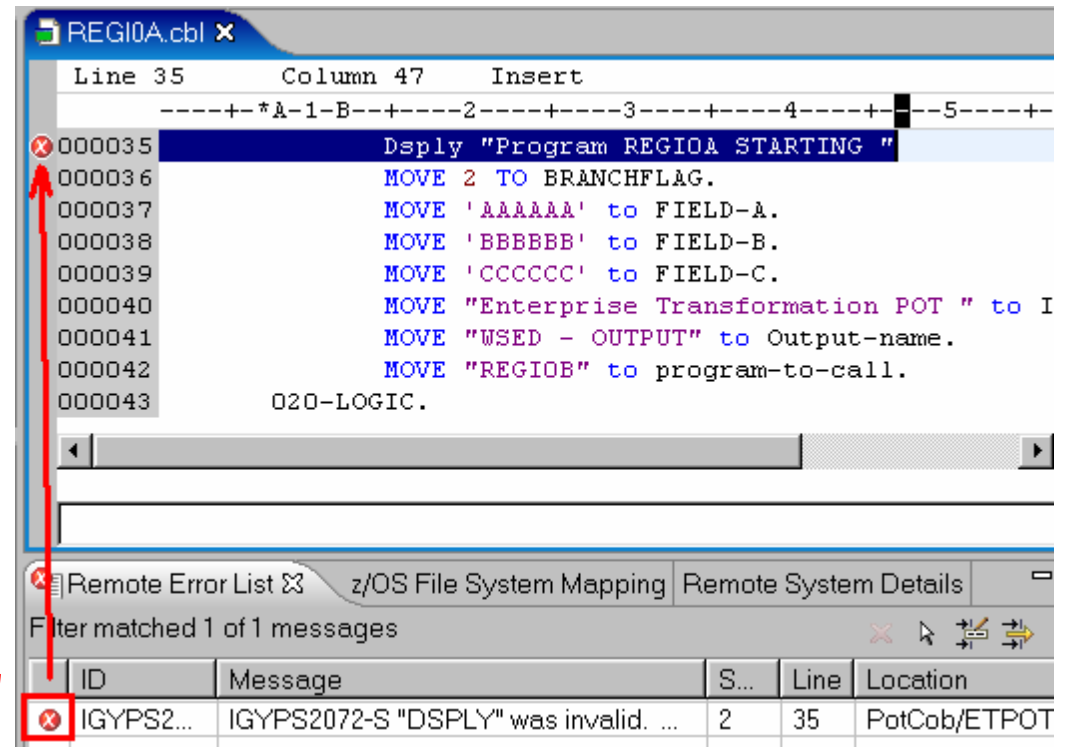
Benefit: Developers complete code more accurately and efficiently.

Use local/remote compiler to do syntax checking



Local Syntax checking..

Just double-click to find the error



Benefit: Uses local CPU



Support for C/C++

- Full edit, compile, content assist, syntax highlighting
- Remote Syntax check
- zOS Debug (through IBM Debug tool)
- Enhanced code navigation support
 - ▶ Outline view shows functions, classes, macros, global variables, and include statements for ease of navigation
 - ▶ Open include files from outline view
 - ▶ Open Declaration action
- Built on top of Eclipse and CDT (C/C++ Development Tools)
- Work out of MVS or USS

The screenshot displays the 'Properties for subProject1' dialog box, specifically the 'C/C++ Settings' tab. The 'Procedures and Steps' section is active, showing a table with the following data:

Procedure Name	Step Name	Status
ELAXFCPP		Enabled
ELAXFCPC		Disabled

Below the table, the 'Outline' view is visible, showing a hierarchical structure of code elements. The 's_instance' class is expanded, revealing its members: 'id' (value 256), 'name' (value 256), and 'next'. Other visible elements include 'DATASET_DSSIZE', 'putMemberRecordPTR', 'c_recl' (value BUFLLEN), 'MAID' (value BUFLLEN), 'nextRecCheck', 'instanceStruct', 'reset', 'set_DSlevel', 'copyBuf', 'write197Err', 'getLength', 'log_wrapper', 'getGroupAndType', 'print_it', 'removeTrailingSpaces', 'crarck', 'crarul', 'crarsv', 'crarld', 'crarprm', 'evalfree', 'Log_Func', 'writeToLog', and 'logPtr'.



JCL Generation and Submission to z/OS execution

JCL generated from COBOL Code

The screenshot shows the IBM Rational software interface. On the left, a project tree under 'z/OS Projects' shows a folder 'DNET045.STEW.COBOL' containing several COBOL files and a sub-folder 'DNET045.STEW.JCL' containing JCL files. 'REGIOA.jcl' is selected and circled in red. A blue arrow points from the text 'JCL generated from COBOL Code' to this file. The main editor window shows the content of 'REGIOA.jcl' with line numbers 000001 through 000011. The code includes job definitions, message classes, and execution commands. Below the editor is an 'Outline' window showing a hierarchical view of the JCL code. A context menu is open over the project tree, with the 'Submit' option highlighted in red.

```

000001 //REGED511 JOB ,
000002 // MSGCLASS=H, TIME=(, 4) , REGION=28M, COND=(16, LT)
000003 // JCLLIB ORDER=DNET045.WSED511.JCL
000004 //*
000005 //DELLIST EXEC PGM=IDCAMS
000006 //SYSPRINT DD SYSOUT=*
000007 IF LASTCC = 8 THEN SET MAXCC = 4
000008 DELETE DNET045.IDECO
000009 IF LASTCC = 8 THEN S
000010 /*
000011 //STP0000 EXEC PROC=EL
    
```

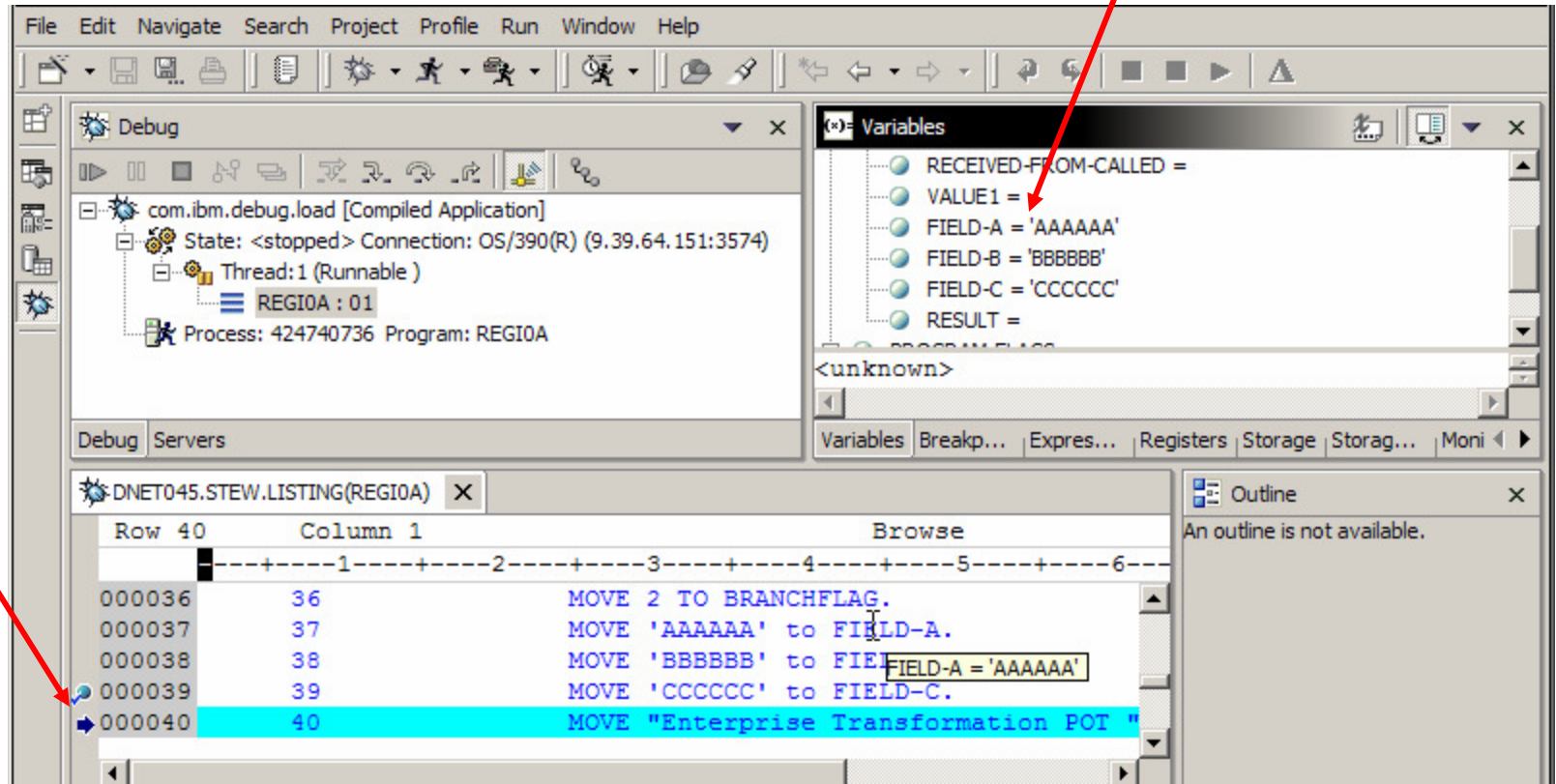
Benefit: Developers focused on business logic and not on writing JCL, JCL smart editor, Outline...



Remote/Local debug

Change contents, etc..

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



Benefit: Same Debug Perspective used for COBOL, PL1, C, C++, Java, JSP, HTML, etc..



Remote CICS Debug – Setup to use RDz

Initiated based on:

- *Transaction*
- *Program*
- *User ID*
- *Termid*
- *NetName*
- *etc*

- Can use TCP (IP)
- Workstation tcpip address
- Port to broadcast on

```

_CADP - CICS Application Debugging Profile Manager - CICSACB2

View Compiled Debugging Profile ETSOAN for DNETO45 activated by DNETO45
to 9.65.145.184

CICS Resources To Debug
Transaction ==> *
Program ==> CUSTINQ4
Comp Unit ==> *
Applid ==> *
Userid ==> *
Termid ==> *
    
```

```

CADP - CICS Application Debugging Profile Manager - CICSACB2

Set Compiled Debugging Display Device (checked at PROFILE activation time)

Debugging Display Device
Session Type ==> TCP (3270,TCP)
3270 Display Terminal ==> 0048

TCP/IP Name Or Address
==> 9.65.145.184
==>
==>
Port ==> 08003
    
```

```

Line 100 Column 1 ETSOA.EOT.LISTING(CUSTINQ4) Browse
-----+-----+-----+-----+-----+-----
000098 98 GET-CUST-INFO.
000099 99 * -- added to access DB2 - Regi
000100 100 MOVE CustNo to db2-custno.
000101 101 * The connect below is required for local
000102 102 * EXEC SQL CONNECT TO EOTZOS END-EXEC.
000103 103
000104 104 EXEC SQL SELECT CUST_FN, CUST_ADDR1, CU
000105 105 CUST_ST, CUST_CTRY, CUST_LN
000106 106 INTO :db2-firstname,
    
```

Monitoring Job Output

The screenshot displays the IBM Rational Software Development Platform interface. The main window shows the output of a JES2 job (JOB03276) on a z/OS system. The output includes job statistics and a detailed job log. A 'Remote Systems' panel on the right shows a tree view of the system structure, including 'My Jobs' and various job files. At the bottom, a 'Remote System Details' panel shows a table of jobs with a context menu open over the selected job.

Job Output:

```

JES2 JOB LOG -- SYSTEM MVS J
17.07.57 JOB03276 ---- FRIDAY, 22 DEC 2006 ----
17.07.57 JOB03276 IRR010I USERID DNETO45 IS ASSIGNED TO THIS JOE
17.07.57 JOB03276 ICH70001I DNETO45 LAST ACCESS AT 16:57:09 ON PF
17.07.57 JOB03276 $HASP373 DNETO45C STARTED - INIT 6 - CLASS A
17.07.57 JOB03276 IEF403I DNETO45C - STARTED - TIME=17.07.57
17.07.59 JOB03276 - --TIMJ
17.07.59 JOB03276 -JOBNAME STEPNAME PROCSTEP RC EXCP CPU
17.07.59 JOB03276 -DNETO45C STP0000 COBOL 04 738 .00
17.08.00 JOB03276 -DNETO45C LKED LINK 00 230 .00
17.08.03 JOB03276 -DNETO45C BIND 00 101 .00
17.08.03 JOB03276 IEF404I DNETO45C - ENDED - TIME=17.08.03
17.08.03 JOB03276 -DNETO45C ENDED. NAME- TOTJ
17.08.03 JOB03276 $HASP395 DNETO45C ENDED
----- JES2 JOB STATISTICS -----
22 DEC 2006 JOB EXECUTION DATE
    
```

Name	Job ID	Job Name	Job Owner	Return C...	Return Info	System r...	User retu...	Return St...
DNETO45C:JOB03276	JOB03276	DNETO45C	DNETO45	U0004	NORMAL		004	COMPLET...
DNETO45X:JOB03410	JOB03410	DNETO45X	DNETO45	U0000	JCLERROR			

Context Menu Options:

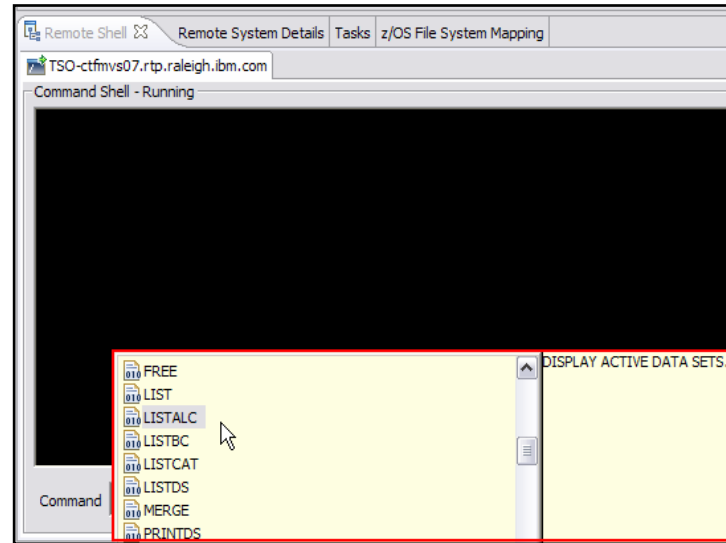
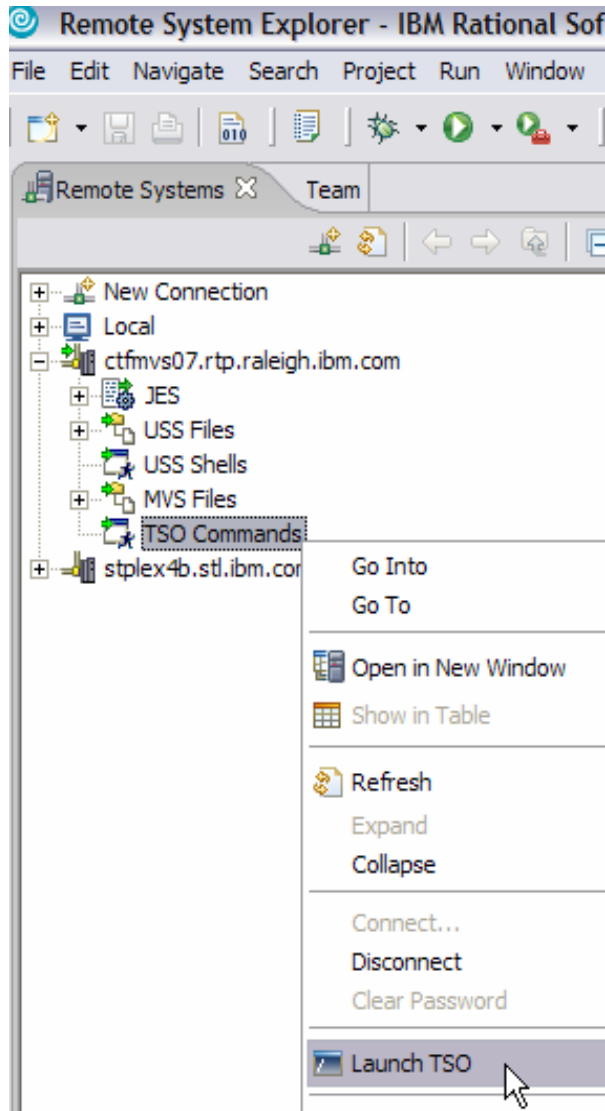
- Open
- Hold
- Cancel
- Purge
- Release
- Refresh Status

Footer text: Purges the selected job

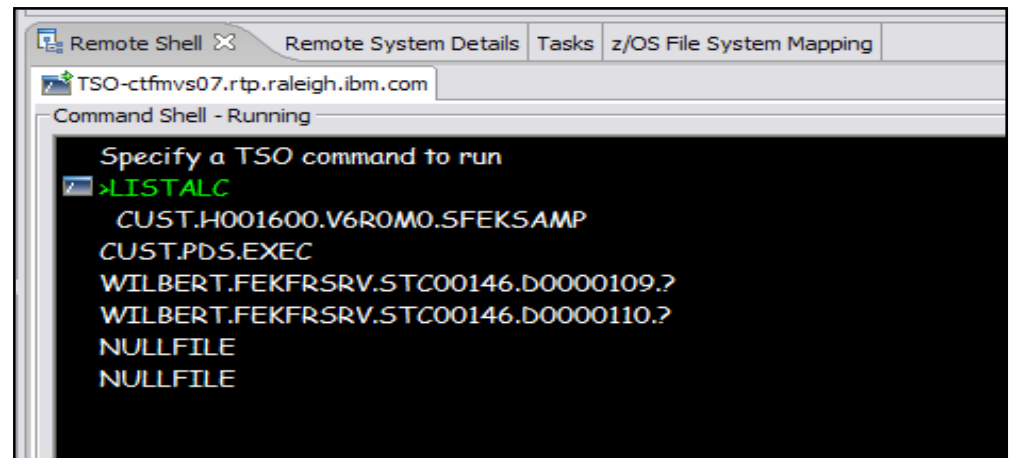
Benefit: Developers do not have to continually switch between systems to use SDSF. No TSO and SDSF needs.



TSO Commands (as well USS)



Content Assist



Use ClearCase Repository Access

The screenshot shows the IBM Rational Developer for System z environment. The central window is the RDz ISPF emulator, displaying a main menu for 'IBM Rational ClearCase z/OS Extensions - TSO Client'. The menu options are:

- 1.1 Select Environment Definition
- 1.2 Select a Distributed User
- 1.3 Select View
- 1.4 Select/Create UCM Activity
- 2.1 Upload Files
- 2.2 View File List
- 2.3 Build
- 3.1 TSO Client Log

Current configuration details shown in the emulator:

- Profile: DNET471
- ClearCase view: MADRDZ
- UCM activity: AUCT00000206
- Local PDS Prefix: DNET471.MADRDZ

At the bottom of the emulator window, there is a keyboard control panel with buttons for PF1 through PF12, Enter, PA1, PA2, Attn, SysReq, NewLine, and NextPad.

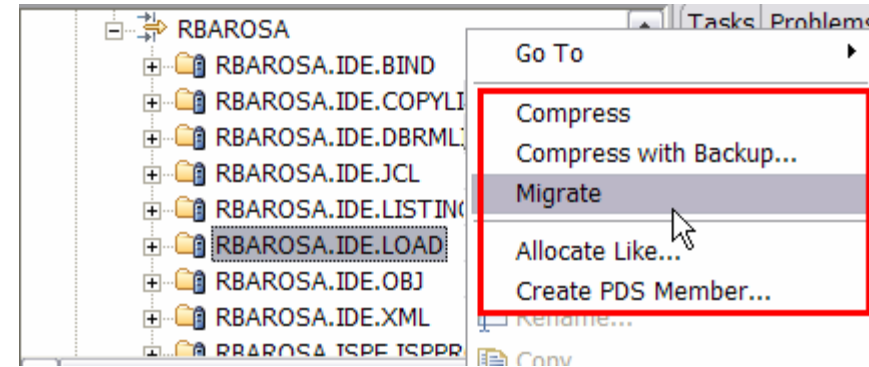
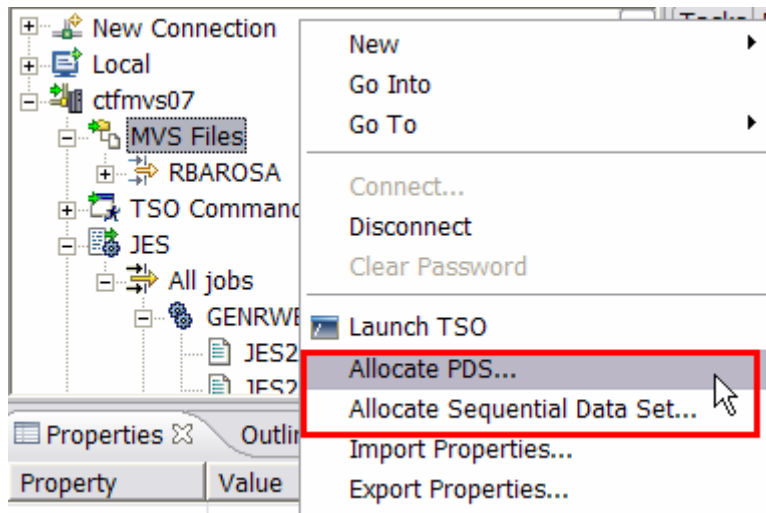
Below the emulator window, the 'Remote Error List' and 'z/OS File System Mapping' tabs are visible. The 'z/OS File System Mapping' tab shows a table with the following data:

Name	Parent filter pool	Parent filter	Number of filter strings	Connection-private
My Jobs	Ratz-madrid Filter Pool	Not applicable	1	No

RDz ISPF emulator



z/OS files and Dataset Management



- Allocate, Create PDS/PDSE, Member, etc....
- PDS allocation models, example PDS for COBOL source, 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.



Remote connection to AIX

The screenshot shows the IBM Rational software interface. The main window displays a COBOL program named 'PrintApp.cbl'. The code is structured as follows:

```

Line 1      Column 1      Insert
-----*A-1-B-----2-----3-----4-----5-----6-----7--|-+-----8
Identification Division.
Program-ID. PRINTAPP.

Data Division.
Working-Storage Section.
01 Work-Parms.
   05 In-Len          PIC S9(4) BINARY.
   05 Char-count      Pic 99 Value ZEROS.
   05 Out-Name        PIC X(100).

Linkage Section.
01 Recvd-Parms.
   05 In-name         Pic x(30).

Procedure Division using Recvd-Parms.
  Move spaces to Out-Name.

  Move 0 to Char-count
  Inspect Function Reverse(In-Name)
    Tallying Char-count For Leading Spaces
  Compute In-Len = 30 - Char-count

  Move "Thanks to " to Out-Name (1:10).
  Move In-name(1:In-Len) to Out-Name(11:In-Len)
  Move " for succeeding!" to Out-Name ((11 + In-Len):16).
  Display Out-name.
  Goback.
  
```

On the right side, the 'Remote Systems' tree shows a hierarchy of folders and files. The 'AIXCOBOL_1' folder is expanded, showing sub-folders like 'BuildOutput' and 'cobol', and files like 'a.out', 'aixCobol', 'build.sh', 'core', 'dan', 'dbuild.sh', 'PrintApp', 'sPrintApp', 'sStartApi', and 'StartApp'.

- Can use RDz to connect to AIX
 - ▶ Access to files on AIX
 - Edit, copy, compile, link
- Debug support to AIX through IBM debug tool (AIX)

- Pre-req's
 - ▶ IBM COBOL compiler
 - ▶ IBM Debug tool (AIX)



z/OS-based DB2 Stored Procedure Support

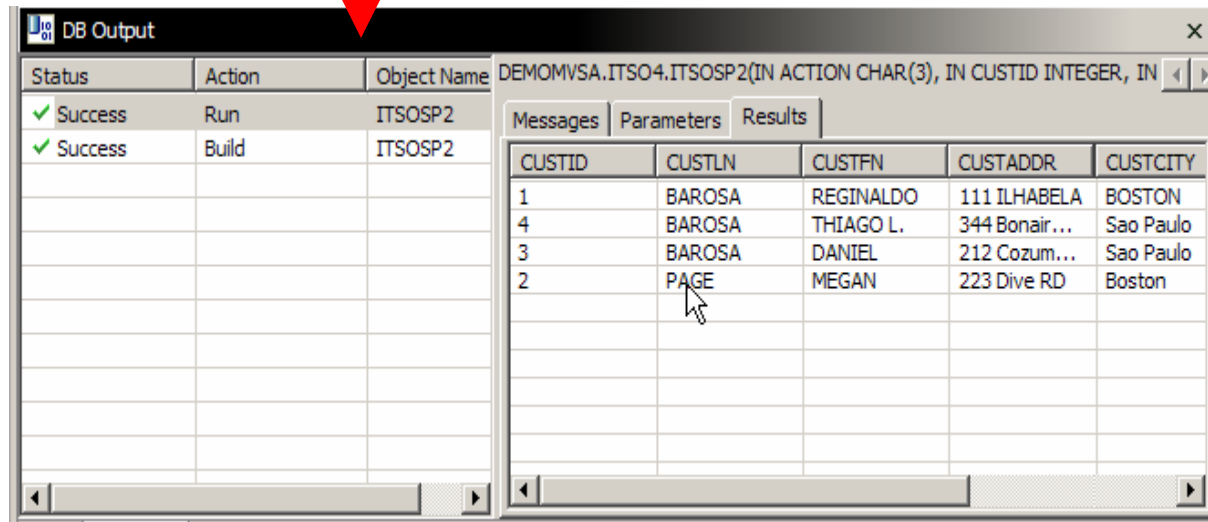
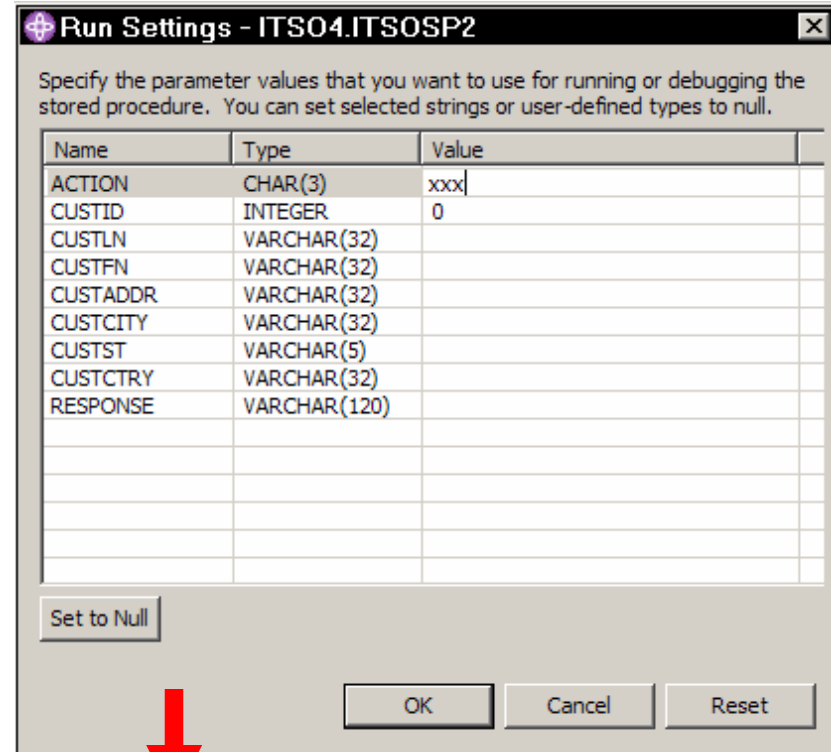
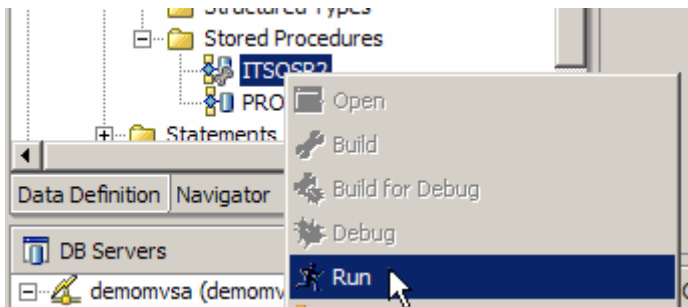
- Provides Wizard
 - ▶ Creates Stored Procedures that reside on a DB2 zOS server.
 - Generate SQL for the definition of the stored procedure
 - Generate the **PL/I** and **COBOL** stored procedure program

- Provides build environment
 - ▶ COBOL and PL/I editor
 - ▶ Builds and registers it on a DB2 Universal Database server

- Provides debug environment
 - ▶ Debug from the workstation



Stored Procedure Test Facility



- Gets the parameter info from the DB2 catalogue
- Provides an interface, which acts as the caller of the stored procedure
- Provides a place to enter values for the stored procedure
- Will run the stored procedure.
- Will invoke the stored procedure under the debugger if Runtime options are specified



Local Development using CICS TX

- Integration of CICS TXseries v6.1
- Provides local syntax check
 - ▶ CICS TS 3.X
 - ▶ CICS TX
- Provides a local CICS TXseries runtime
- Bundled with RDz version 7

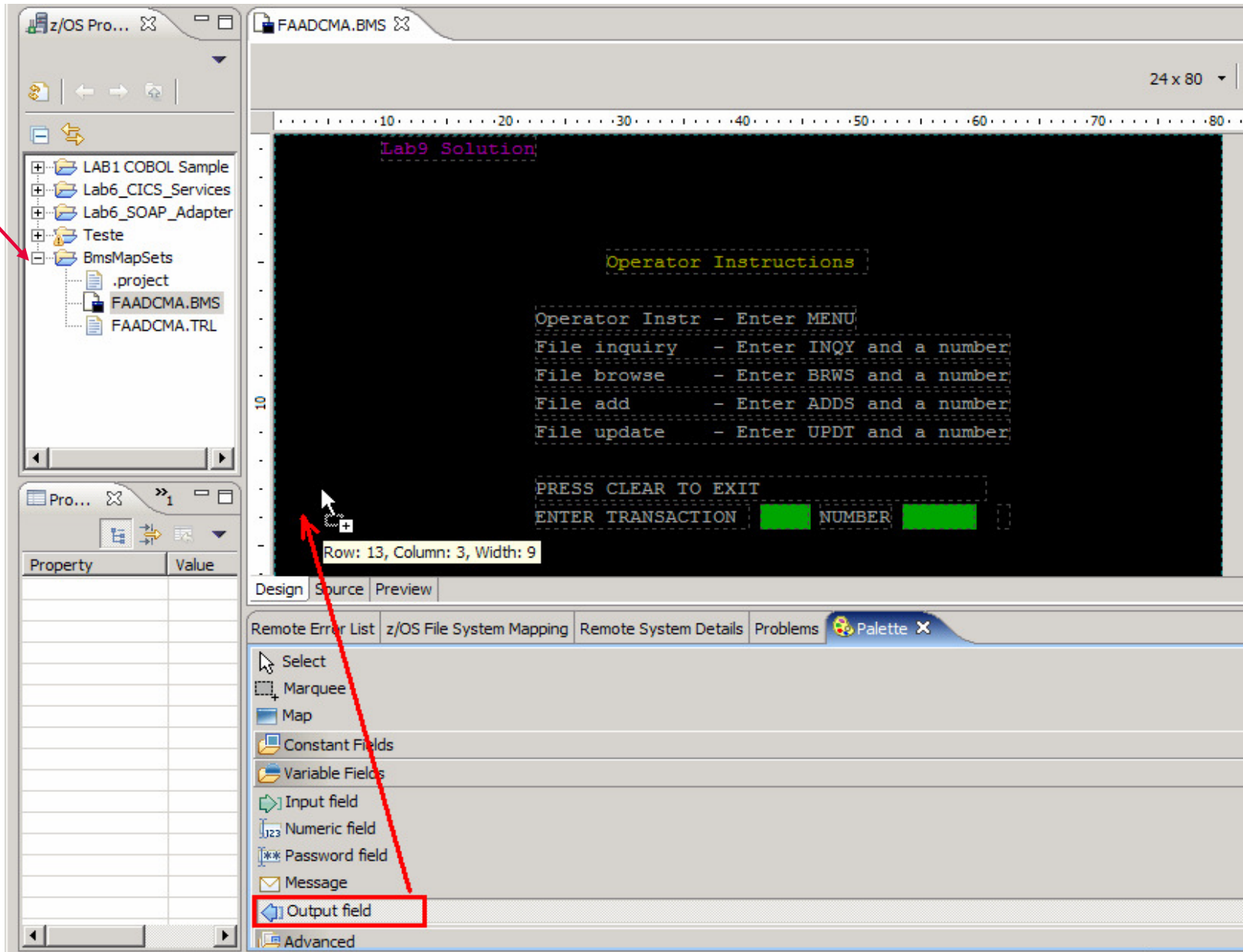
ID	Message	S...	Line	Location	Host N
IGYP50226	IGYP50226-E ERZ004025E: Command requires the option: 'TOKEN'.	2	60	CICSPROJ/COBOL2/...	ctfmvst
IGYP50226	IGYP50226-E ERZ004025E: Command requires the option: 'INTO'.	2	60	CICSPROJ/COBOL2/...	ctfmvst



CICS BMS Map Support

BMS Project

- 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



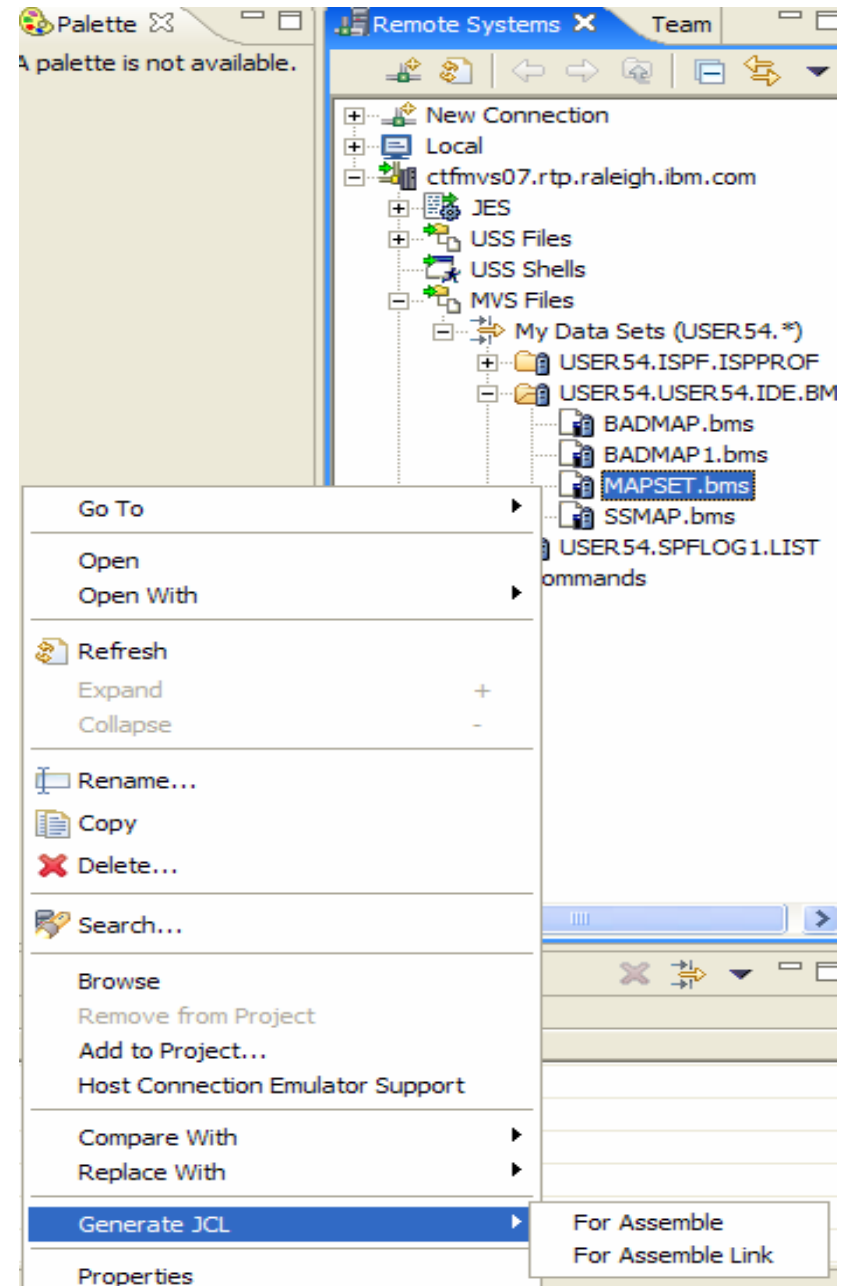
Generate JCL for maps

Generate JCL directly for map files

→ JCL for Assemble

→ JCL for Assemble and Link

A properties sheet define the Properties for the .bms member to be used for the compile



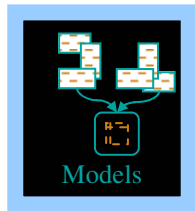
What is zSeries Rapid Application Development Tool?

- An easy to use Wizard
- Generates web application code
 - ▶ Generated code follows 'best practices'
 - ▶ Documented for future modifications and learning
- Provides quick and easy applications
- Specifically targets zOS DB2 database developers wanting to create web based applications using a mixed workload environment.
 - ▶ J2EE – Websphere Application Server
 - JSPs(Java Server Faces) & EGL
 - ▶ zSeries – CICS
 - COBOL & DB2

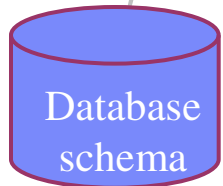
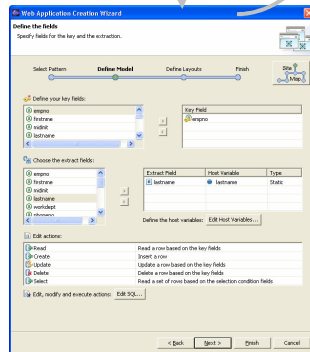
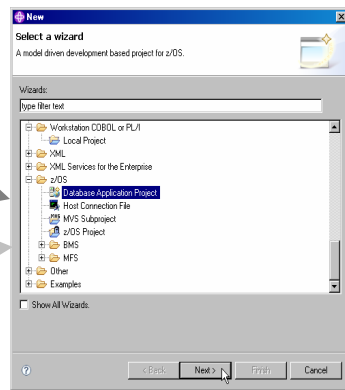


Database Application Generator wizard Architecture Overview

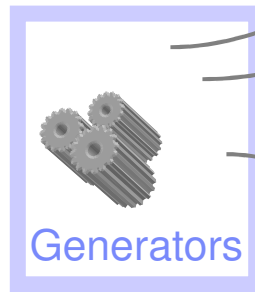
UML



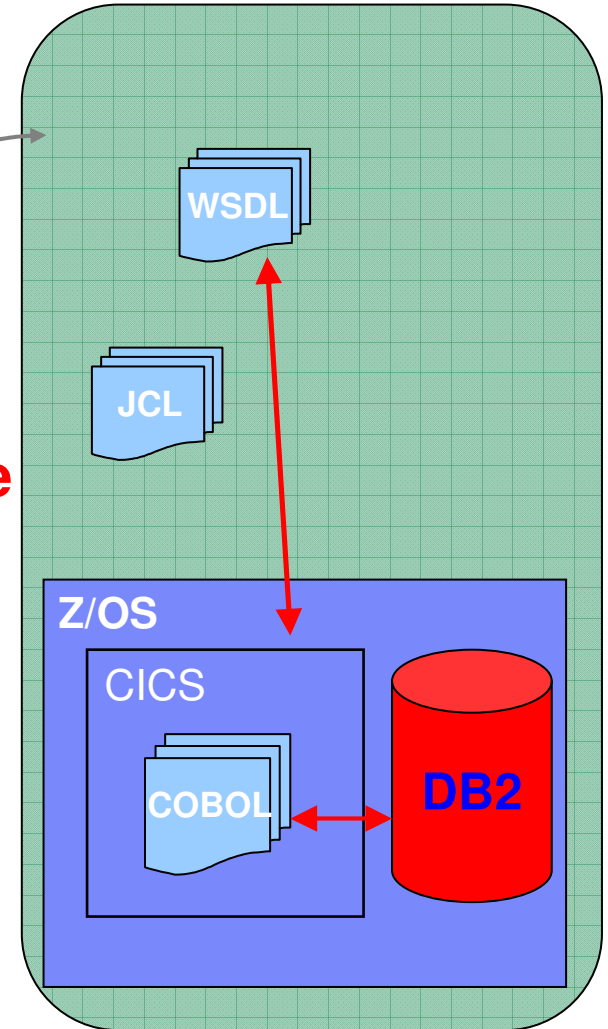
WDz Wizard



z/OS DB2

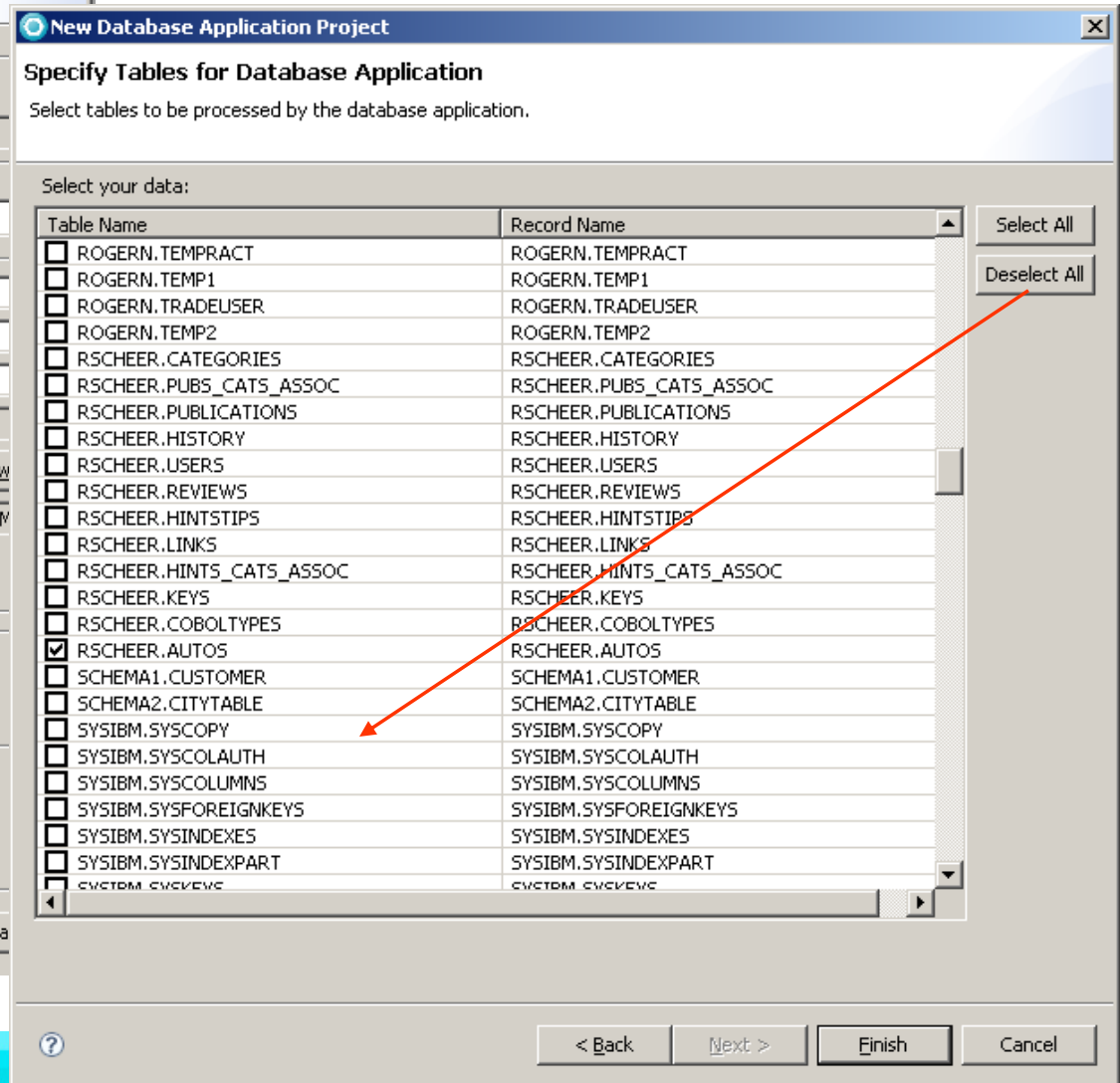
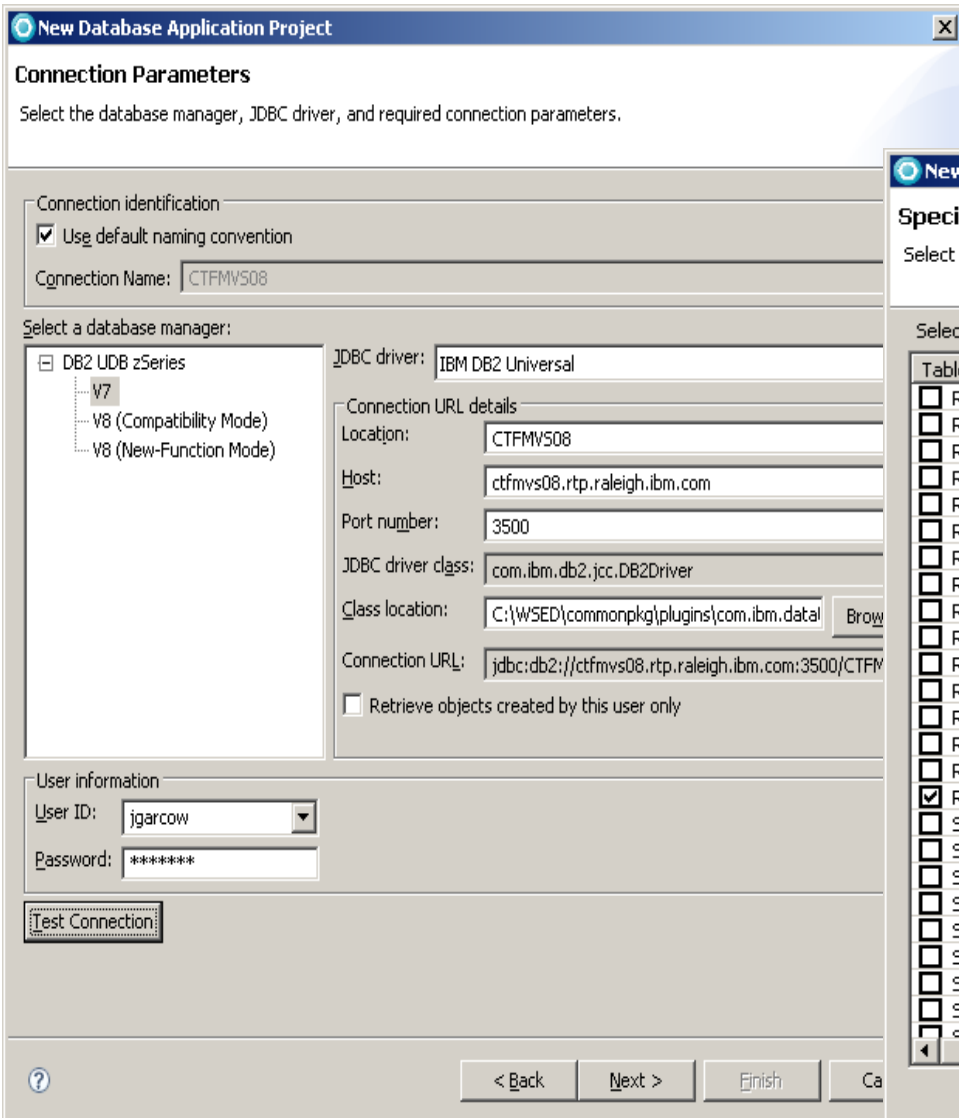


generate



Database Application -- Generated from Schema

- The WebService and COBOL process can easily be generated directly from the DB2 Schema.



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Why Web Services?

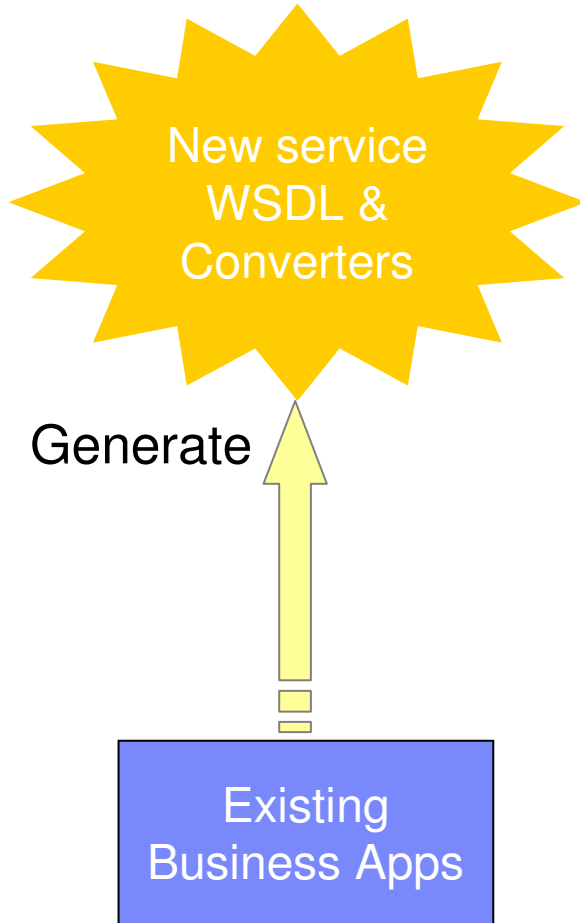
- Web services provide standardized access to assets for different software applications residing on disparate platforms
- Web service definitions provide abstract interfaces which allow for loose coupling between business components – implementation can vary without affecting consumers
- You can reuse applications exposed as Web services in a variety of service-oriented architecture frameworks, such as a process choreographer or an enterprise service bus.



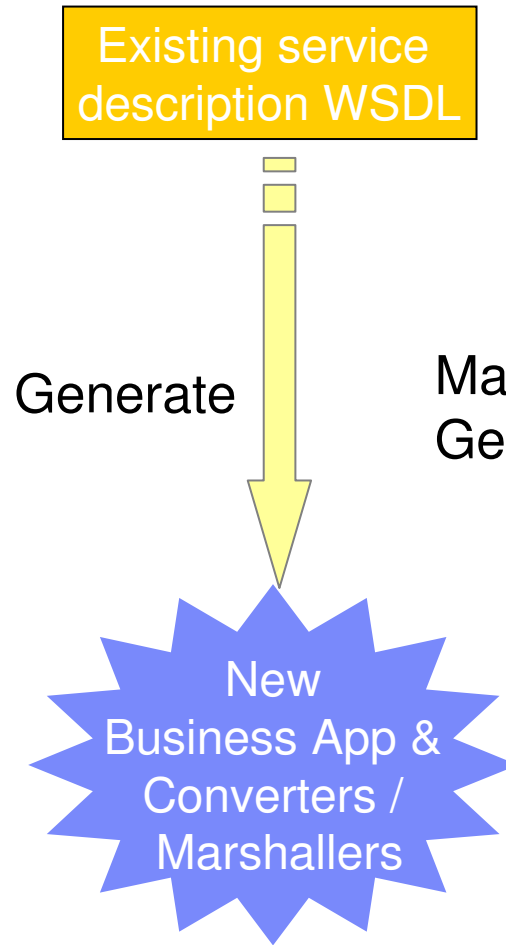
XML Services for the Enterprise (XSE)

Web Service Enablement Styles

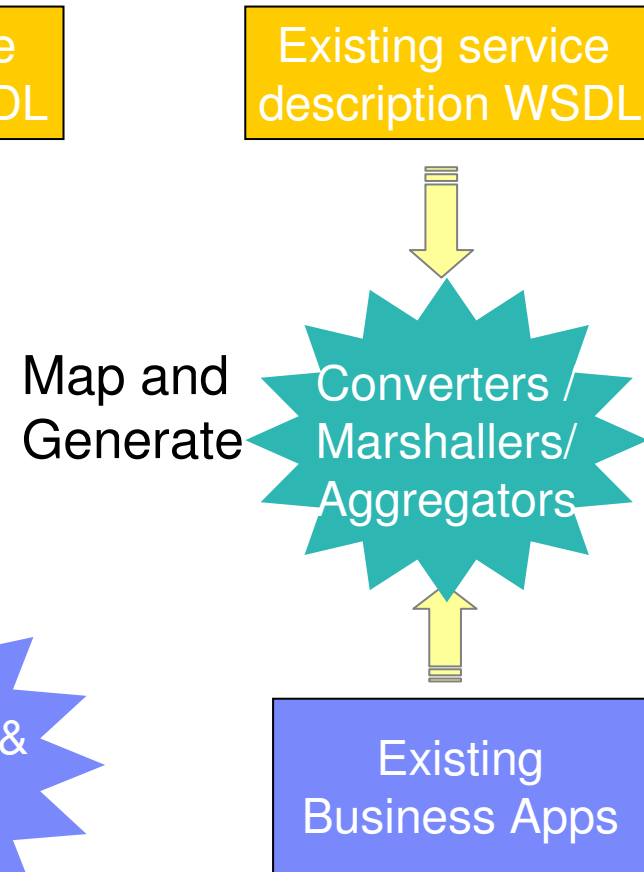
Bottom-up



Top-down



Meet in the middle



XML Services for the Enterprise (XSE)

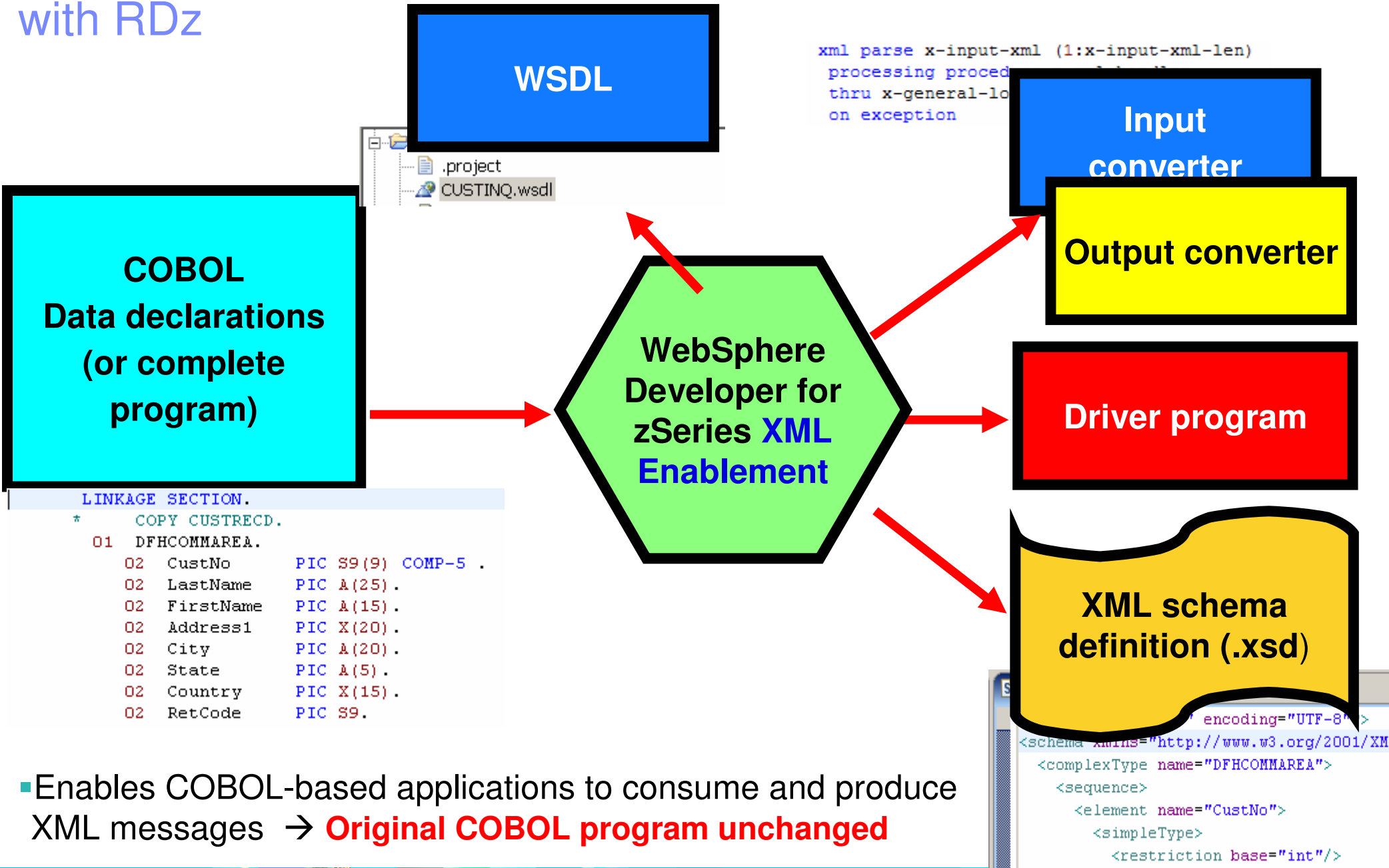
- **Web Services Enablement wizard (bottom-up)**
 - ▶ Generate Web Service interface from existing COBOL application
 - ▶ Bottom-up approach since COBOL at the bottom (base) of the creation process

- **Web Services Enablement wizard (top-down)**
 - ▶ Generate COBOL Program and copybooks from existing WSDL

- **Web Services Enablement wizard (meet-in-the-middle)**
 - ▶ Map 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



Example: z/OS CICS Version 2.2 or 2.3 and adapters created with RDz



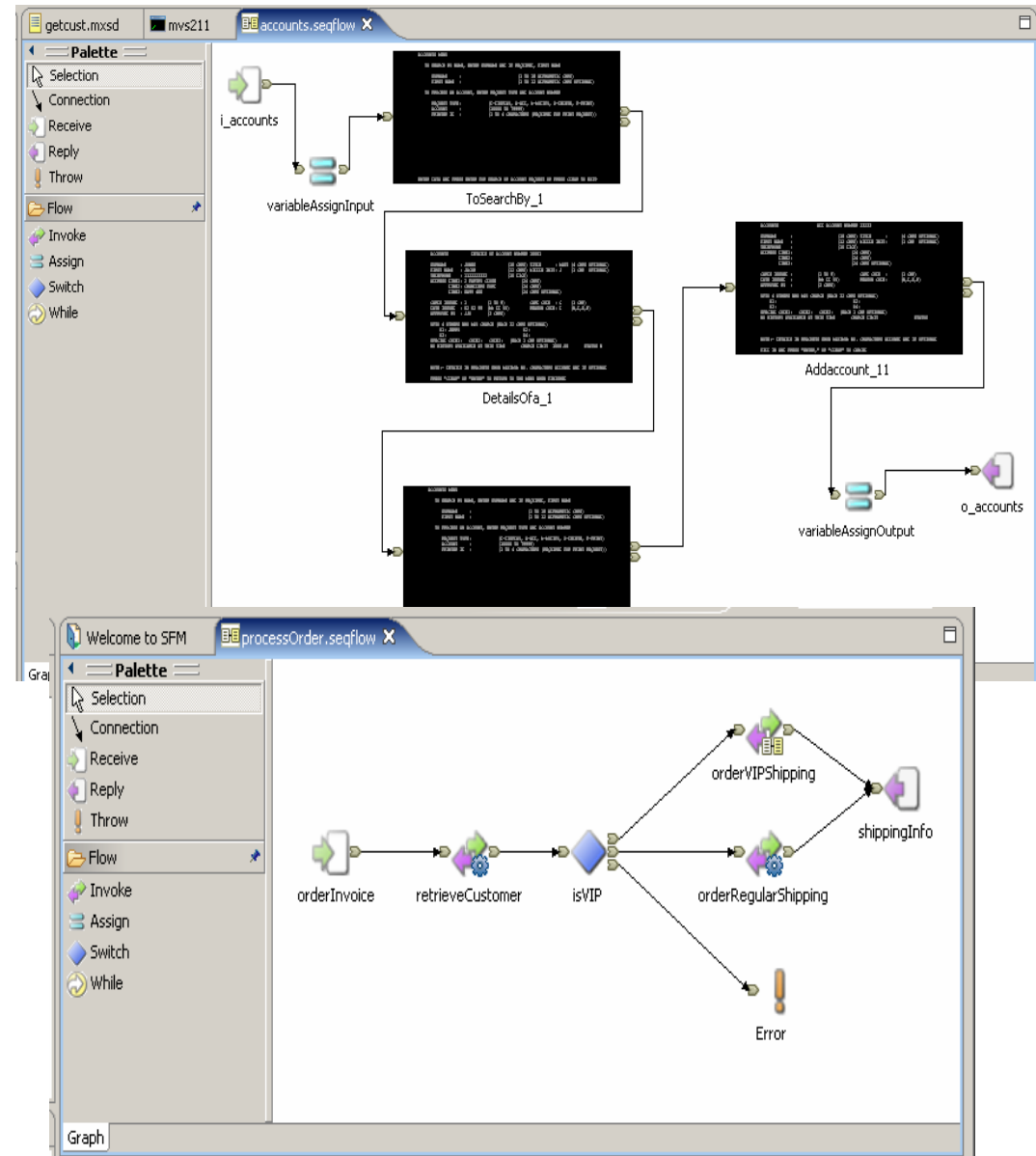
- Enables COBOL-based applications to consume and produce XML messages → **Original COBOL program unchanged**

Example: Testing using RDz

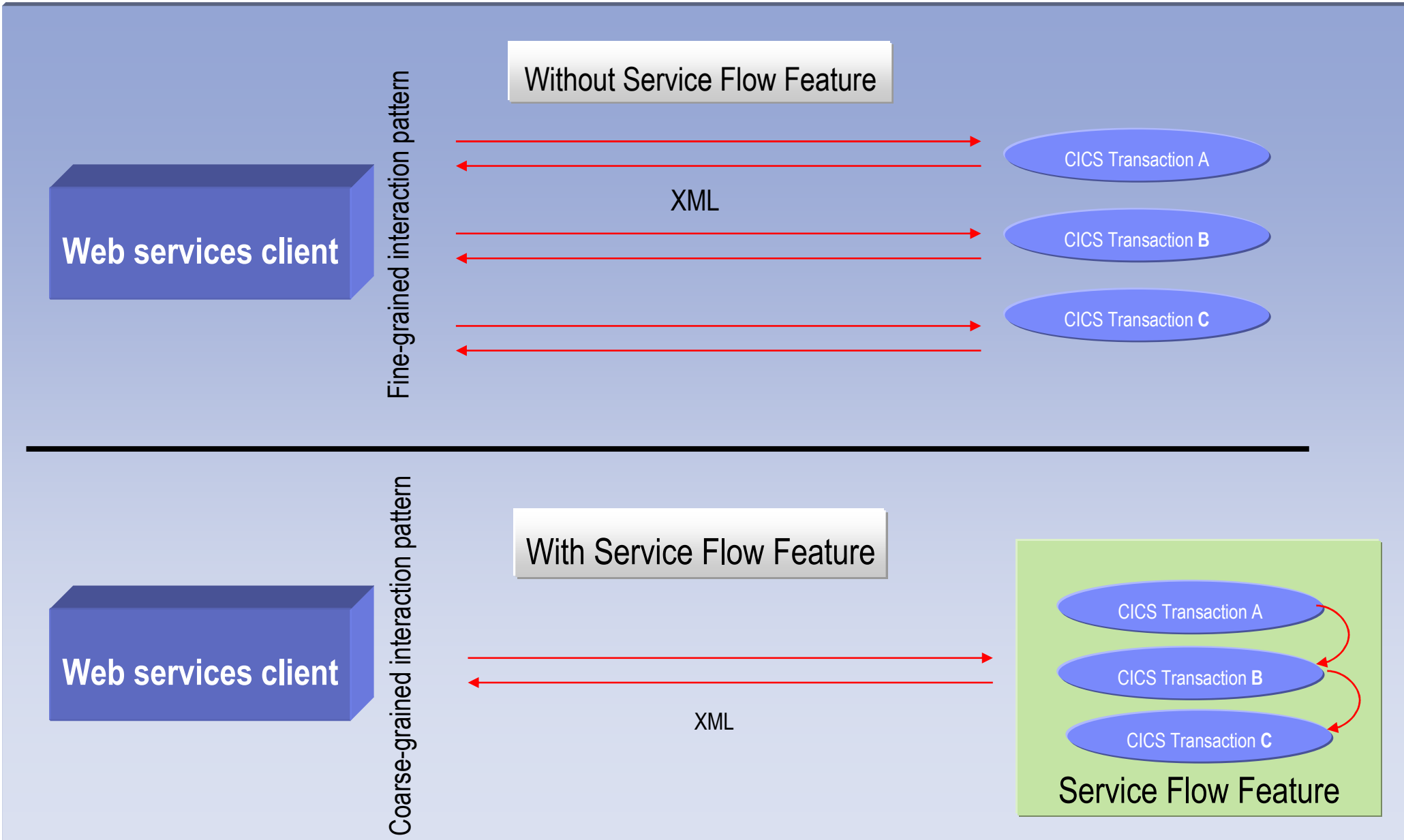
The screenshot displays the IBM Rational software interface. On the left, a project tree shows a folder named 'EOT_3_LOCAL_Create_services' containing a sub-folder '.project' and several files including 'CUSTINQ.wSDL'. A context menu is open over the 'CUSTINQ.wSDL' file, with the 'Web Services(H)' option selected. This menu has a sub-menu open showing options: 'Test with Web Services Explorer', 'Publish WSDL file', 'Generate Java bean skeleton', 'Generate Client', and 'Generate WSIL'. A large blue arrow points from the 'Test with Web Services Explorer' option to the right-hand side of the interface. On the right, a window titled 'Web Services Explorer' is visible, showing a URL 'omvs.demopkg.ibm.com:3091/CUSTINQ4'. Below the URL, there is a form with a field labeled 'CustNo int' containing the value '6'. Below this field are 'Go' and 'Reset' buttons. At the bottom of the window, a 'Status' section is expanded to show a list of data returned from the service: 'DFHCOMMAREA' with fields 'CustNo (int): 6', 'LastName (string): Barosa', 'FirstName (string): Thiago', 'Address1 (string): 7 Sao Benedito', 'City (string): Sao Paulo', and 'State (string): SP'. A red box highlights the entire status area.

What is Service flow support?

- Service Flow Feature is a CICS feature. **Service flow support** is a RDz tool to build service flows out of your existing **Commarea** and **Terminal** based CICS applications.
- It allows you to:
 - Model business processes
 - Implement business processes by aggregating multiple transaction invocations, terminal interactions, and sub-flows
 - Deploy these aggregations to runtimes in CICS Transaction Server V3.X or WebSphere Application Server
 - Optionally deploy business process as a web service
- Development concepts consistent with other SOA development tasks



Service Flow in RDz version 7



Why Service Flow Feature?

■ Increase Productivity

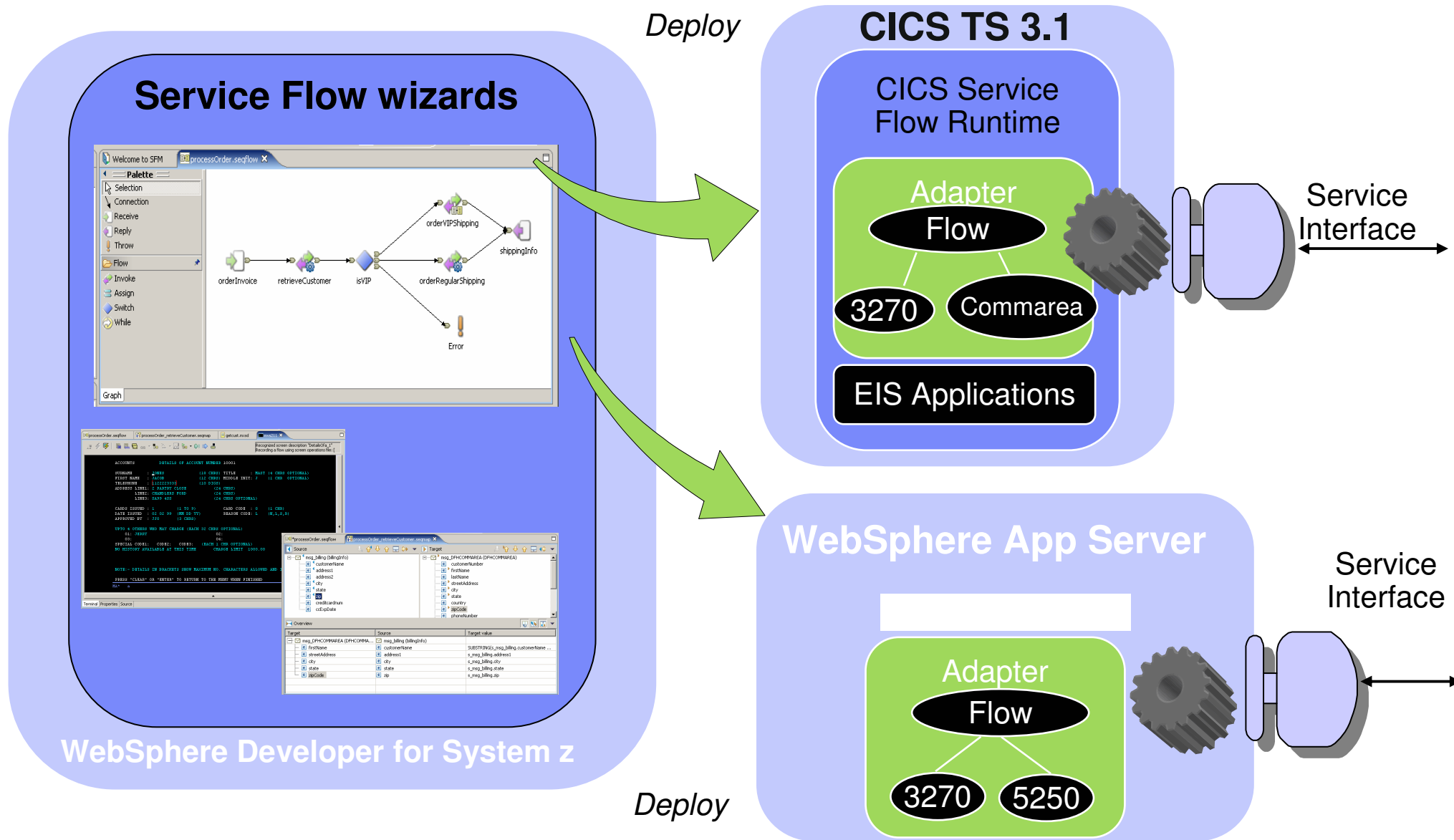
- ▶ By building libraries of annotated components representing current assets
- ▶ By rapidly assembling new applications out of existing components using graphical tools
- ▶ By exploiting existing developer skills and literacy

■ Transform the Enterprise

- ▶ By unlocking critical IT assets and re-purposing them to participate in a service oriented architecture
- ▶ By opening access to existing fine-grained applications as coarse-grained business functions, while maintaining QOS
- ▶ By providing a layer of abstraction between service consumer and application implementation / user interface
- ▶ By fostering SOA skills in traditional developers



Supported Runtimes



Generation & Deployment

■ CICS 3.X

▶ Generate

- COBOL for Adapter Navigator and Server Adapters
- JCL for compiling, linking, and defining resources to CICS
- WSDL, WSBIND, and XML<>COBOL converters

▶ Deploy

- Transfer artifacts to Host
- Deploy artifacts by submitting the generated JCL

■ HATS

▶ Generate

- HATS Macro

▶ Deploy

- Import into HATS Studio
- Use HATS to generate Web service from macro



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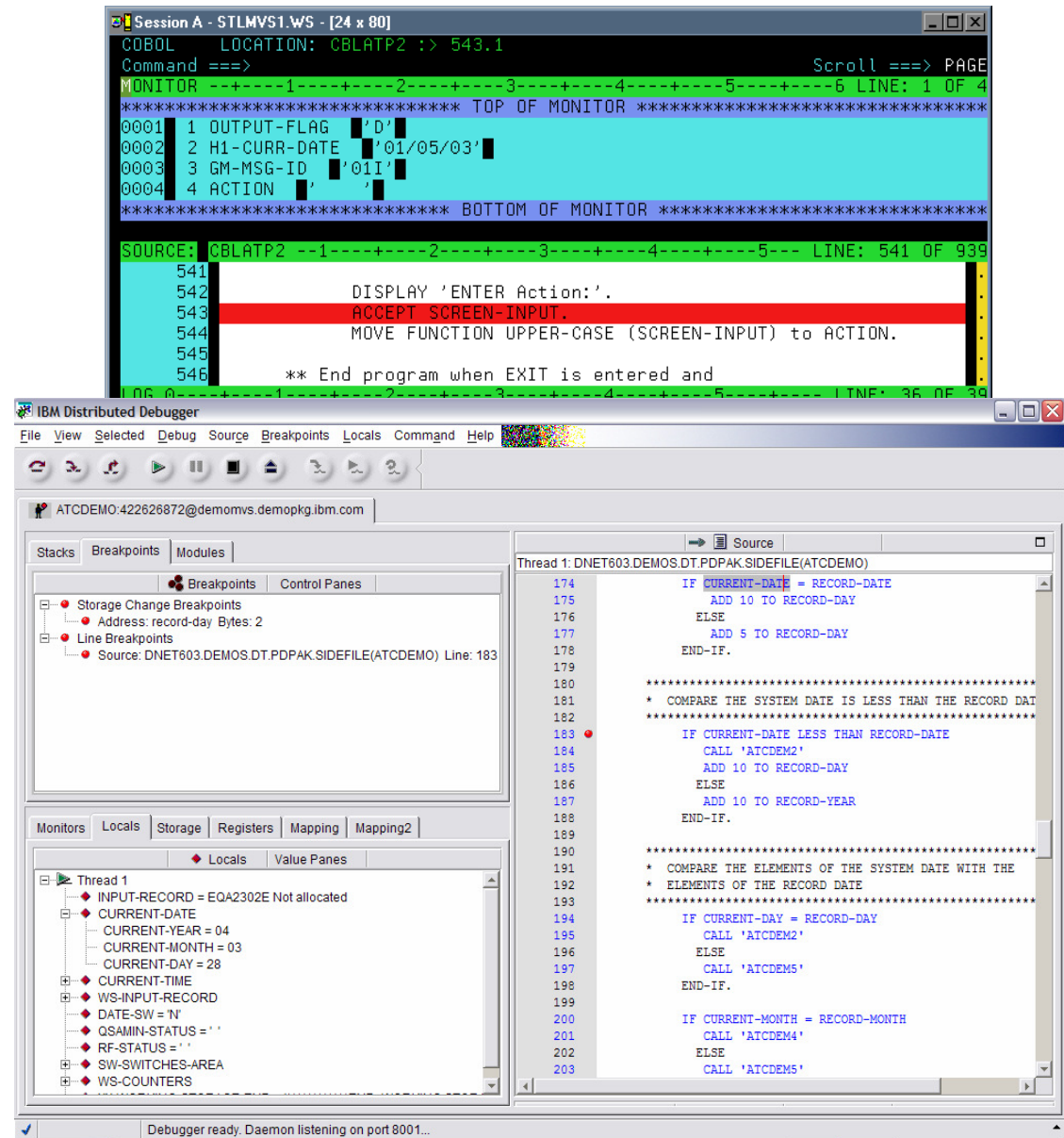
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Debug Tool Integration

- Supports COBOL, PL/I, C/C++
- Supports CICS, IMS, DB2, batch (and even WebSphere Application Server applications!)
- From the workstation:
 - ▶ View executing source code
 - ▶ Step through host code line-by-line
 - ▶ Set breakpoints
 - ▶ Alter working storage values
 - ▶ Alter register values
 - ▶ Etc....
- Debug z/OS and distributed code in the same interface, even stepping between runtimes and platforms!
- Requires IBM Debug Tool V7.1



New in 7.1 - Fault Analyzer integration

- Fault Analyzer gathers information about an application and the surrounding environment at the time of the abend
- Integration allows RDz user to access and view Fault Analyzer history files
- Requires Fault Analyzer V7.1

The screenshot displays the IBM WebSphere Developer for System z interface. The top window shows a synopsis of a system abend 0C7. The bottom window shows the 'Fault Summary' for a system abend 0C9, including a table of fault history.

Synopsis (Top Window):

```

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 (Bottom Window):

Module COBBLOW, program COBBLOW, source line # 49
: Abend 0C9 (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
    
```

Remote Error List:

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	SOCB	n/a
F00006	August 1, 2003	PSTRAND4	PSTRAND	STLABF1	SOC9	n/a
F00001	June 7, 2003	BILLUIR	PSTRAND	MVS2	SOC9	n/a
F00031	January 11, 2007	COBBLOW	PSTRAND	FAE1	SOC9	SOC9



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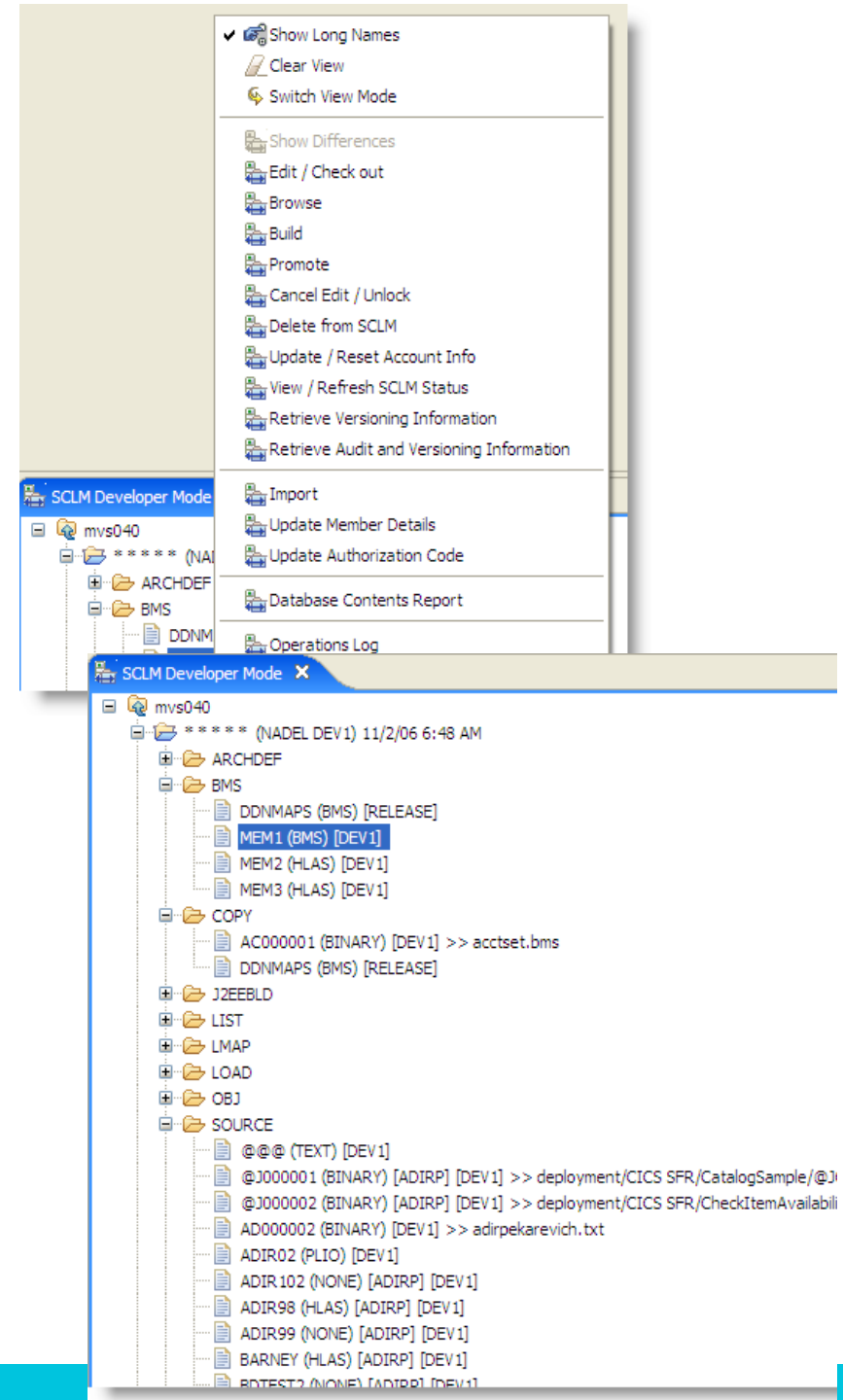
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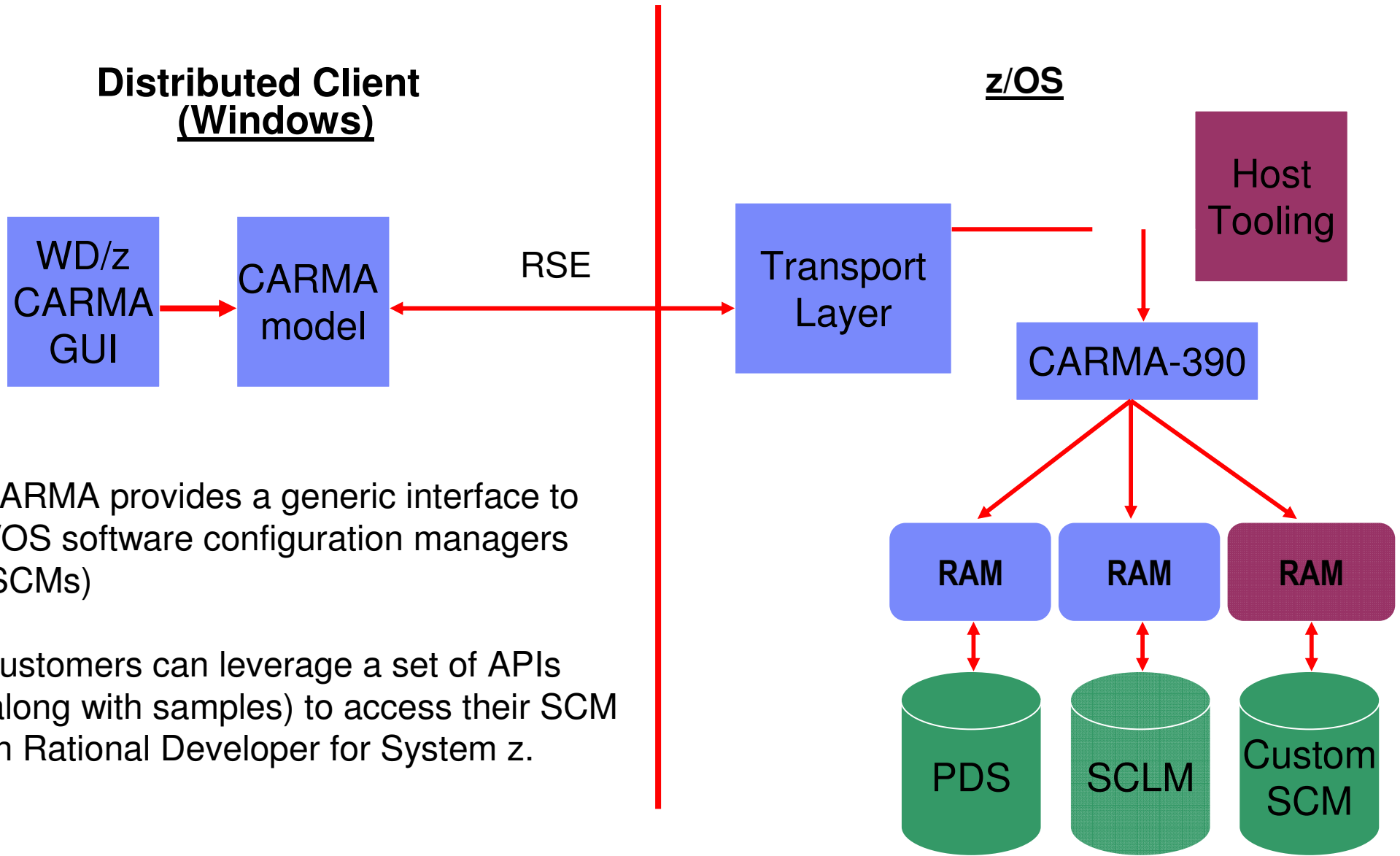


SCLM Developer Toolkit

- An Eclipse-based GUI to SCLM including:
 - ▶ A SCLM-specific environment
 - ▶ A SCLM view providing a tree-based list of:
 - groups
 - types
 - members
 - audit/version information
 - ▶ EOU wizards for performing common SCM operations
- Store both Java and COBOL into SCLM
- SCLM managed build and deployment services
- Integration with RDz syntax check and error feedback mechanism
- Support for accessing source from multiple LPARs in single view



Common Access Host Repository Manager (CARMA)



CARMA provides a generic interface to z/OS software configuration managers (SCMs)

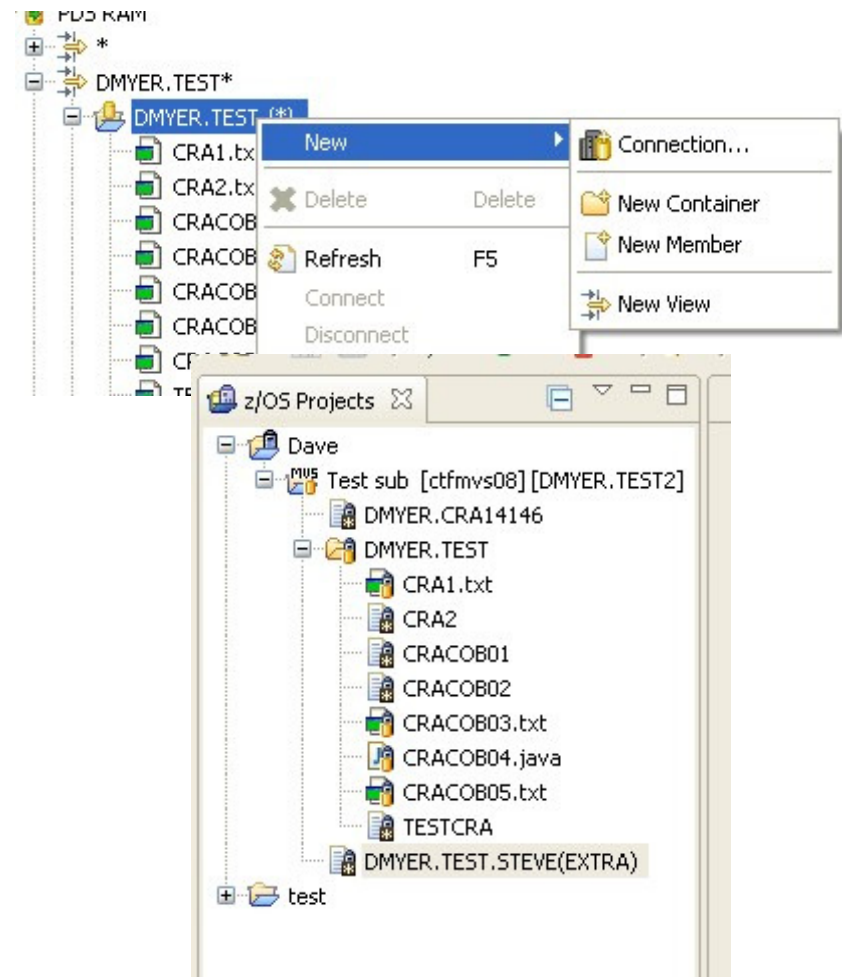
Customers can leverage a set of APIs (along with samples) to access their SCM on Rational Developer for System z.

RAM = Repository Access Manager



Integrate other SCMs using CARMA

- Code the “last mile” of access on the host and the framework takes care of the rest
- Create navigation views of source code
 - ▶ Browse/Filter existing members
 - ▶ Create/Delete members
 - ▶ View metadata on members
 - ▶ Work with different member versions
 - ▶ Display both metadata and project members using the CARMA fields view
- Extract source code to local/remote projects for editing, build, debug
 - ▶ Project resources maintain linkage back to SCM location for checkin/checkout, compare, replace, synchronization, etc
 - ▶ Extract properties from the SCM to setup builds in zOS remote projects



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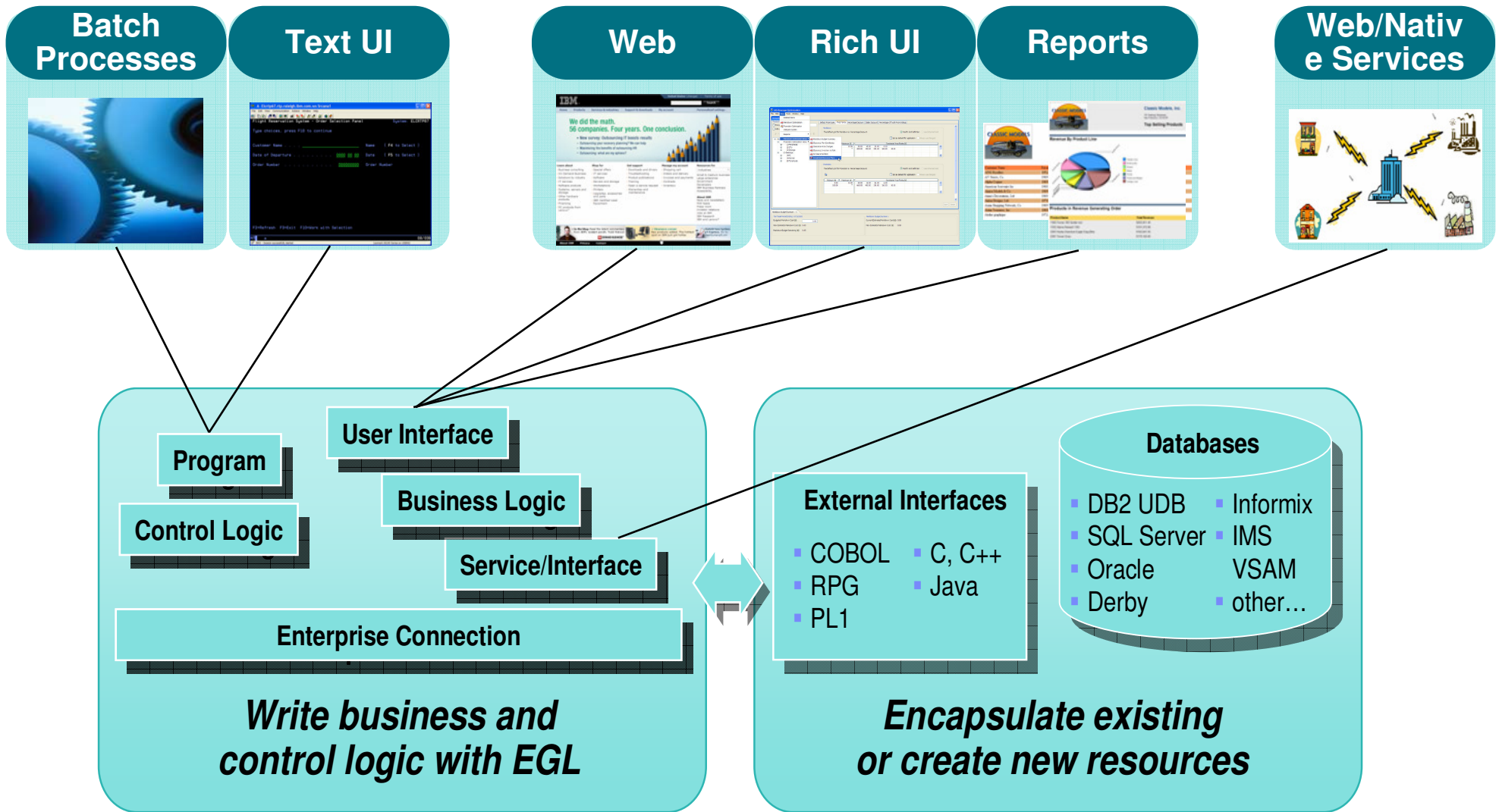
Web and JEE Development

- Create Web Pages / JSF / Struts
- JEE/Java Development
- JCA Connectors
- Distributed debugger
- Web Services and Test environment



Rational Business Developer Extension provides Application Flexibility

End-to-end development for a broad variety of applications



Note-Plugs in to Rational Developer for System z



IBM Rational Developer for System z

JES and PD Tools

- 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
- Interact with the Job Entry Subsystem (JES) to submit jobs, monitor jobs, and review job output
- Debug zOS applications from workstation as they execute live in the remote runtime

Integration with EGL using RBDe

- Quick and easy development of modern enterprise applications for procedural programmers
- Simplify and speed up creation of Web applications and services without having to learn Java or J2EE

Traditional Development

Development Environment

- Connect to z/OS systems
- Work with z/OS resources like COBOL, PL/1, C, C++, JCL, etc.
- 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
- Create, build, and catalog DB2 stored procedures on zOS
- Compile and test programs locally to ensure correctness

Screen design

- Visually create, modify, build, and deploy BMS maps sets or MFS/IMS maps remotely or on the local workstation

Code Generation

- Generate CRUD DB2 program code from UML, which can also be easily integrated into web service applications

IBM Rational Developer for System z

RBDe

Host Tooling Integration

[JES, FA, FM, Debug Tool]

zOS Application Development

[COBOL, PL/1, C/C++, JCL, Screens, Stored Procedures, etc]

Enterprise Service Tools

[Web Services For CICS/IMS]

Host / Distributed SCM Integration

IBM Rational Application Developer

zOS Web Service and Flow Creation

- Implements SOA and Web Services
- SOA access to CICS V3.2 and IMS V9 COBOL applications
- Bottom-up/Top-down or meet-in-the-middle COBOL to XML mapping support
- Integrated COBOL XML converters, XML schemas, and WSDL generation
- Service Flow Modeler to build/deploy service flows out of your existing Commarea, Channel, MQ, and Terminal CICS applications.

SCM Support

- Access to host SCMs such as SCLM
- Framework for writing/deploying custom SCM integration code
- Support for storing zOS resources in distributed SCMs such as ClearCase

Web and JEE Development

- Create Web Pages / JSF / Struts
- JEE/Java Development
- JCA Connectors
- Distributed debugger
- Web Services and Test environment



Scenario: Support for Composite Application Development

RDz:

- Brings the power of J2EE, rapid Application Development, and robust team support to diverse enterprise IT organizations
- Consists of:
 - ▶ An intuitive, visual construction based on open standards (Java Server Faces)
 - ▶ Broad SOA support through Web Services and JCA with specialized zSeries capabilities
 - ▶ An easy to learn, language neutral environment for rapid application development
 - ▶ Comprehensive state-of-the-art facilities for developing, debugging and deploying Java, COBOL, PL/I and C/C++ applications and services

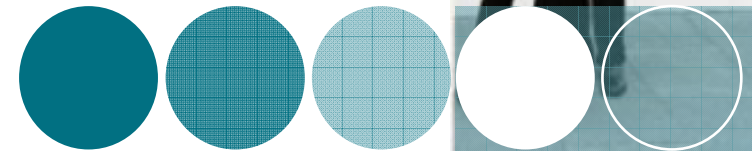
Benefits:

- Increase developer productivity
- Leverage existing processing
- Integrate with lifecycle
- Extend skill sets across the organization



Agenda

- IBM Rational Software - Our unique value
- Application Development for z: The Rational Approach
- IBM Rational Developer for system z: The Enterprise IDE
- IBM Rational ClearCase and ClearQuest: Enterprise-Wide Application Lifecycle Management
- Summary



IBM Rational ClearQuest

Comprehensive Software Change Management

An industry-leading solution that provides flexible defect and change tracking, process automation, reporting and lifecycle traceability for better visibility and control of the software development lifecycle

- ✓ Real-time reporting and process enforcement improve project visibility and control
- ✓ Automated workflows and e-mail notifications enhance team communication and coordination
- ✓ Test management unifies testing activities, from planning through results, for improved software quality
- ✓ Access control, electronic signatures, repeatable processes and audit trails simplify compliance management
- ✓ Integration with requirements, development, build, test, deployment and portfolio management tools facilitates rapid response to change



Report and Manage Defects

The screenshot displays the IBM Rational ClearQuest RDz perspective. On the left, a navigation tree shows various project components, with 'All Defects' selected. The main window shows a table of defects with columns for ID, Headline, Severity, Owner, and State. A 'Create (Defect)' dialog box is open, showing fields for ID, State, Headline, Suite Project, UCM Project, Owner, Priority, Severity, Customer Priority, and Description. The dialog also includes buttons for 'Apply', 'Revert', 'OK', and 'Cancel'.

id	Headline	Severity	Owner	State
AUCT00000075	too many spaces in 'change due' field	4-Minor	dale	Assigned
AUCT00000076	add items fails for large quantities	3-Average	chris	Opened
AUCT00000077	unable to add item already in sale list	2-Major	dale	Assigned
AUCT00000078	change due amount is supposed to be red	3-Average	alex	Closed
AUCT00000079	application crash if logout before reorder is complete	1-Critical	sandy	Assigned
AUCT00000171	Items listed for sale are not persisted in database.	1-Critical	Brian	Submitted
AUCT00000191	Cancel bid function does not actually cancel build	1-Critical	chris	Submitted
AUCT00000199	System lets you register multiple accounts with same login	1-Critical	jan	Submitted
AUCT00000200	Auction not accepting reserve bids	2-Major	jan	Closed
AUCT00000201	Rearrange directories, add src and JCL for zOSE Remote Build	1-Critical	admin	Opened
AUCT00000206	Reword Banner.CBL	1-Critical	admin	Opened

IBM Rational ClearQuest RDz perspective



Manage Development Activities

The screenshot displays the IBM Rational Developer for System z interface. The main window shows a 'ClearQuest Chart: Active Defects by Owner' with a 3D bar chart. The chart's Y-axis is labeled 'Count' and ranges from 0 to 5. The X-axis is labeled 'Owner' and lists ten individuals: admin, alex, Brian, chris, dale, dana, devon, jan, morgan, sandy, and tracy. The bars represent the number of active defects for each owner: admin (2), alex (1), Brian (1), chris (3), dale (5), dana (1), devon (1), jan (2), morgan (3), sandy (2), and tracy (1). A 'Capture Image <CTRL><F11>' button is visible at the bottom right of the chart area.

Owner	Count
admin	2
alex	1
Brian	1
chris	3
dale	5
dana	1
devon	1
jan	2
morgan	3
sandy	2
tracy	1

Console output:

```

ClearQuest
Connect to admin,RATL4z7@AUCT
Result: Successful!
Completed: Thursday, January 24, 2008 12:36 PM

-----
Connection: admin,RATL4z7@AUCT
Execute Chart: Public Queries/Distribution Charts-All Projects/Active Defects by O
Result: Successful!
Completed: Thursday, January 24, 2008 12:41 PM
    
```

IBM Rational ClearCase

Complete Software Configuration Management

An industry-leading solution that provides sophisticated version control, workspace management, parallel development support and build auditing to improve productivity

- ✓ Integration with leading IDEs allows you to work in your preferred environment
- ✓ Transparent real-time access to files and directories virtually anywhere in your organization
- ✓ Sophisticated branching and graphical merge tools enable concurrent access and efficient use of time
- ✓ Light-weight feature-rich clients allow you to work locally or remotely.
- ✓ Support for open source environments provides added workspace flexibility



Our exclusive solution

Software Configuration Management

IBM Rational ClearCase

- An industry-leading solution
- Built on proven technology and best practices
- Flexible and scalable architecture supporting single, distributed and replicated servers
- Cross platform support for distributed, mainframe and midrange environment
- Part of a complete end-to-end lifecycle solution



IBM Rational ClearCase

Flexible alternatives for implementation

Rational ClearCase supports two implementation methods:

- Unified Change Management (UCM)
 - ▶ Out-of-the-box solution
 - ▶ Activity-based change management process
 - ▶ Configurable automated workflow process
 - ▶ Proven best practices

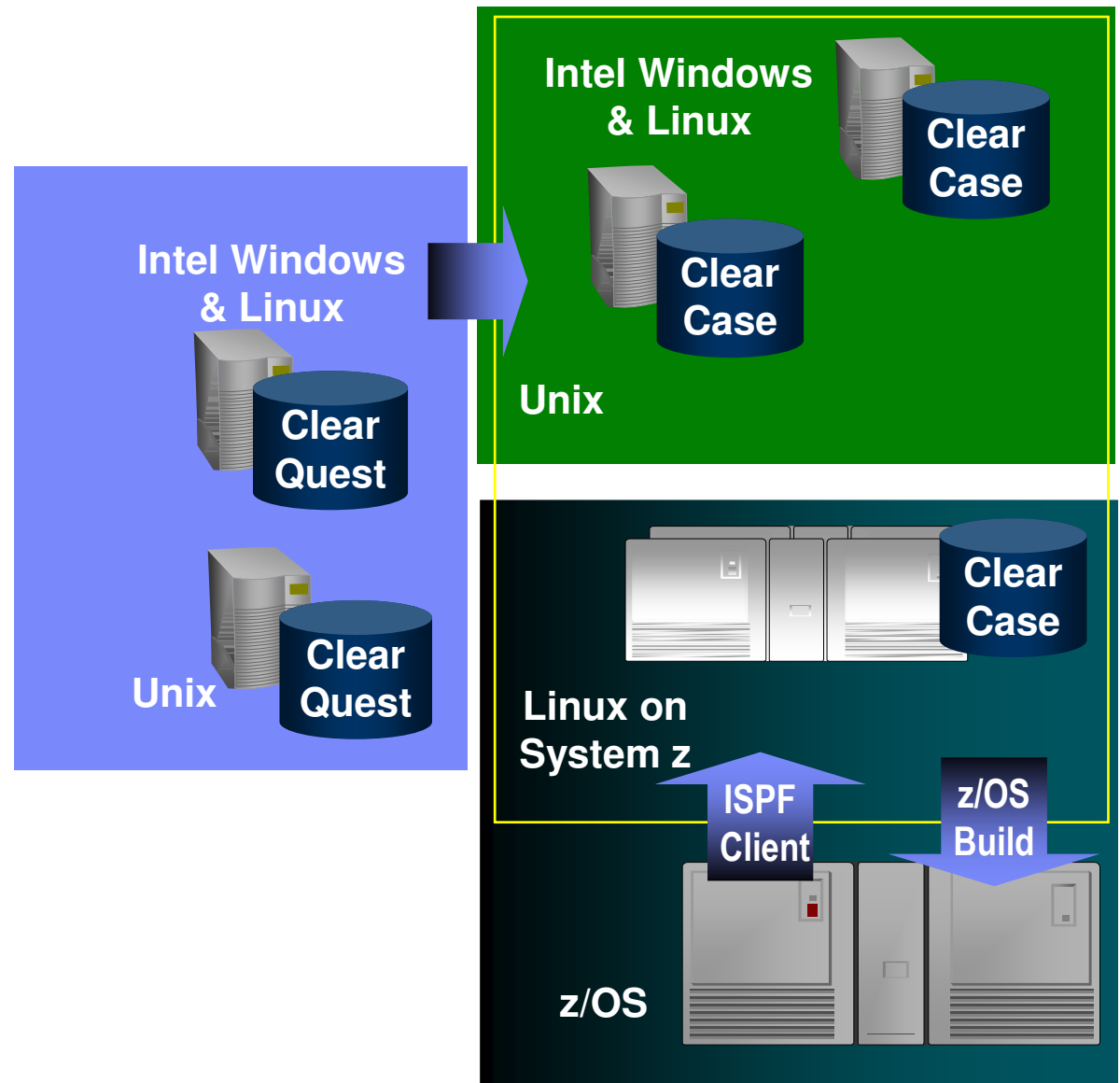
- Base Rational ClearCase
 - ▶ Flexibility to implement virtually any configuration management solution tailored to a particular development environment
 - Unlimited and automated branching
 - Customize to your needs



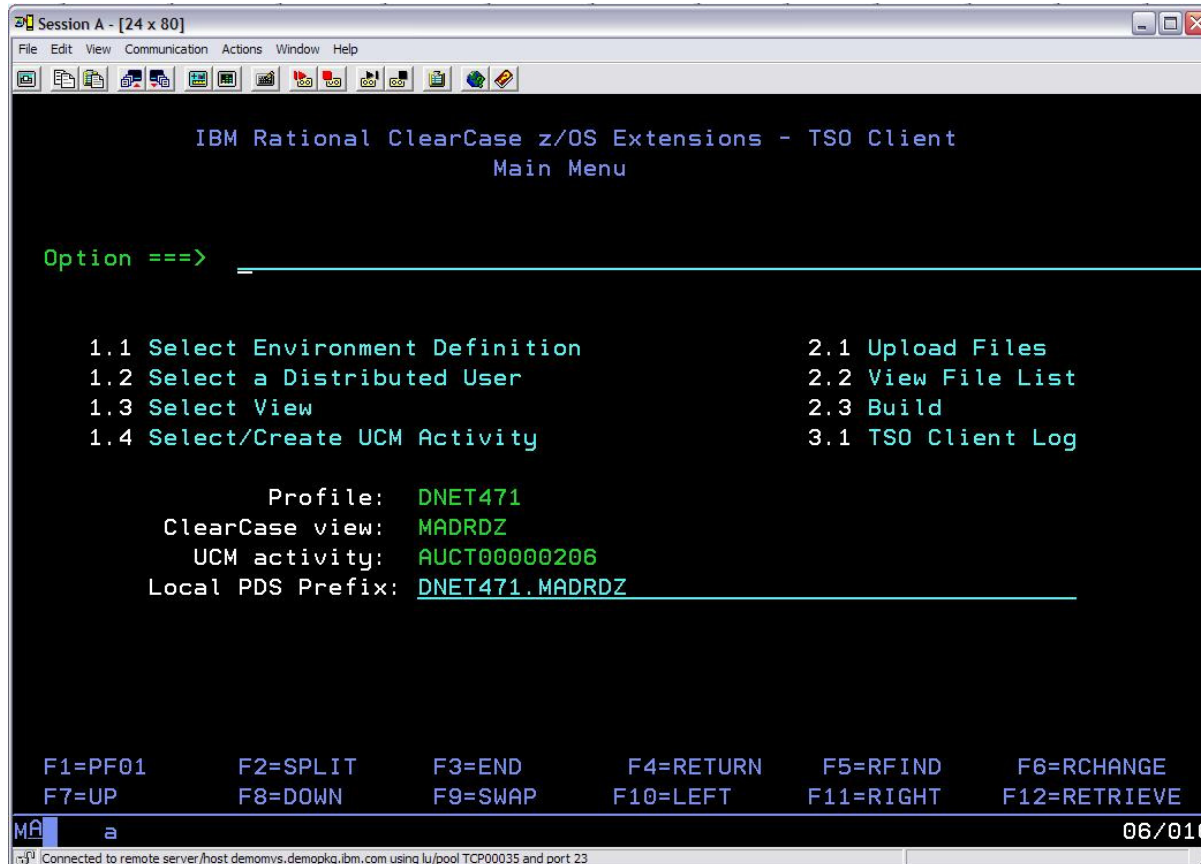
IBM Rational ClearCase/ClearQuest for the Enterprise

- Integrations with leading IDEs
 - ▶ Eclipse framework
 - ▶ IBM Rational Application Developer (RAD)
 - ▶ IBM Rational Developer for system z
 - ▶ IBM Rational Developer for system i
 - ▶ Microsoft Visual Studio 2005
 - ▶ z/OS ISPF
 - ▶ and more....

- Wide-range of supported environments
 - ▶ UNIX
 - ▶ Windows
 - ▶ Linux
 - ▶ IBM z/OS®
 - ▶ IBM i5/OS
 - ▶ Work locally or remotely



ClearCase ISPF Client



Eclipse



UNIX/Linux



ISPF



CLI



Browser



Manage ClearCase assets with RDz ISPF

z/OS Projects - demomvs.demopkg.ibm.com.hce - IBM Rational Developer for System z

File Edit Navigate Search Project Data Run Editor Menu Window Help

z/OS Projects

demomvs.demopkg.ibm.com.hce

Current host connection profile is: /HostConnectProjectFiles/demomvs.demopkg.ibm.com.hce

IBM Rational ClearCase z/OS Extensions - TSO Client
Select Action

File name: S4TRNLD
State:
PDS (Member): DNET471.MADRZ.SRC.JCL(S4TRNLD)
In PDS:
In
Profile: DNET471
ClearCase view: MADRZ
UCM activity: AUCT00000206
Option ==>

To select action, enter the associated option.

A - Add to Source Control U - Upload
CI - Check In UCO - Undo Check Out
CO - Check Out VT - Show Version Tree
DP - Compare With Previous Version

Comment for check out, check in, and add to source control:
F1=PF01 F2=SPLIT F3=END F4=RETURN F5=RFIND F6=RCHANGE
F7=UP F8=DOWN F9=SWAP F10=LEFT F11=RIGHT F12=RETRIEVE

PF1 PF2 PF3 PF4 PF5 PF6 Enter PA1 Attn NewLine
PF7 PF8 PF9 PF10 PF11 PF12 Clear PA2 SysReq NextPad

Host Properties Host Connection

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

Subsystem JES			
Name	Parent filter pool	Parent filter	Number of filter strings
My Jobs	Ratzz-madrid Filter Pool	Not applicable	1

ClearCase Repository

z/os PDS

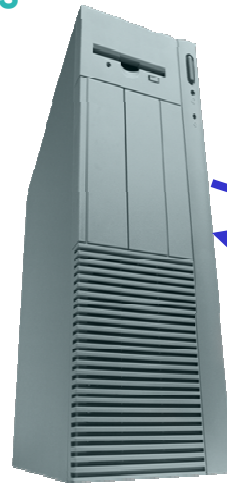
Accessing ClearCase Managed assets with ISPF



ClearCase z/OS Managed Builds

- Initiate any batch task on z/OS to generate z/OS executables (including USS)
- Automatic capture of all derived objects, including executable, object decks, compile listings, etc.
- Integrate heterogeneous build processes
- Automatic and complete build audits

Windows
UNIX
Linux



Build request

Return derived objects



Build request

Return derived objects
z/OS, USS

Linux for
System z



The screenshot shows a Windows Explorer window with a file list and a 'Properties' dialog box open over it. The dialog box is on the 'Custom' tab, showing a table of attributes for the selected file.

Type	Value
AUTHPARMS	N
CICS	N
COBOL390	Y
COPT	N
COPYLIB1	PS.COPYLIB
COPYLIB2	N

The background Explorer window shows a directory tree on the left and a file list on the right. The file list includes folders like 'PSBH.PSJS122' and 'PSBH.PSJS224', and files like 'CCOPT316.CBL' through 'CCOPT319.CBL'. The 'Properties' dialog box has tabs for 'General', 'Custom', 'Triggers', 'Protection', and 'Lock'. The 'Hyperlinks' section is empty. Buttons for 'OK', 'Cancel', 'Apply', and 'Help' are at the bottom of the dialog.

brandt.onorato_CC3_OPT_Test_Dev

- My Activities
- SandBox
 - Analysis_Artifacts
 - Database_Artifacts
 - Deployment_Artifacts
 - Design_Artifacts
 - Dev
 - COBOL
 - Copylibs
 - IBMscripts
 - SAS
 - TELON
 - lost+found
 - Misc_Artifacts
 - Test_Artifacts

Name		
CCOPT002.CE		----
CCOPT101.CE		---- IEFBR14 - Delete Temporary Files
CCOPT102.CE	TEMP1	DD DSN=PSBH.PSJ5122.OBJECT, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT103.CE		----
CCOPT104.CE	TEMP2	DD DSN=PSBH.PSJ5122.LISTING, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT201.CE		----
CCOPT202.CE	TEMP3	DD DSN=PSBH.PSJ5122.SOURCE, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT204.CE		----
CCOPT205.CE	TEMP4	DD DSN=PSBH.PSJ5122.RESOLVED, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT207.CE		----
CCOPT208.CE	TEMP5	DD DSN=PSBH.PSJ5122.COPYLIBS, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT209.CE		----
CCOPT210.CE	TEMP6	DD DSN=PSBH.PSJ5122.LDPREP, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT211.CE		----
CCOPT300.CE	TEMP7	DD DSN=PSBH.PSJ5122.DBRMLIB, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT303.CE		----
CCOPT308.CE	TEMP8	DD DSN=PSBH.PSJ5122.DB2PC, DISP=(MOD,DELETE), UNIT=SYSDA,SPACE=(0,0)
CCOPT310.CE		----
CCOPT311.CE		-----
CCOPT312.CE		Step: sdelete cmd: rccbuild.exe -h cdc.state.ky.us@3606 -b S1DELE
CCOPT313.CE		-V -V
CCOPT314.CE		06/07/20 14:20:53 (c) Copyright, IBM Corp. 2001
CCOPT315.CE		Copyright (c) 2002 Rational Software Corporation
CCOPT316.CE		06/07/20 14:20:53 Command Line:rccbuild.exe -h cdc.state.ky.us@360
CCOPT317.CE		0 -c LE -V -V -V
CCOPT318.CE		verbosity = '3'
CCOPT319.CE		buildScriptFileName = 'sdelete.jcl'
CCOPT320.CE		buildScriptFileType = '26'
CCOPT321.CE		buildScript = 'S1DELETE'
CCOPT322.CE		buildParameters = ''
CCOPT323.CE		serverHost = 'cdc.state.ky.us'
CCOPT324.CE		clientCodepage = 'IBM-850'
CCOPT325.CE		serverCodepage = 'IBM-1047'
CCOPT326.CE		goodrc = '0'
		goodcond = 'LE'
		timeout = 'LE'
		msgfilePrefix = ''
		inputFiles = ''
		outputFiles = ''
		depFiles = ''
		varList = ''
		06/07/20 14:20:54
		RCCI-015
		The build job has been queued by the server. Position is 1.



Comprehensive Build Auditing and Traceability

The screenshot displays the IBM Rational Developer for System z interface. The main window shows the 'Banner' project with a list of build members. A 'Build member list' window is open, showing the 'Uploaded Dataset' as 'DNET471.MADRZ.SRC.JCL'. The 'Rational ClearCase Explorer' window shows the project structure, including 'demo_Madrid' and 'MADRZ'. A 'Command Prompt' window displays the build audit record, including the derived object path, target name, host information, and build script details.

Name	Size	Kind
.cmake.state	6704	View-private File
.project	591	View-private File
BANNER.CBL	6850	File Element Version
BANNER.lod	9280	Non-shareable Deri...
BANNER.lst	86317	Non-shareable Deri...
BANNER.obj	5280	Non-shareable Deri...
BANNER.pid	27	Non-shareable Deri...
BLDALL.MAK	1701	File Element
DEPPROD.MAK	118	File Element Version
mkid.pl	1080	View-private File
rccbuild.log	30574	Non-shareable Deri...
S1ALLOC.JCL	1167	File Element Version
S1ALLOC.MAK	146	File Element Version
S1DEPROD.JCL	955	File Element Version
S2BUILD.MAK	136	File Element Version
S2COMP.JCL	904	File Element Version

```
Derived object: \MadridComps\Banner\BANNER.lod@-12-13T19:15.2147483688
Target BANNER.lod built by demo.None
Host "mauritiu" running NT 5.1 (1586)
Reference time 2007-12-13T19:15:11-05, this audit started 2007-12-13T19:15:39-05

View was mauritiu:C:\Viewstore\MAURITIUS\demo\demo_Madrid.uvs
Initial working directory was X:\MadridComps\Banner

MUPS objects:
\MadridComps\Banner\BANNER.lod@-12-13T19:15.2147483688
\MadridComps\Banner\BANNER.lst@-12-13T19:15.2147483652
\MadridComps\Banner\BANNER.obj@-12-13T19:15.2147483672
\MadridComps\Banner\rccbuild.log @2007-12-13T19:15:55-05>
\MadridComps\Banner\S4TRNLD.JCL@main\demo_Madrid\2 @2007-12-13T19:00:03-05>
\MadridComps\Banner\S5TRNLS.JCL@main\demo_Madrid\2 @2007-12-13T19:00:03-05>

Variables and Options:
RCCBUILD=rccbuild -h demomvs.demopkg.ibm.com@3606 -c LE -n 4 -U -U -v MBR=BANNER
USR=DNET471

Build Script:
rccbuild -h demomvs.demopkg.ibm.com@3606 -c LE -n 4 -U -U -v MBR=BANNER
USR=DNET471 -b S4TRNLD -ft S4TRNLD.jcl -o BANNER.lod
rccbuild -h demomvs.demopkg.ibm.com@3606 -c LE -n 4 -U -U -v MBR=BANNER
USR=DNET471 -b S5TRNLS -ft S5TRNLS.jcl -o BANNER.lst

Derived object: \MadridComps\Banner\BANNER.obj@-12-13T19:15.2147483672
Target BANNER.obj built by demo.None
Host "mauritiu" running NT 5.1 (1586)
Reference time 2007-12-13T19:15:11-05, this audit started 2007-12-13T19:15:11-05
```

Full traceability from source repository to production dataset

Build audit record

Agenda

- IBM Rational Software - Our unique value
 - Application Development for z: The Rational Approach
 - IBM Rational Developer for system z: The Enterprise IDE
 - IBM Rational ClearCase and ClearQuest: Enterprise-Wide Application Lifecycle Management
- Summary



QUESTIONS

IBM Rational Enterprise Tools and Compilers

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