

A System z Developer's Journey Through the Application Lifecycle



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Purpose and Presentation flow

- Purpose ... to present a System z developer's use of tools that help manage the software development cycle: "Day in a Life"
- Flow
 - Overview of
 - What is DevOps and its role in current state of Software development
 - Tools for Software development to support the DevOps story
 - Walk through the dev cycle and tools that supports each step in the cycle

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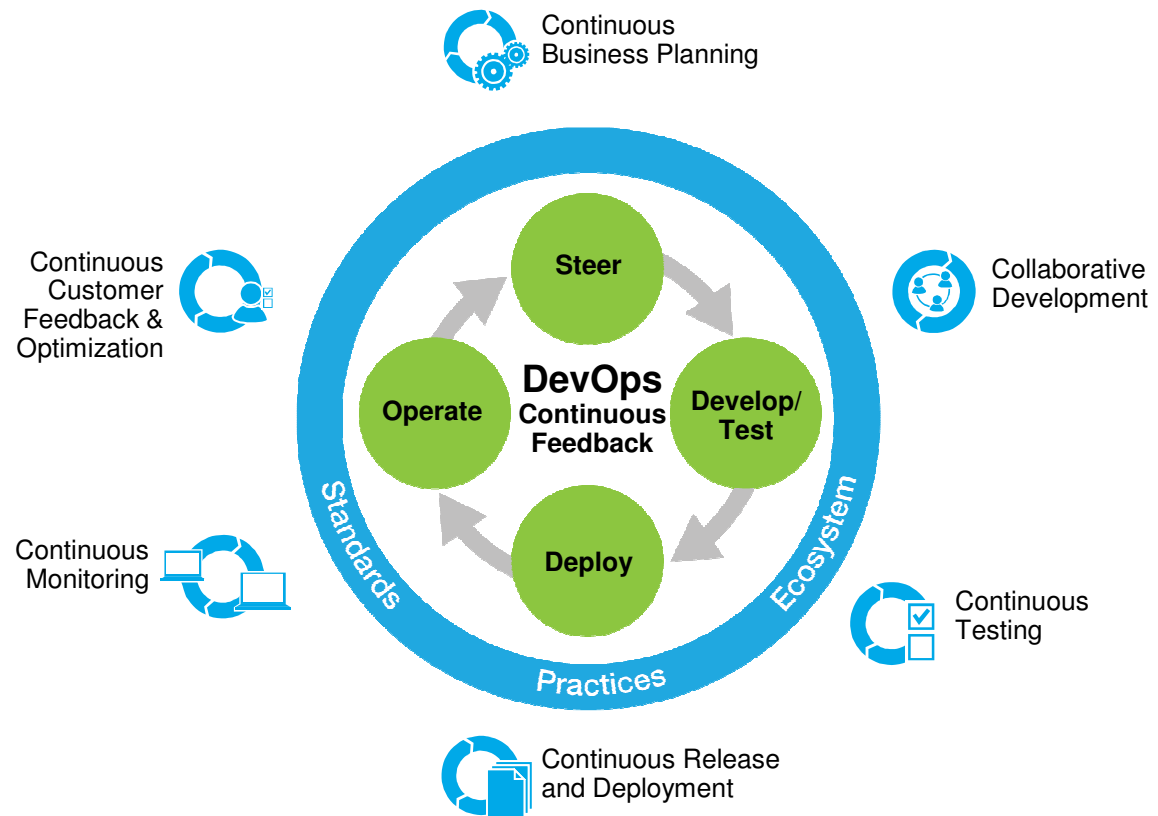
IBM DevOps point of view

Enterprise capability for continuous software delivery that enables organizations to seize market opportunities and reduce time to customer feedback

Accelerate software delivery –
for faster time to value

Balance speed, cost, quality and risk –
for increased capacity to innovate

Reduce time to customer feedback –
for improved customer experience



Our DevOps POV is resonating with clients and they are delivering **measurable business outcomes with DevOps**

Overview of Supported Production Scenario

Project Manager or Support Team has submitted Project Change Request ...

1: Review Change Request

- Analyze application to be changed
- Size/scope effort and risk of change
- Submit to Project Manager for review, approval and scheduling

2: Review and Approve Change Request

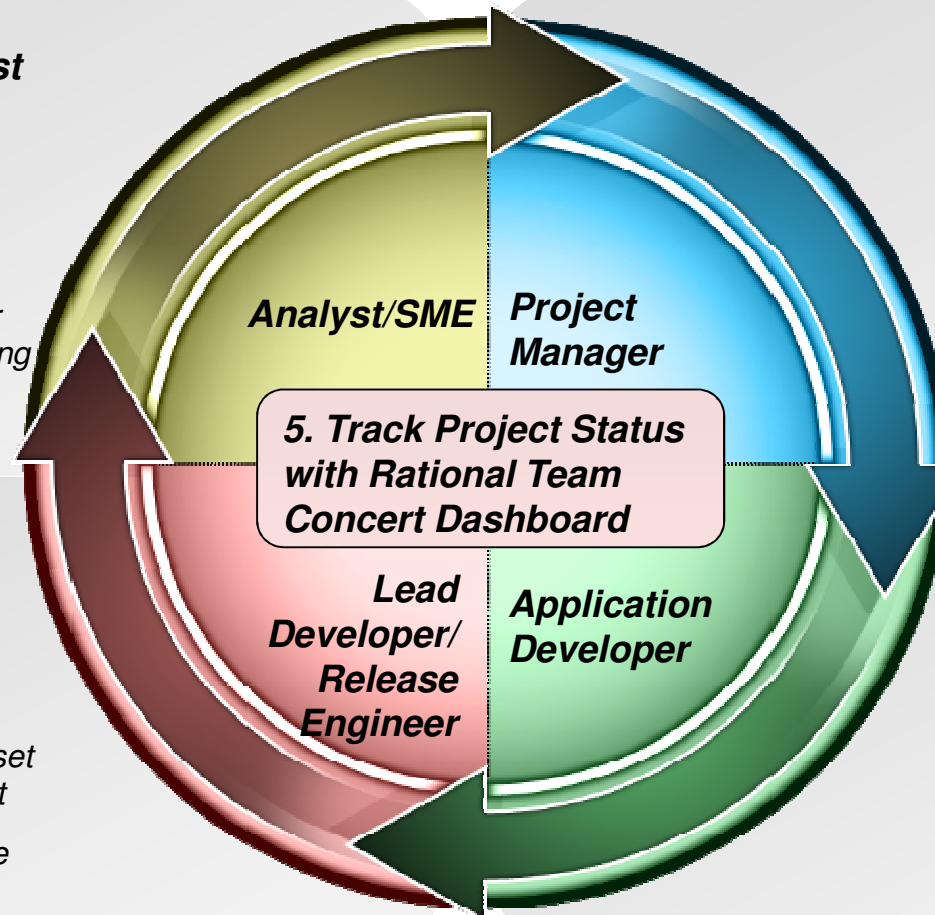
- Review analysis for change request and approve for scheduling
- Create development work item(s) for implementation
- Add work to project plan

4: Promote and deploy enhancement

- Promote changes from development to test
- Create update package with set of changes from development
- Deploy update package to the test environment

3: Implement required changes, build and deliver

- Analyze source to identify modifications
- Implement and test modifications
- Perform personal build and deliver new features



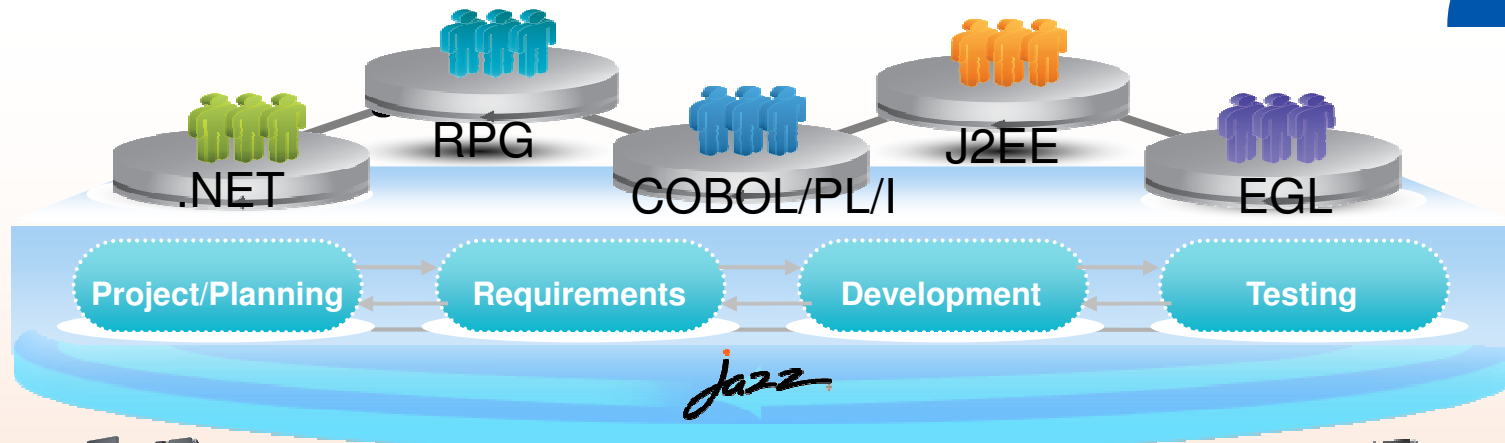
Development Life Cycle

Planning	Source Dev	Governance/Unit test	Build
<ul style="list-style-type: none"> • Define the tasks • Create a plan • Create a work item • Assign the work item to a developer 	<ul style="list-style-type: none"> • Load the project/source artifacts from SCM • Navigate, Analyze, Edit, Syntax check source code 	<ul style="list-style-type: none"> • Compile • Quality assurance <ul style="list-style-type: none"> • Debug • Code Coverage • Code review • Unit Testing 	<ul style="list-style-type: none"> • Check-in/Deliver the source code • Build
<p>CLM</p>	<p>RDz RTC</p>	<p>RDz RD&T RTC</p>	<p>RTC RDz</p>

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Collaborative application lifecycle management

Deploy new, common team infrastructure for source control, change management and build that empowers your team with integrated collaboration, process automation and reporting



- Rational Team Concert
- Rational Quality Manager
- Rational ClearCase
- Rational Requirements Composer
- Rational Build Forge
- Rational ClearQuest

“Building an agile development team requires a multiplatform approach, and Sodifrance uses Rational Developer for System z and Rational Team Concert for System z to help application teams synchronize their efforts and improve collaboration. Rational on System z offers a powerful and valuable combination for any company that wants to boost its development team’s productivity.”

— Hugh Smith, Project Manager, Sodifrance



Rational Team Concert – A single tool, many capabilities



Work Items

Planning

Source Control

Builds – Continuous

Dashboards & Reporting

Method Enforcement and Automation

Problem
A work item must be associated with the change set or a comment must be set
Deliver (Failed)

Reason
All change sets should have a work item or comment associated with them
Missing work item or comment

This makes it easier for the team to track its progress through the iteration and allows other users to understand why your changes were made.

- Solutions**
- Associate Existing Work Item
 - Associate New Work Item
 - Associate and Try Again (experimental)
 - Override 'Descriptive Change Sets' Precondition

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Multiple plan views facilitate continuous planning



BRM Sprint 2 (1.0) Plan | 28 items: 25 open, 3 closed | Ends in: 10 days

Plan Details | Edit

Planned Items | Links | Snapshots | Dashboard | Notes

View As: Roadmap | (3 items filtered)

Actions	Summary	Effective E	Owned By	Rank
▶	Donors Can Choose to Support Multiple Organization	-	Deb	1
▶	Donor Dividend Allocation Criteria	-	Marco	3
	Widget Disposed Exception	1.2 weeks	Bob	-
	Browser Exception	2 hours	Rob	-
▶	Requests sent in form of email	-	Tanuj	4
	Some messages are not externalized	3 days	Bob	-
	SWT Exception	1.5 days	Marco	-
▶	Frequency of dividend transfer	-	Deb	-

BRM Sprint 2 (1.0) Plan | 30 items: 25 open, 5 closed | Ends in: 6 days

Plan Details

Planned Items | Links | Snapshots | Dashboard | Notes

View As: Taskboard

Story	Open	In Progress
Donor Dividend Allocation Criteria	Implement - Donor Dividend Allocation Criteria	
Frequency of dividend transfer		Implement - Frequency of dividend transfer

BRM Sprint 2 (1.0) Plan | 30 items: 25 open, 5 closed | Ends in: 6 days

Plan Details

Planned Items | Links | Snapshots | Dashboard | Notes

View As: Planned Time

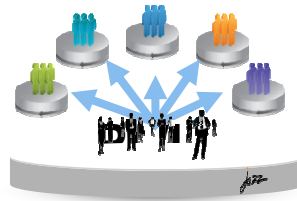
Person	Closed Items	Open Items	Load
Deb	0	1	0.8 +8 h
cp	0	1	0.8 +8 h
Deb	3	5	168/8 -180 h
Marco	2	14	92/8 -84 h
Tanuj	0	0	0.8 +8 h

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Rational Developer for System z: An Integrated Development Environment for System z

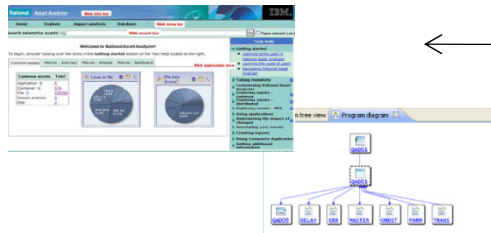
Integration with Team
Concert for Lifecycle and
Source Management



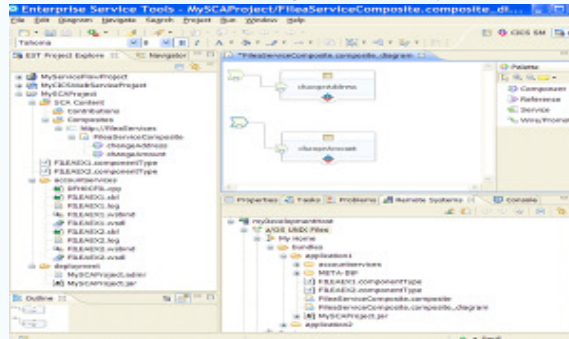
Access to typical System
z sub-system functionality
in z/OS, CICS, IMS, DB2,
WAS



Integration with Asset
Analyzer for Application
Understanding and Impact
Analysis

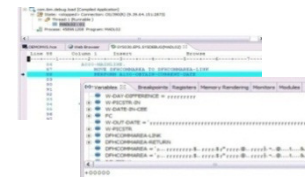


Rational Developer for System z

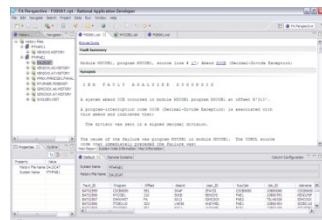


New

**Out of the Box debugger
and code coverage
capabilities**



Integration with Fault
Analyzer for Dump Analysis

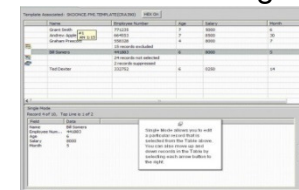


A modern IDE for productive development of
cross-platform applications written in COBOL,
PL/I, ASM, Java, EGL or C/C++ in System z
CICS, IMS, DB2, Batch applications



Integration with RD&T for flexible
access to System z environment

Integration with File
Manager for file and test
data handling



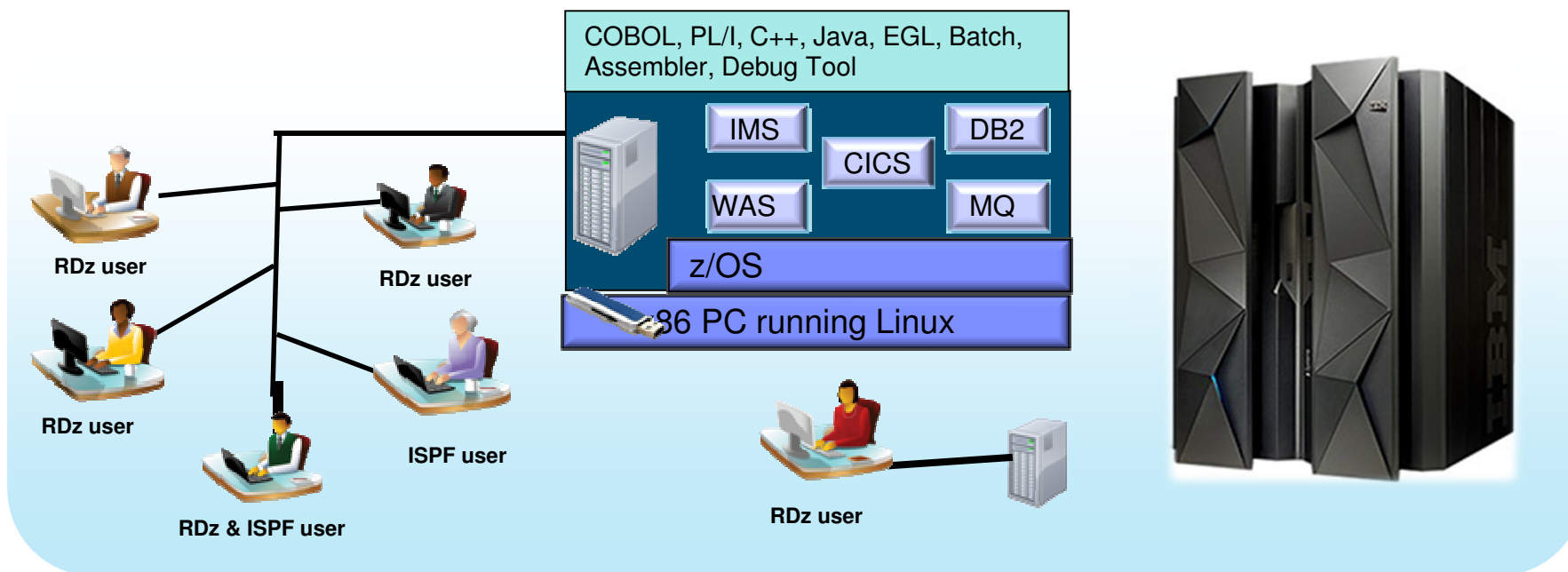
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RE
in Orlando **2015**



Rational Development and Test Environment for System z

The ultimate in modern application development for System z



- Increase availability of z/OS testing environment and resources
 - Liberate developers to rapidly prototype new applications
 - Develop and test System z applications anywhere, anytime!
 - Eliminate costly delays by reducing dependencies on operations staff
- Improve quality and lower risk via automation, measurement, and collaboration
- Focus on what is required for the change at hand, then scale

Note: This Program is licensed only for development and test of applications that run on IBM z/OS. The Program may not be used to run production workloads of any kind, nor more robust development workloads including without limitation production module builds, pre-production testing, stress testing, or performance testing.

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Development Life Cycle

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<p>CLM</p>	<p>RDz RTC</p>	<p>RDz RD&T RTC</p>	<p>RTC RDz</p>

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Demo: What we will show

- Business Analyst
 - opening a new work item for Developer using RTC
- Software Developer
 - discovering the new work item in his work queue in RTC
 - accessing and loading his code into his work env using RTC
 - working to setup work using integrated RDz/RTC
 - editing the COBOL source file and figuring out how to code the requirement stated in the work item
 - code the requirement, personal build and test
- Build/Release Admin
 - team build, test and deploy
 - mark the work item Complete in RTC
- Business Analyst
 - Verify that requirement is complete and close the work item in RTC

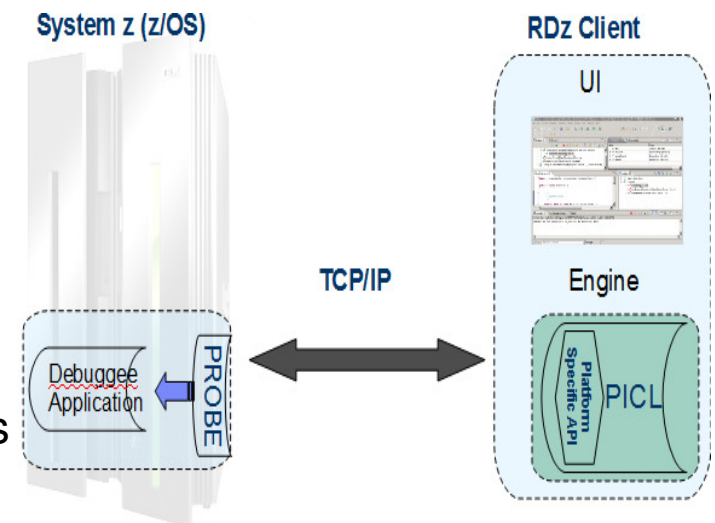
Integrated Debugger

✓ Host-offload architecture:

- ✓ Remote debugger with only a small footprint on the mainframe:
 - Leverages workstation CPUs enabling faster processing of debug information
 - Enables scalability and reliability
- ✓ Debugger client is supported on Windows and Linux

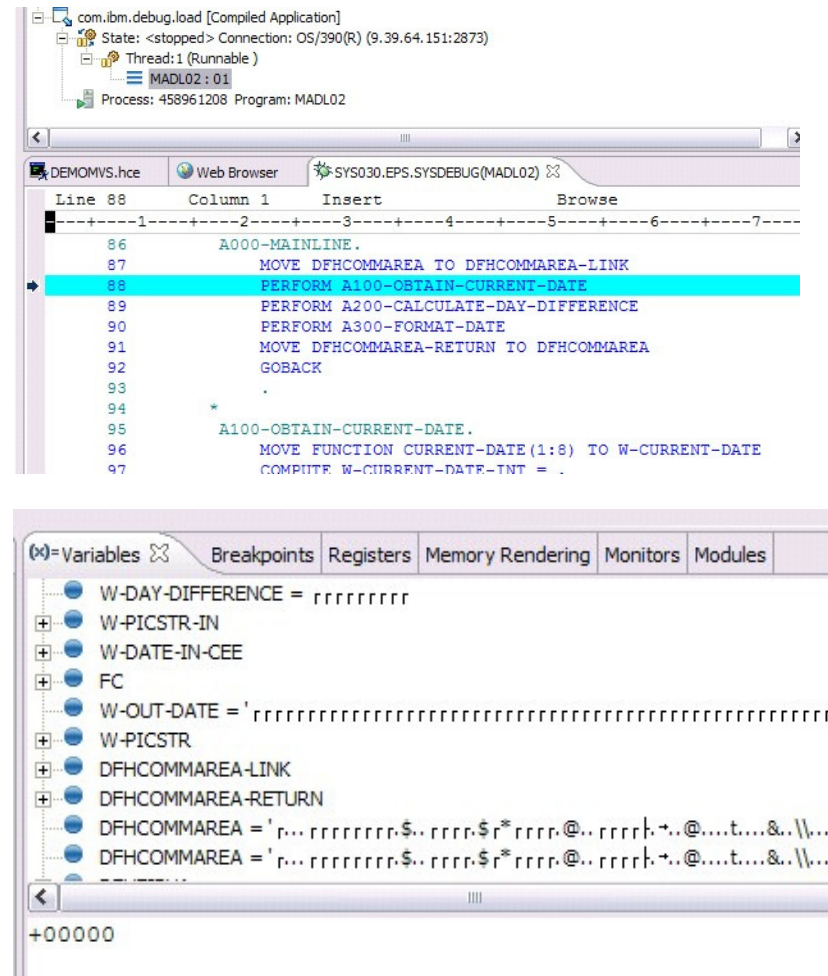
✓ Simple and Secure Connections:

- ✓ Single client can handle multiple debug sessions on multiple hosts or an application the spans multiple systems
- ✓ Client initiated debug – no need to specify client IP address and port (v9.0.1.2)
- ✓ SSL/TLS support



Debug Multiple Runtimes

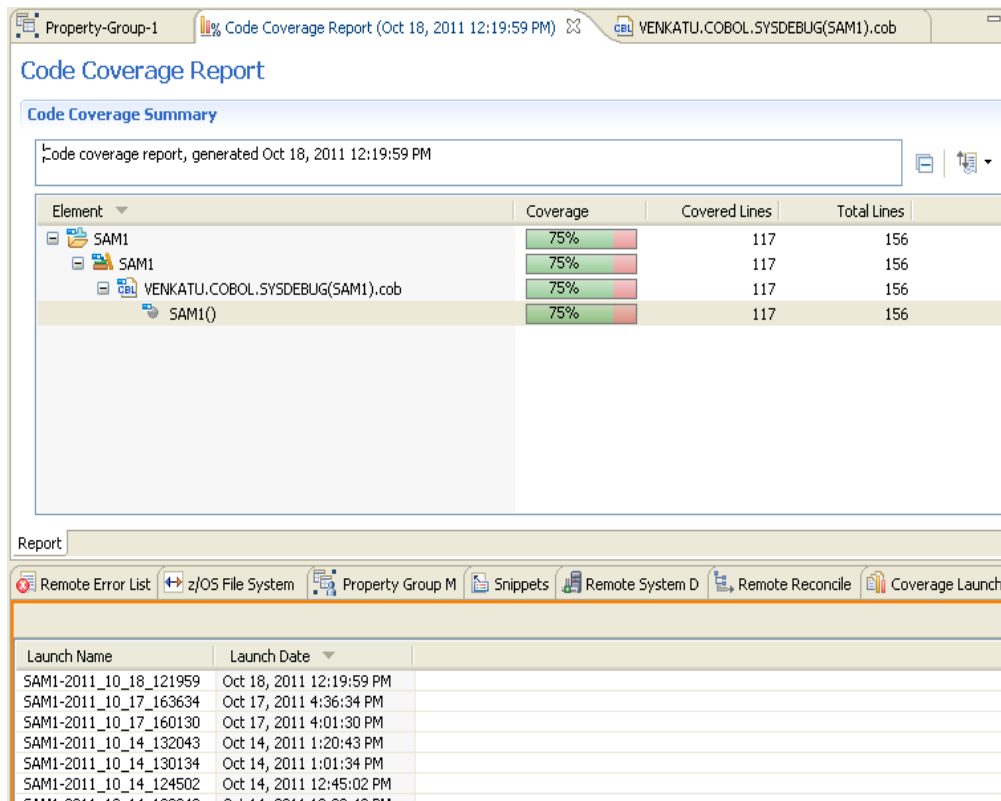
- Use the cross-platform debugger to debug end-to-end systems as they execute in the runtime
 - CICS
 - Batch
 - Java
- From the workstation:
 - View executing source code
 - Step through host code line-by-line
 - Set breakpoints
 - Alter working storage values
 - Alter register values
 - Etc...
- Debug zOS and distributed code in the same interface even stepping between runtimes and platforms!
- Leverage Integration with IBM Debug Tool for other runtimes



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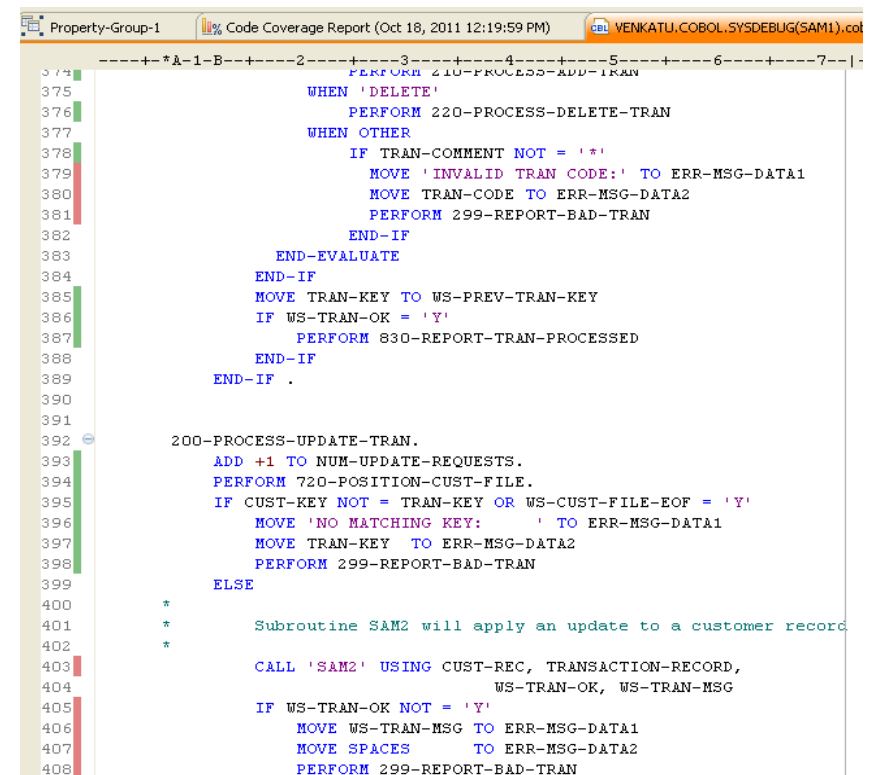
Enhanced Application Quality – Code Coverage

- Line Level Code Coverage - provides tools to measure and report on test coverage of an application
 - Leverages the Integrated Debugger technology
 - Indicating what source code lines were tested and remain to be tested



Element	Coverage	Covered Lines	Total Lines
SAM1	75%	117	156
SAM1	75%	117	156
VENKATU.COBOL.SYSDEBUG(SAM1).cob	75%	117	156
SAM1()	75%	117	156

Launch Name	Launch Date
SAM1-2011_10_18_121959	Oct 18, 2011 12:19:59 PM
SAM1-2011_10_17_163634	Oct 17, 2011 4:36:34 PM
SAM1-2011_10_17_160130	Oct 17, 2011 4:01:30 PM
SAM1-2011_10_14_132043	Oct 14, 2011 1:20:43 PM
SAM1-2011_10_14_130134	Oct 14, 2011 1:01:34 PM
SAM1-2011_10_14_124502	Oct 14, 2011 12:45:02 PM



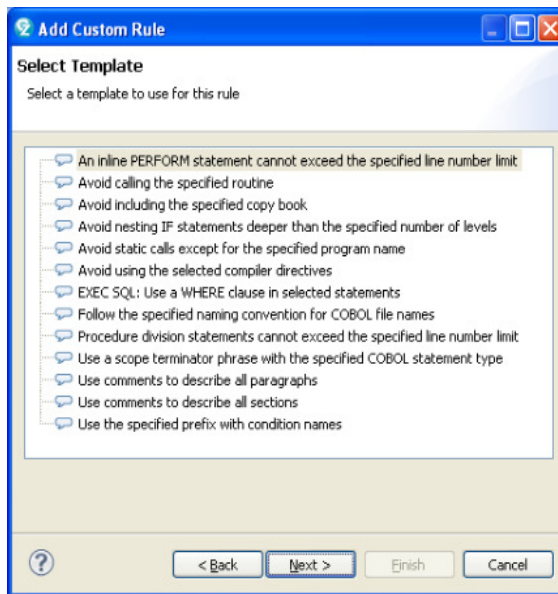
```

374  -----*A-1-B-----2-----3-----4-----5-----6-----7-----|
375  PERFORM 210-PROCESS-ADD-TRAN
376  WHEN 'DELETE'
377  PERFORM 220-PROCESS-DELETE-TRAN
378  WHEN OTHER
379  IF TRAN-COMMENT NOT = '*'
380  MOVE 'INVALID TRAN CODE:' TO ERR-MSG-DATA1
381  MOVE TRAN-CODE TO ERR-MSG-DATA2
382  PERFORM 299-REPORT-BAD-TRAN
383  END-IF
384  END-EVALUATE
385  END-IF
386  MOVE TRAN-KEY TO WS-PREV-TRAN-KEY
387  IF WS-TRAN-OK = 'Y'
388  PERFORM 830-REPORT-TRAN-PROCESSED
389  END-IF
390  END-IF .
391
392  200-PROCESS-UPDATE-TRAN.
393  ADD +1 TO NUM-UPDATE-REQUESTS.
394  PERFORM 720-POSITION-CUST-FILE.
395  IF CUST-KEY NOT = TRAN-KEY OR WS-CUST-FILE-EOF = 'Y'
396  MOVE 'NO MATCHING KEY:' TO ERR-MSG-DATA1
397  MOVE TRAN-KEY TO ERR-MSG-DATA2
398  PERFORM 299-REPORT-BAD-TRAN
399  ELSE
400  *
401  * Subroutine SAM2 will apply an update to a customer record
402  *
403  CALL 'SAM2' USING CUST-REC, TRANSACTION-RECORD,
404  WS-TRAN-OK, WS-TRAN-MSG
405  IF WS-TRAN-OK NOT = 'Y'
406  MOVE WS-TRAN-MSG TO ERR-MSG-DATA1
407  MOVE SPACES TO ERR-MSG-DATA2
408  PERFORM 299-REPORT-BAD-TRAN
    
```

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Enhanced Quality & Structure Analysis – Code review

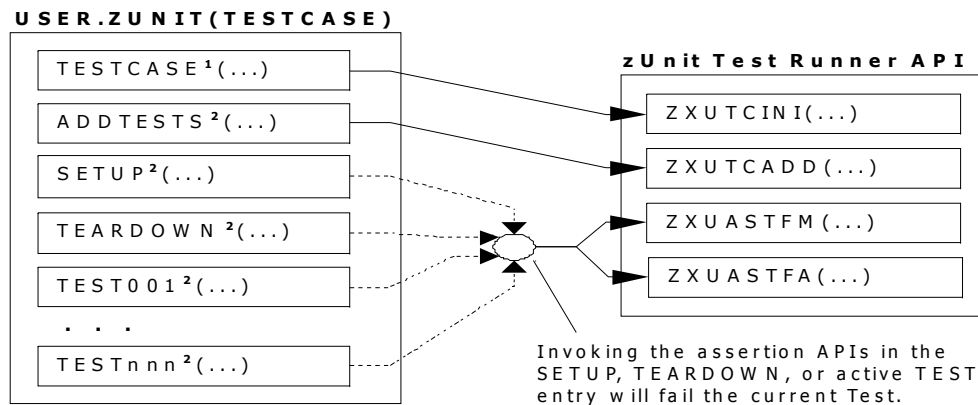
- Code Review/Governance - provides predefined rules and templates for COBOL and PL/I applications
 - Ensure adherence to corporate standards
 - Custom rules for COBOL and PL/I



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zUnit – Unit testing framework for z/OS

- Frameworks that assist developers in writing code to perform repeatable, self-checking unit tests are collectively known as xUnit.
- [xUnit](#) defines a set of concepts that together provide a light-weight architecture for implementing unit testing frameworks.
 - JUnit, for example, is a very popular instance of the xUnit architecture.
- **zUnit** is a xUnit instance for System z
- Goal is to encourage the **continuous integration and continuous testing** methodology for System z Application development and maintenance



¹Language-specific details:

- In COBOL, this is the first program appearing in the Test Case source file and it will be invoked by the Test Runner for Test Case initialization.
- In PL/I, this is the procedure declared with option(fetchable) in the Test Case source file and it will be invoked by the Test Runner for Test Case initialization.

²Language-specific details:

- In COBOL, these are expected to be subprograms (non-nested and therefore compatible with FUNCTION-POINTER).
- In PL/I, these are expected to be internal procedures that are declared at the package level (non-nested).

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zUnit Capabilities

▪ zUnit Test Runner

- Runs on z/OS
 - Installed and configured on z/OS as part of RDz Host install and customization
- Fetches and runs the Test Suite referred to in a zUnit configuration file

▪ zUnit Wizard used to generate Test Cases

- RDz client feature
- Eclipse based wizards allow creation of:
 - Template Test Cases are generated in COBOL or PL/I
 - Simple pass/fail **assertion** API

(RDz v9.1) Complete COBOL test cases:

- Identify the interface or set of copy book(s)
 - Generate XML Schema to represent the interface
 - Generate XML files where you would specify test input and expected output
 - Generate a Test Case based on the XML file
 - (Optionally) Generate stubs for called programs
- RDz viewers/editors for unit test XML results



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What have we learned



- What is Software DevOps and its importance in today's Enterprise
- The tools that help manage every day life of Software DevOps practitioners
- How to use some of the tools and where to find more...

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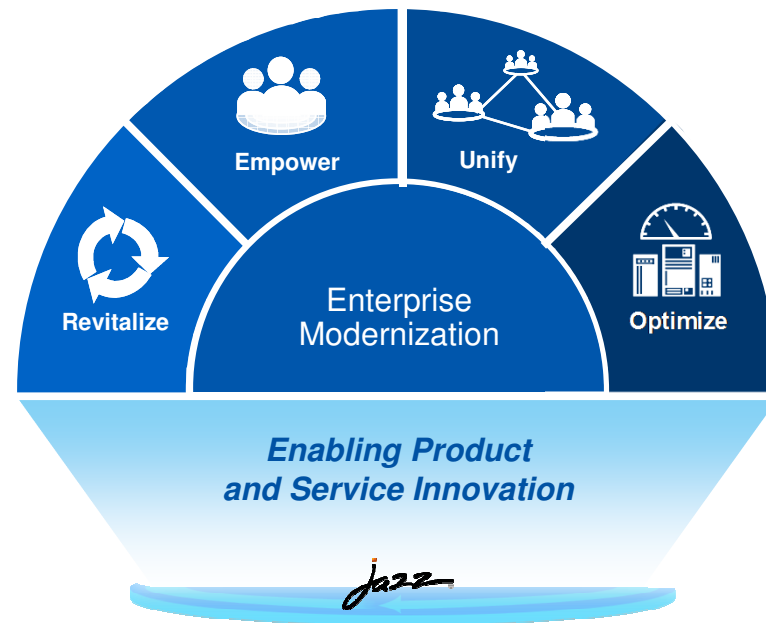
Summary

- Many companies spend more than 70% on keeping lights on, and that amount is increasing
- IT organizations have problems modifying applications at speed of business
- IBM provides a structured approach to incrementally modernize your portfolio based on business priorities
- Change without a Plan is chaos
- A Plan without change is stagnation
- Business goals change
 - applications need to change to address them
- Continual renewal is required
 - tools help to guide, govern, drive, and accomplish this change

Getting started

Next steps to modernize your enterprise applications

www.ibm.com/rational/modernization



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QUESTIONS

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Back up and Reference

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<p>CLM</p>	<p>RDz RTC</p>	<p>RDz RD&T RTC</p>	<p>RTC RDz</p>

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Any process: Executable and repeatable

Use ONE tool to support both agile and non-agile

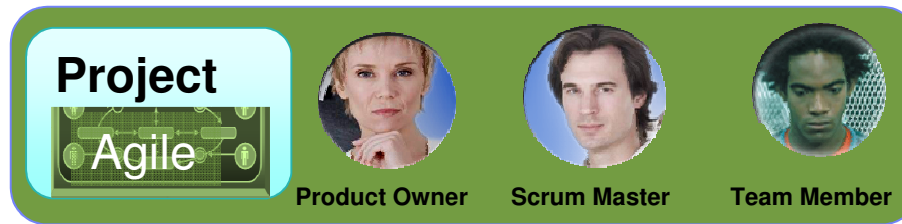
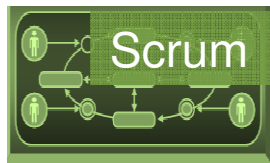


Process Architect

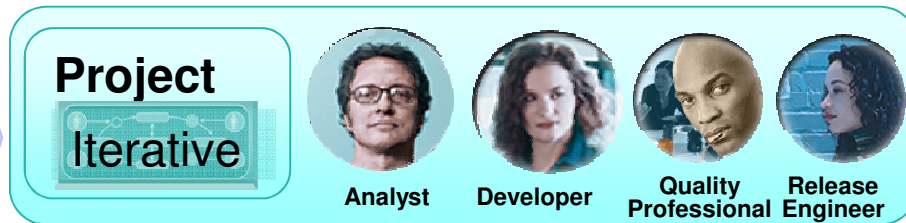
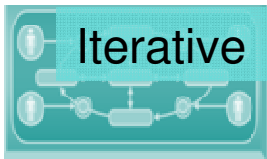


Project Manager

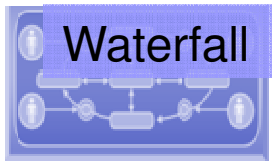
Variant #1



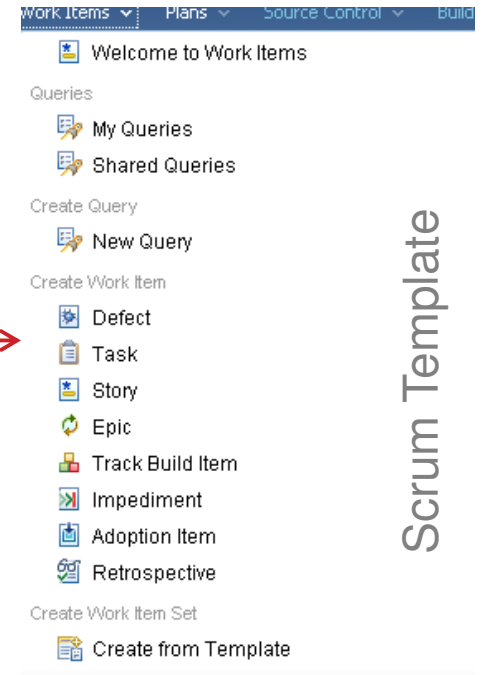
Variant #2



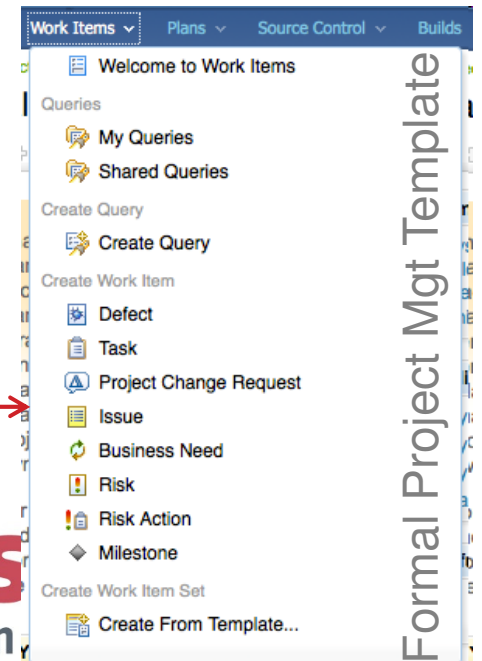
Variant #3



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Scrum Template

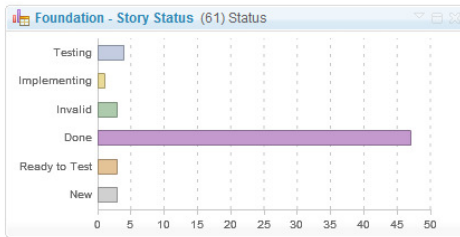


Formal Project Mgt Template

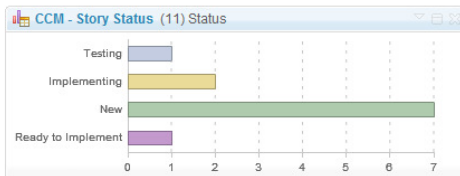
Progress Tracking - Everyone can see live project status

Story Status Current Iteration

Shows the status of all stories planned for the current iteration



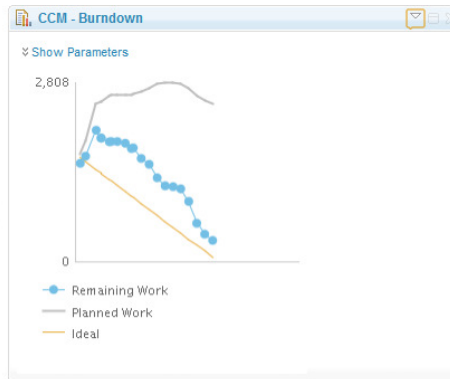
- ### Foundation - Current Stories (61)
- 155918: Provide TVT testcases and testcase updates to TVT team
 - 155399: [Repository - M14] Performance, quality and robustness enhancements
 - 154407: [Continuation] Manage and repair DB inconsistencies during 3.0.1 M14
 - 155024: Track the fixing of hangs occurring on shutdown of the CLM server
 - 155033: Explore servlet dispatching enablement as a backup option
 - 155030: [Application SDK - 14] Performance, quality and robustness enhancements
 - 155120: LPA Web UI fixes and polish
 - 111848: User can validate consistency of configuration information across contexts
 - 155168: Fix bugs and improve the quality of LPA services
 - 155624: update JREs for 3.0 iFix1 and 3.0.1
- Page 1 of 7



- ### CCM - Current Stories (11)
- 150244: address "run as administrator" issues on win7
 - 142127: As a user I want to see all extended state groups in taskboards
 - 150955: Improve the performance of loading a work item

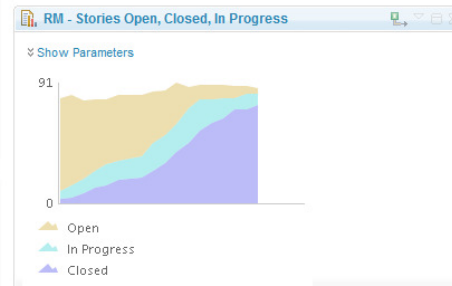
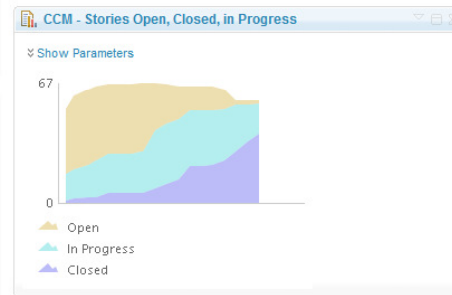
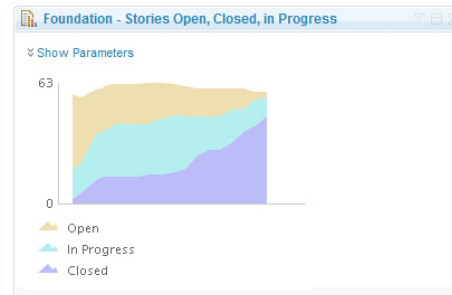
Burndown Current Iteration

Shows the remaining amount of estimated work in hours of work items planned for the current iteration.



Stories Open/Closed/In Progress

Shows the number of stories which are open, in progress, done during the iteration.



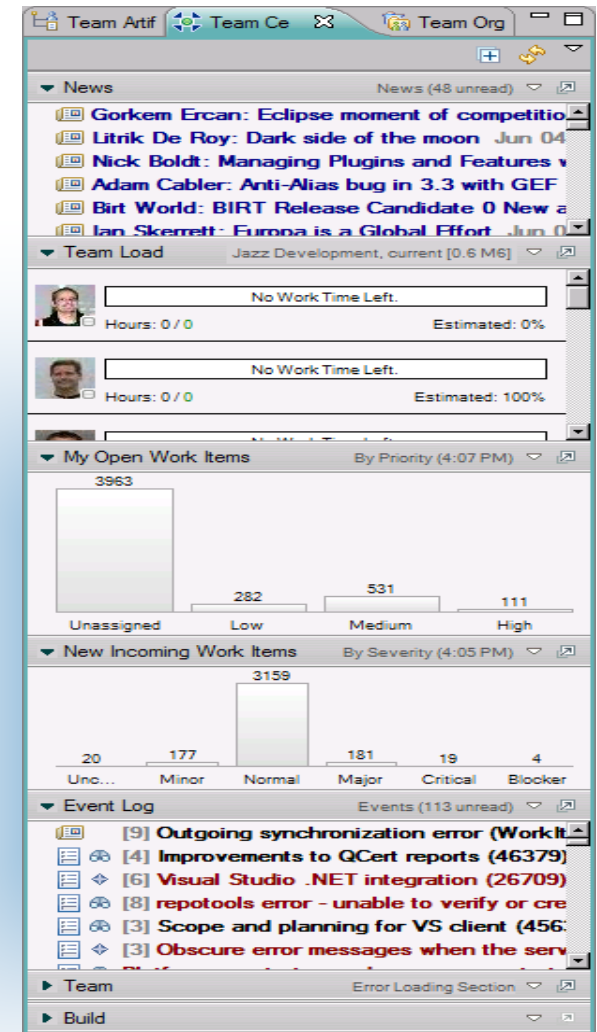
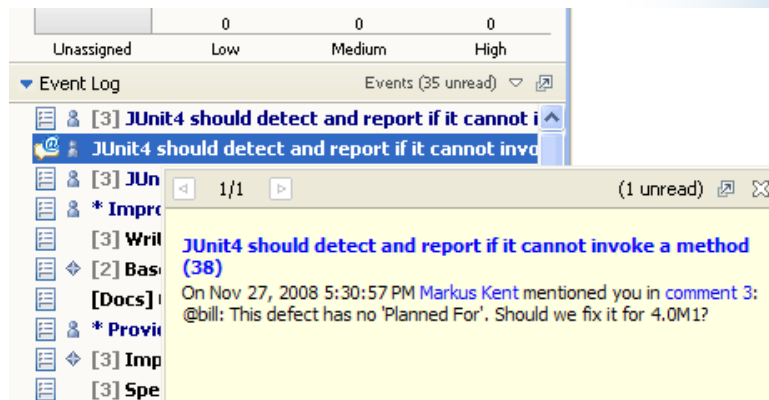
Complete your session evaluations online at www.SHARE.org/Orlando-Eval

In-context Collaboration – Team View



Team Central

- Shows what is happening on project:
 - News & events
 - What's being worked on
 - Changes
- Configurable (RSS feeds) - New kinds of information easily added
- Personalized, Persistent - Each team member can tailor to their needs



Complete your session evaluations online at www.SHARE.org/Orlando-Eval

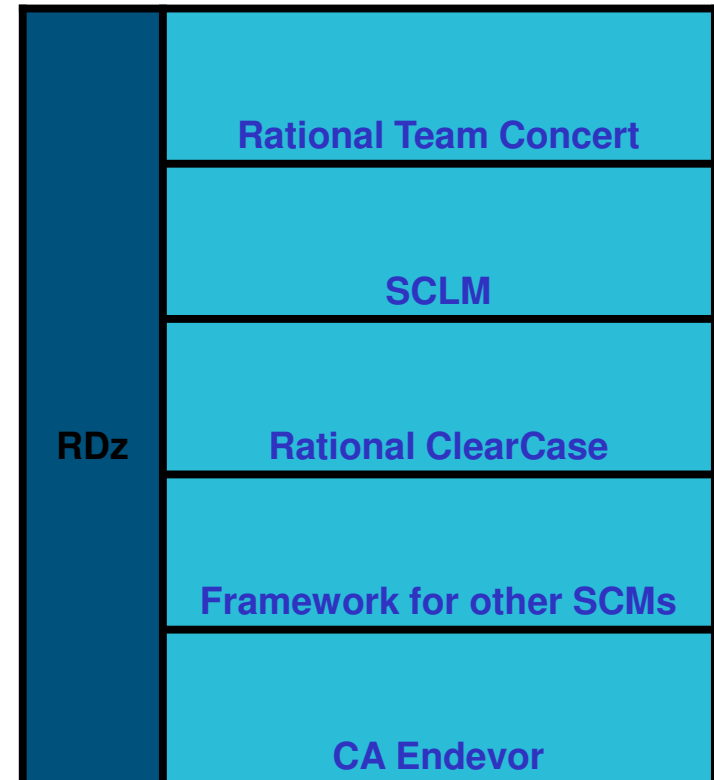
Development Life Cycle

Planning	Source Dev	Governance/Unit test	Build
<ul style="list-style-type: none"> Define the tasks Create a plan Create a work item Assign the work item to a developer 	<ul style="list-style-type: none"> Load the project/source artifacts from SCM Navigate, Analyze, Edit, Syntax check source code 	<ul style="list-style-type: none"> Compile Quality assurance <ul style="list-style-type: none"> Debug Code Coverage Code review Unit Testing 	<ul style="list-style-type: none"> Check-in/Deliver the source code Build
CLM	RDz RTC	RDz RD&T RTC	RTC RDz

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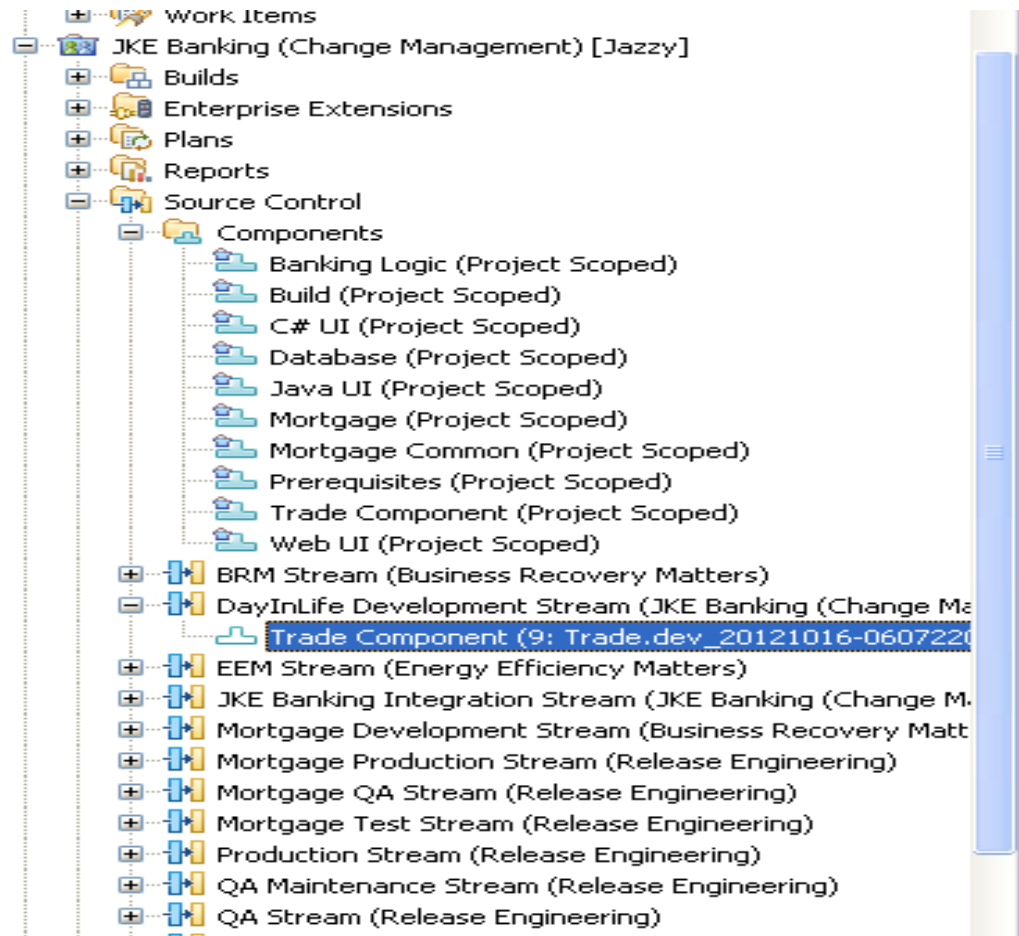
RDz Source Code Integration

- Rational's Strategic Source Code tooling is RTC and RDz provides tight integration
- RDz offers integration into a variety of other Source Code Management (SCM) tools as well as a framework for creating SCM integration on your own (CARMA)
- Variety of vendors supply plug-ins to RDz to provide easy access to processes and source code controlled by their products



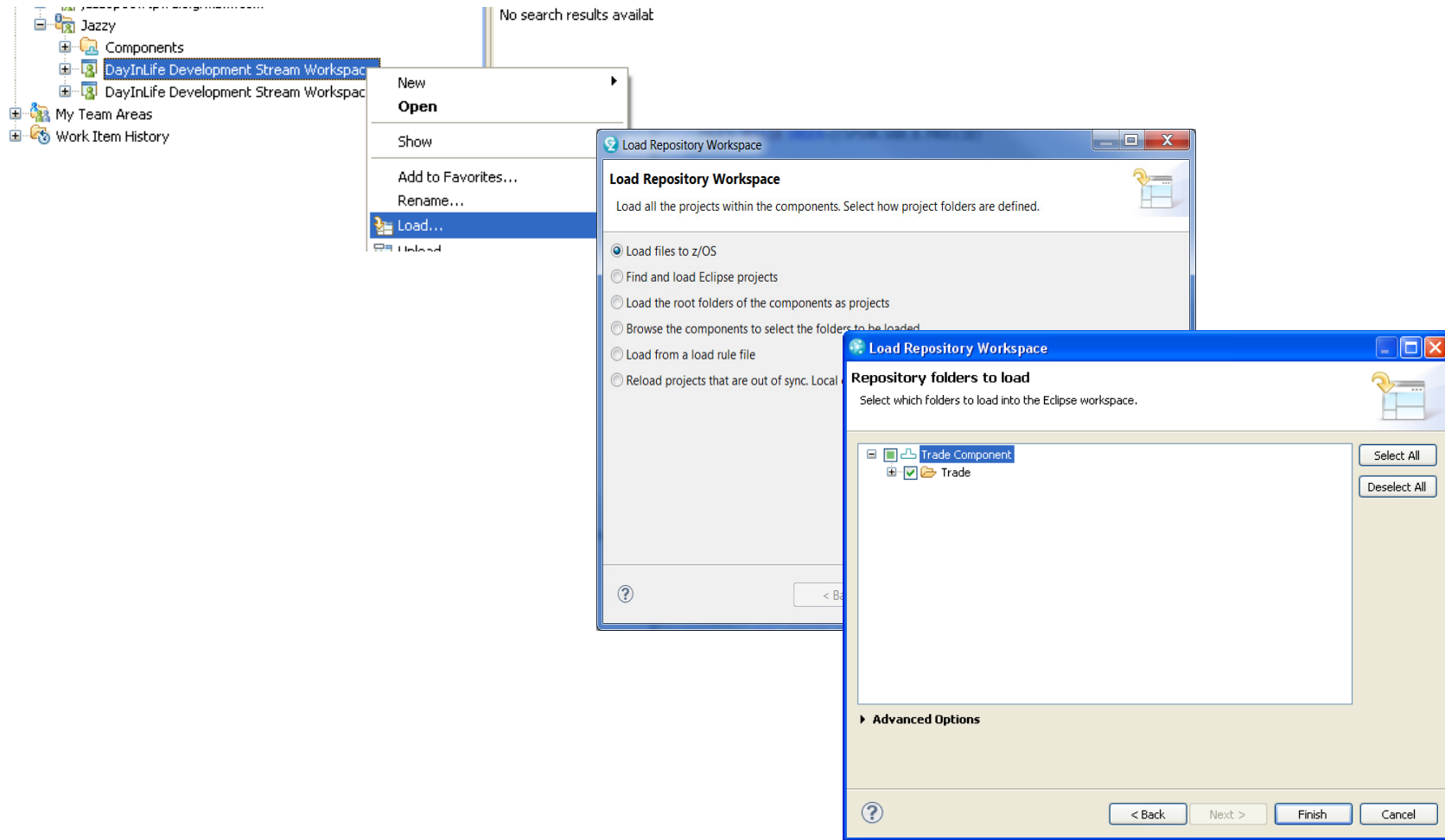
Complete your session evaluations online at www.SHARE.org/Orlando-Eval

Source Control Management



Complete your session evaluations online at www.SHARE.org/Orlando-Eval

Load the source artifacts



Complete your session evaluations online at www.SHARE.org/Orlando-Eval

The Benefits of RDz



Instead of maneuvering to access panels and working **sequentially**, in RDz the functionality you need is always in-focus – you work **concurrently**

Edit a program

File Compare

Access Datasets + Dataset Management

Submit a Compile

File Search

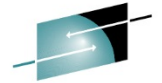
Dataset Statistics

Access Jobs (Outlist facility)

Resource	JOB ID	Job Name	Job Owner	Job Entry ...	Return Code	Return Info	User retur	Return Sta	Spool Tracks	Priority
DDS0001:TSU16893	TSU16893	DDS0001								
DDS0001:TSU16886	TSU16886	DDS0001								
DDS0001:TSU16840	TSU16840	DDS0001								
DDS0001:TSU16839	TSU16839	DDS0001								
DDS0001:TSU16824	TSU16824	DDS0001								
DDS00				2010/04/07...	0004	ABEND	004	1	1	1
DDS0001				2010/04/07...	U0004	NORMAL	004	1	1	1
DDS0001				2010/04/07...	U0012	NORMAL	00C	1	1	1

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

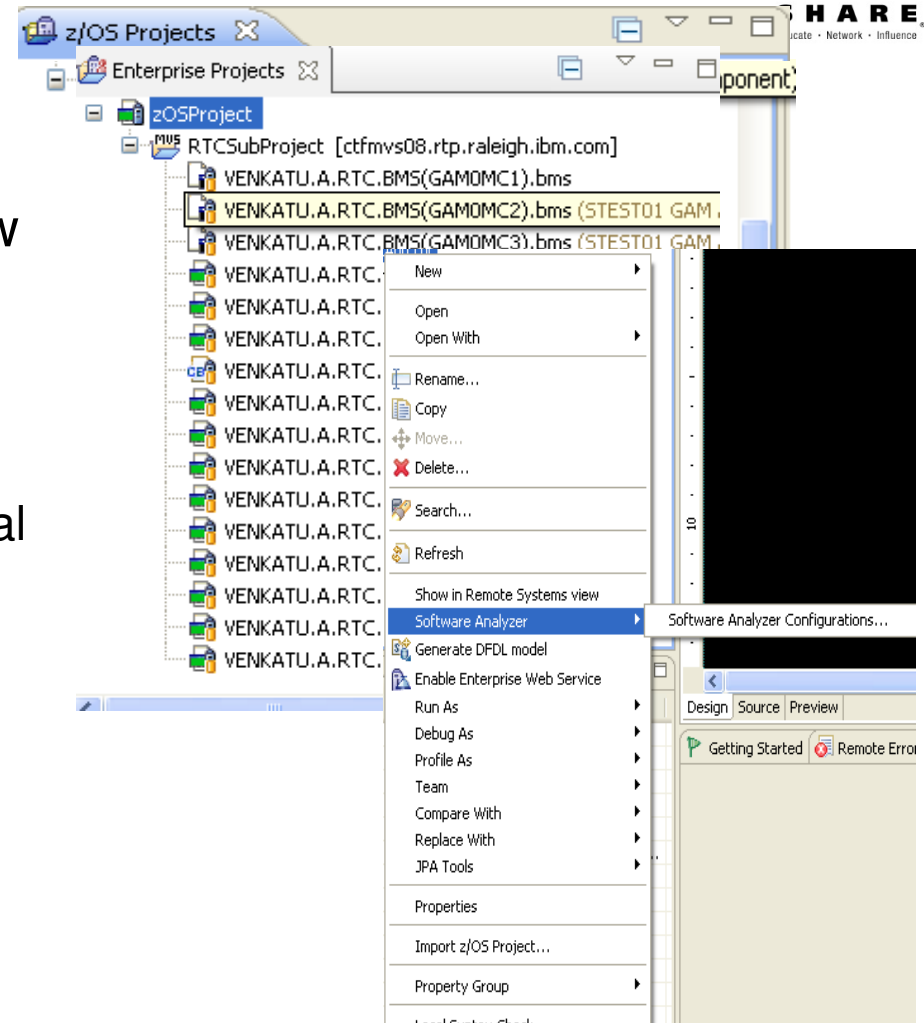




SHARE
Create • Network • Influence

RDz and RTC together

- Once the project is loaded, it will appear in the RDz z/OS projects view
- RDz augments the development productivity & experience
 - Appropriate editors (COBOL, maps, etc.) and functions (content assist, real time syntax check, etc.)
 - High value functions (Enterprise web services, SFM, Code review, Unit testing, program analysis/control flow etc.)

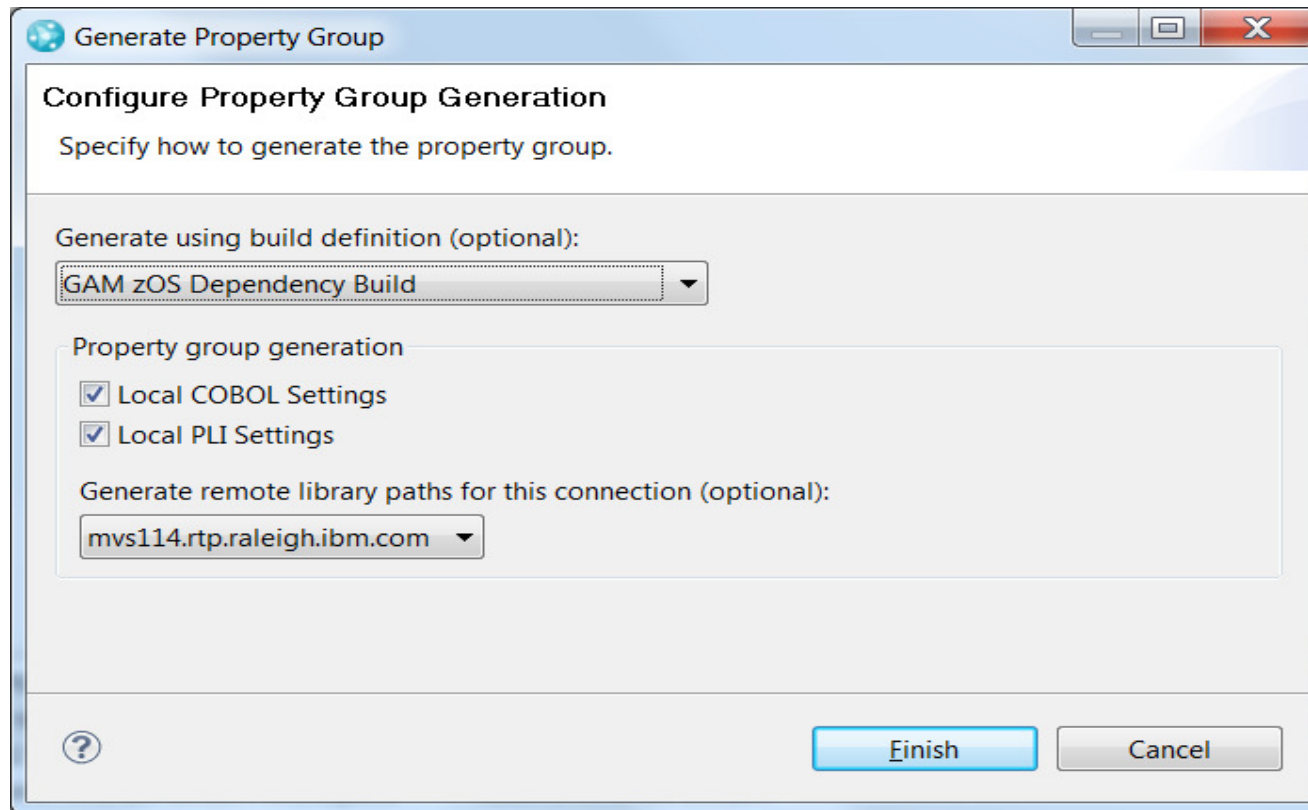


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Create a Property Group

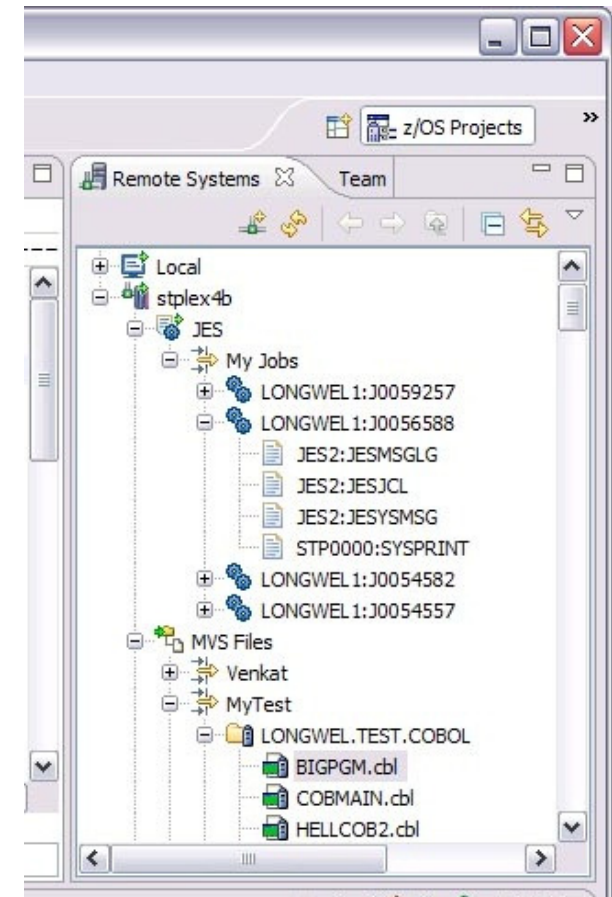
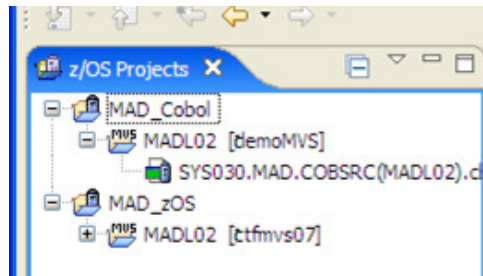
- Generate property groups for your project based on RTC build definition
- Allows RDz to resolve the dependencies and thus offer all the tooling



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Navigate datasets and jobs live on zOS

- Connect to multiple hosts concurrently
- Respects existing security configurations and user IDs
- Search, filter, browse, edit, compare, migrate, and allocate new MVS datasets and USS files
- Copy source code, members, or datasets between systems with a few mouse clicks.
- Access JES queues submit jobs, view job state, and open output spools
- Submit TSO or USS commands
- Add datasets and members into projects to group applications and work items together logically
- Open an emulator in the IDE to configured hosts



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Edit capabilities in RDz

RDz at a high level has different types of editors

- LPEX Editor
 - Supports editing of COBOL, PLI, HLASM, JCL, C/C++, Rexx etc.
 - Provides ISPF like edit experience including prefix commands, command line and even look and feel
 - Supports advanced edit functions for COBOL, PLI and HLASM like real time syntax checking, content assist
- COBOL, PLI, and JCL advanced editors
 - Based on the Eclipse editor infrastructure, provide more advanced edit capabilities like quick fixes, hyper-linking, hover, easy navigation between various edit sessions or within the same edit session.
 - Supports real time syntax checking, content assist, key word highlighting etc.

```
Line 49      Column 1      Insert
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
000027      *
000028      *****
000029      IDENTIFICATION DIVISION.
000030      PROGRAM-ID.  GAMOVDB.
000031
000032      DATA DIVISION.
000033
000034      WORKING-STORAGE SECTION.
000035
000036      COPY  GAMOBMD.
000037      COPY  GAMOBDD.
000038      COPY  GAMOBED.
000039      COPY  GAMOBED.
000040      COPY  GAMOBPD.
000041      01  DATABASECONNECTION.
000042      49  SCHEMA
000043      49  PIC X VALUE '...'.
000044
000045      01  ITABLEPREPARE.
000046      49  ITABLE-VAR-LEN
000047      49  ITABLE-VAR-TXT
000048
12| 01  INVENTORYPREP.
000050      02  PIC X(12) VALUE 'INSERT'.
000051      02  INVNTDBCON PIC X(9).
000052      02  TABLENAME PIC X(11).

PROCEDURE DIVISION.

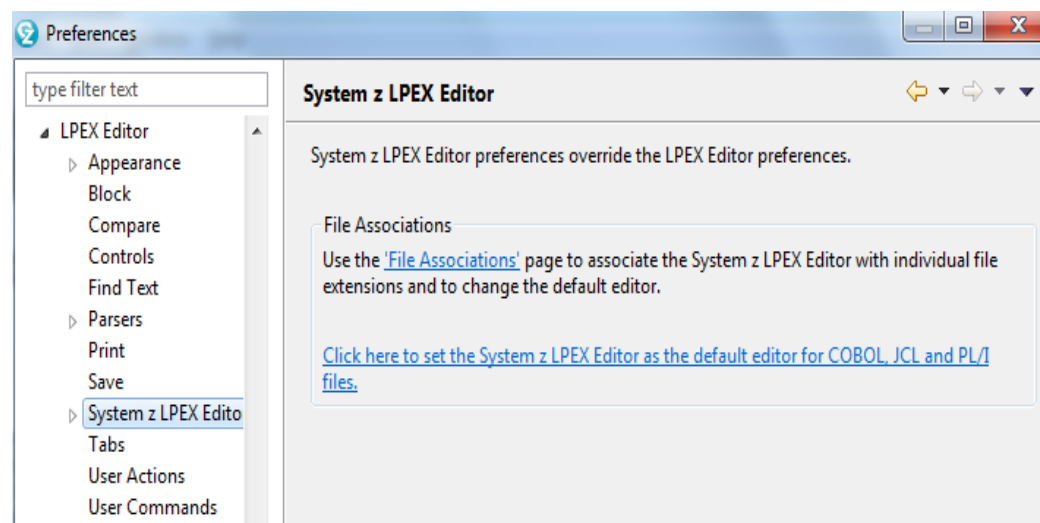
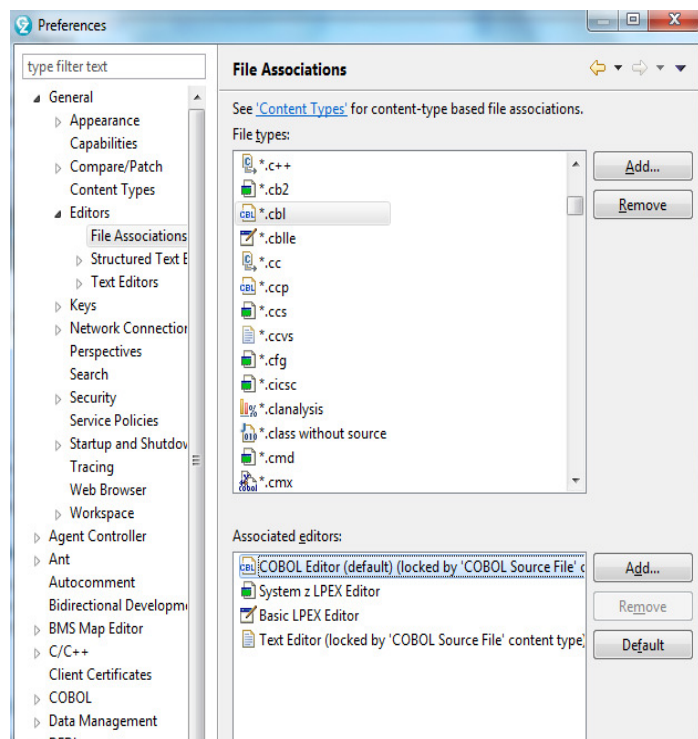
INITIALIZE INPUTS-OUTPUTS.
INITIALIZE INVO.
INITIALIZE LOCINVO.
MOVE LOW-VALUE TO LOCINVO.
MVE LOW-VALUE TO INVO.
```

Change to "MOVE"

COBOL, PL/I and JCL Editor – the new default

- New workspaces created in RDz 9.x
 - New editors are the default
 - Single click switch to LPEX is available

Applicable to source and
include/copybooks

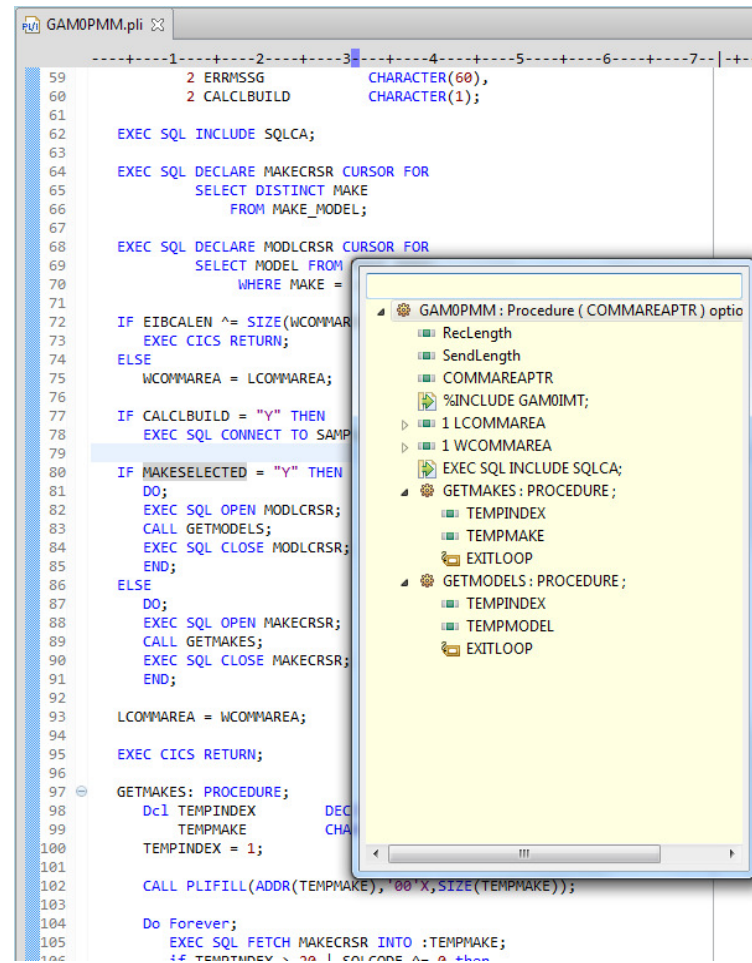
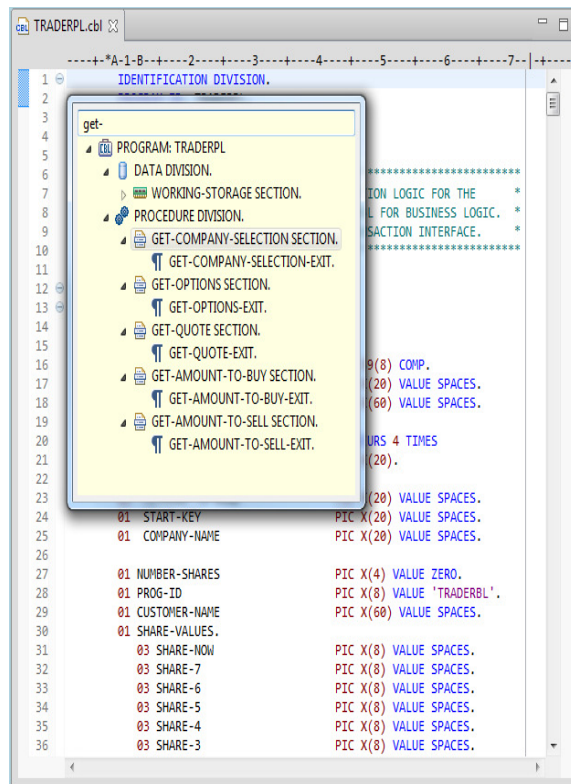


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COBOL, PL/I and JCL Editor improvements

■ Quick Outline

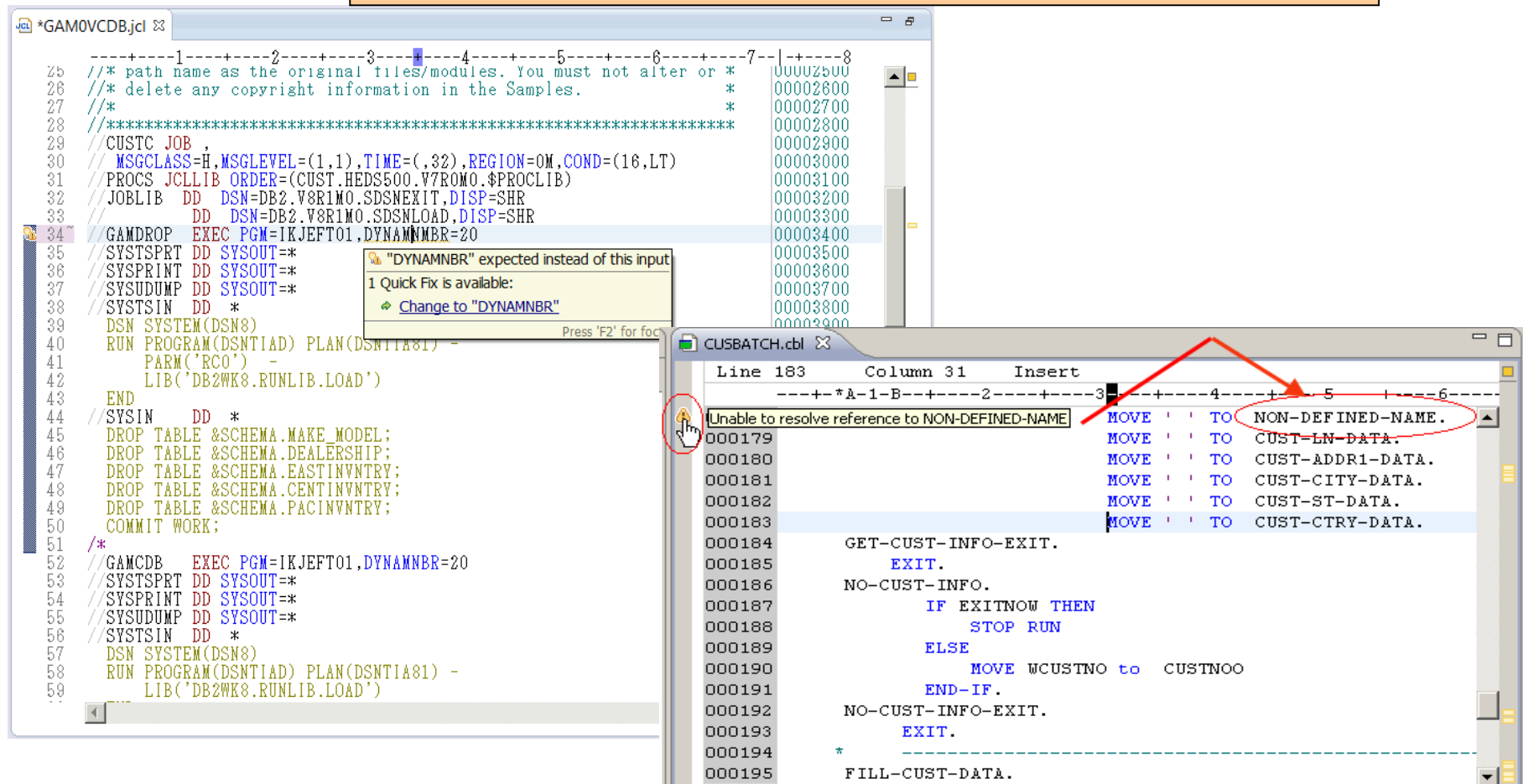
- Press Ctrl+O to activate



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Editor Productivity Features – real time syntax checking

Real-time syntax check without requiring code compile or save



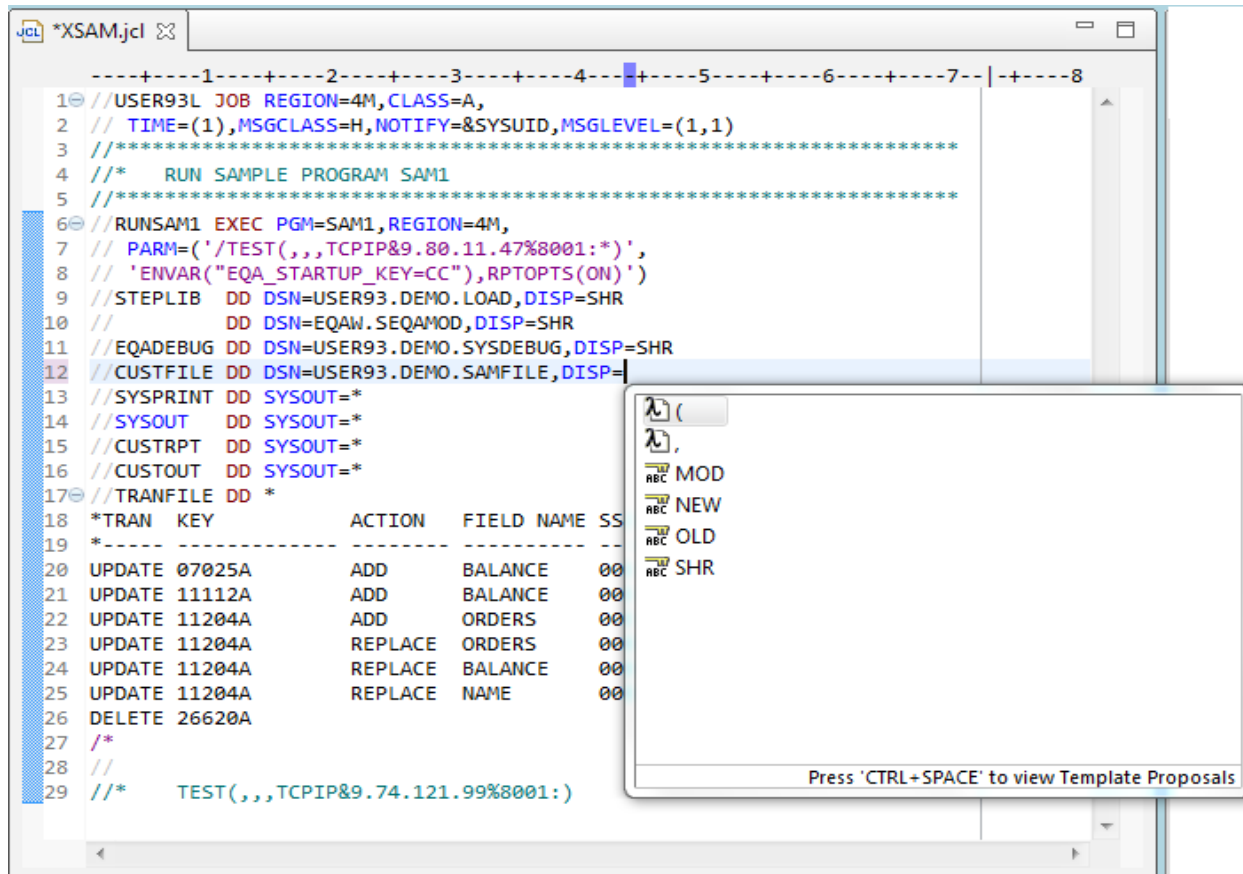
```
25 /* path name as the original files/modules. You must not alter or *
26 /* delete any copyright information in the Samples.
27 /*
28 /******
29 //CUSTC JOB ,
30 // MSGCLASS=H,MSGLEVEL=(1,1),TIME=(,32),REGION=0M,COND=(16,LT)
31 //PROCS JCLLIB ORDER=(CUST.HEDS500.V7ROMO.$PROCLIB)
32 //JOB LIB DD DSN=DB2.V8R1MO.SDSNEXIT,DISP=SHR
33 // DD DSN=DB2.V8R1MO.SDSNLOAD,DISP=SHR
34 //GAMDROP EXEC PGM=IKJEFT01,DYNAMNBR=20
35 //SYSTSPRT DD SYSOUT=*
36 //SYSPRINT DD SYSOUT=*
37 //SYSUDUMP DD SYSOUT=*
38 //SYSTSIN DD *
39 DSN SYSTEM(DSN8)
40 RUN PROGRAM(DSNTIAD) PLAN(DSNTIA81) -
41 PARM('RCO') -
42 LIB('DB2WK8.RUNLIB.LOAD')
43 END
44 //SYSIN DD *
45 DROP TABLE &SCHEMA.MAKE_MODEL;
46 DROP TABLE &SCHEMA.DEALERSHIP;
47 DROP TABLE &SCHEMA.EASTINVNTRY;
48 DROP TABLE &SCHEMA.CENTINVNTRY;
49 DROP TABLE &SCHEMA.PACINVNTRY;
50 COMMIT WORK;
51 /*
52 //GAMCDB EXEC PGM=IKJEFT01,DYNAMNBR=20
53 //SYSTSPRT DD SYSOUT=*
54 //SYSPRINT DD SYSOUT=*
55 //SYSUDUMP DD SYSOUT=*
56 //SYSTSIN DD *
57 DSN SYSTEM(DSN8)
58 RUN PROGRAM(DSNTIAD) PLAN(DSNTIA81) -
59 LIB('DB2WK8.RUNLIB.LOAD')
```

Line 183 Column 31 Insert
Unable to resolve reference to NON-DEFINED-NAME
MOVE ' ' TO NON-DEFINED-NAME.
MOVE ' ' TO CUST-LN-DATA.
MOVE ' ' TO CUST-ADDR1-DATA.
MOVE ' ' TO CUST-CITY-DATA.
MOVE ' ' TO CUST-ST-DATA.
MOVE ' ' TO CUST-CTRY-DATA.

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

JCL Editor Content Assist

- **Keyword syntax proposals**
 - Press Ctrl+SPACE to activate



```

1 //USER93L JOB REGION=4M, CLASS=A,
2 // TIME=(1),MSGCLASS=H,NOTIFY=&SYSUID,MSGLEVEL=(1,1)
3 //*****
4 //*   RUN SAMPLE PROGRAM SAM1
5 //*****
6 //RUNSAM1 EXEC PGM=SAM1, REGION=4M,
7 // PARM=(' /TEST(, ,TCPIP&9.80.11.47%8001:*) ',
8 // 'ENVAR("EQA_STARTUP_KEY=CC"),RPTOPTS(ON) ')
9 //STEPLIB DD DSN=USER93.DEMO.LOAD, DISP=SHR
10 // DD DSN=EQAW.SEQAMOD, DISP=SHR
11 //EQADEBUG DD DSN=USER93.DEMO.SYSDEBUG, DISP=SHR
12 //CUSTFILE DD DSN=USER93.DEMO.SAMFILE, DISP=
13 //SYSPRINT DD SYSOUT=*
14 //SYSOUT DD SYSOUT=*
15 //CISTRPT DD SYSOUT=*
16 //CUSTOUT DD SYSOUT=*
17 //TRANFILE DD *
18 *TRAN KEY          ACTION  FIELD NAME  SS
19 *-----
20 UPDATE 07025A      ADD     BALANCE   00
21 UPDATE 11112A      ADD     BALANCE   00
22 UPDATE 11204A      ADD     ORDERS    00
23 UPDATE 11204A      REPLACE ORDERS    00
24 UPDATE 11204A      REPLACE BALANCE   00
25 UPDATE 11204A      REPLACE NAME     00
26 DELETE 26620A
27 /*
28 //
29 /*   TEST(, ,TCPIP&9.74.121.99%8001:)
  
```

Press 'CTRL+SPACE' to view Template Proposals

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

JCL Editor improvements

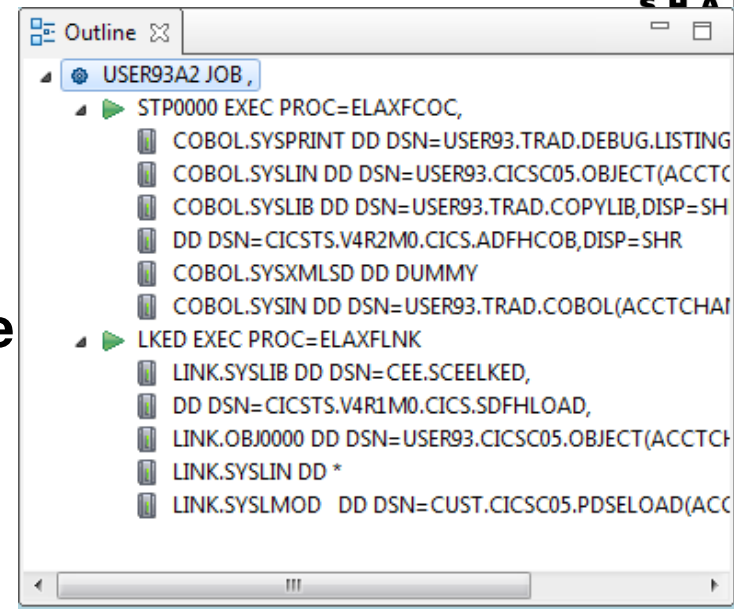
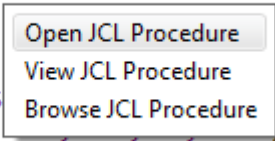


■ JCL Outline shows all DDs

- No longer only instream

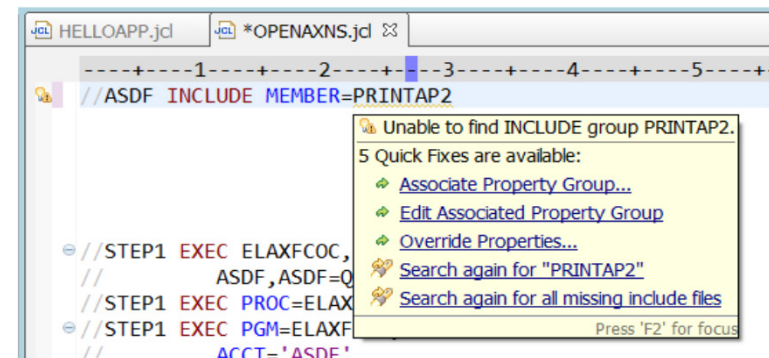
■ Open actions allow Open, View, Browse

```
5 //STP0000 EXEC PROC=ELAXFCOC,  
6 // CICS=,  
7 // DB2=,  
8 // COMP=,  
9 // PARM.COBOL=('CICS  
10 // 'LIB,TEST,SOURCE,  
11 //COBOL.SYSPRINT DD DSN=USER93.TRAD.DEBUG.LISTING(ACCT  
12 //COBOL.SYSLIN DD DSN=USER93.CICSC05.OBJECT(ACCTC
```



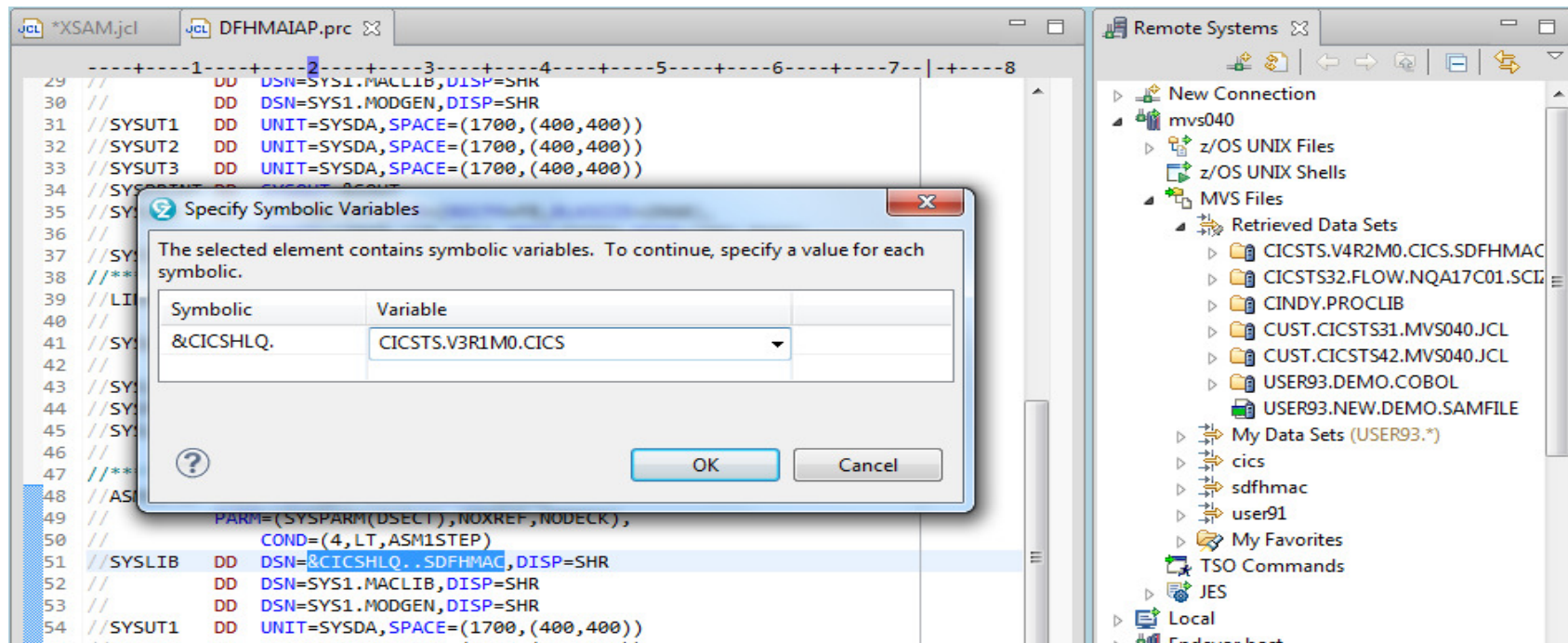
■ Improvements for INCLUDE members

- Hover to see contents
- Open actions support
- Syntax check with Quick fixes

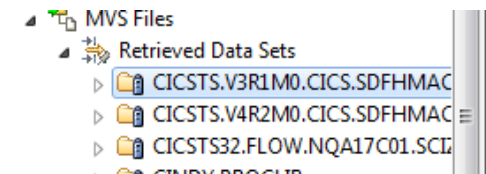


JCL Editor Symbolic resolution

- Open Declaration (F3) on data set with Symbolic variables



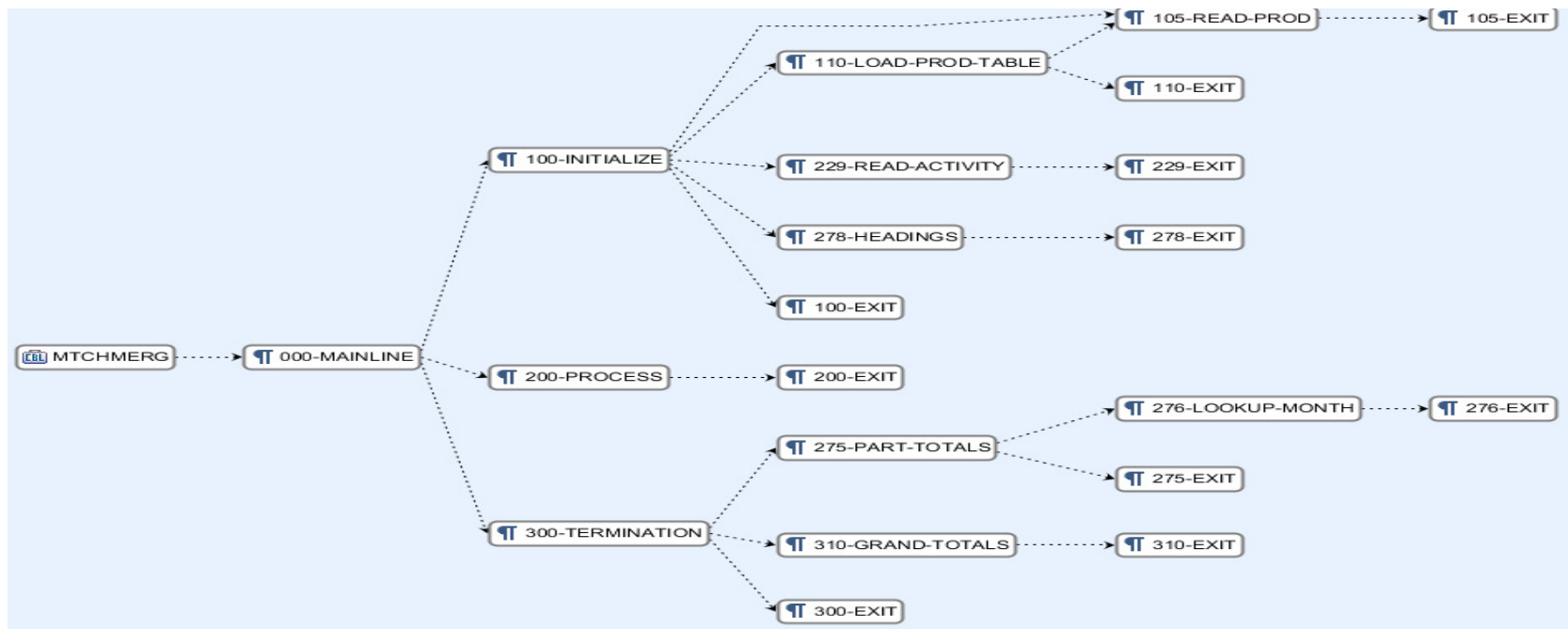
- Data set is Retrieved using specified value



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Enhanced Application Quality & Structure Analysis

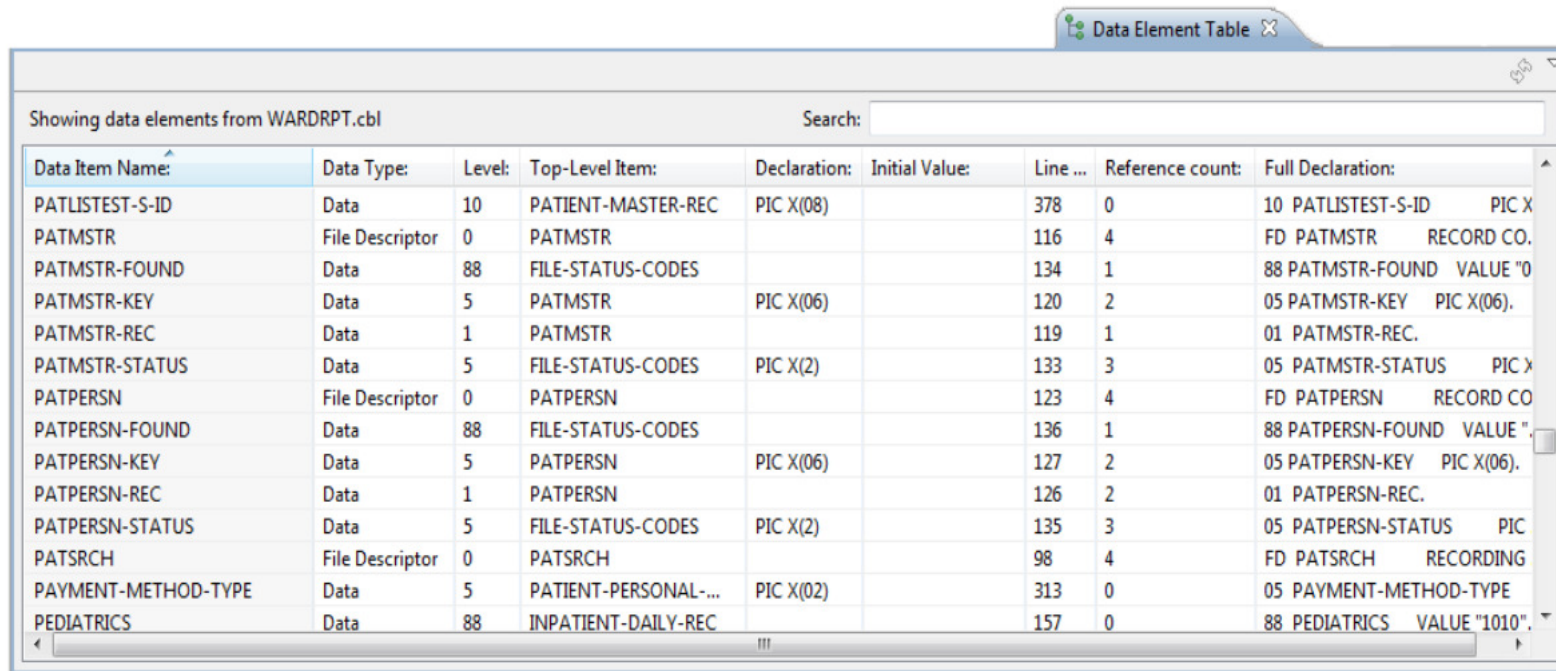
- Application Analysis
 - Control flow diagrams for COBOL and **PLI** programs,
 - **Graphical representation of the program flow with links to the source**
 - Helps identify and highlight potential unreachable code



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Enhanced Structure Analysis – Data Element Table

- A table representation of the user-defined data items and symbols in a program
 - ▶ Hyperlinks in the table are integrated with the editor allowing easy access to the declaration of the data items.
- Generated by showing the “symbol table” generated when RDz real-time syntax check parses the program

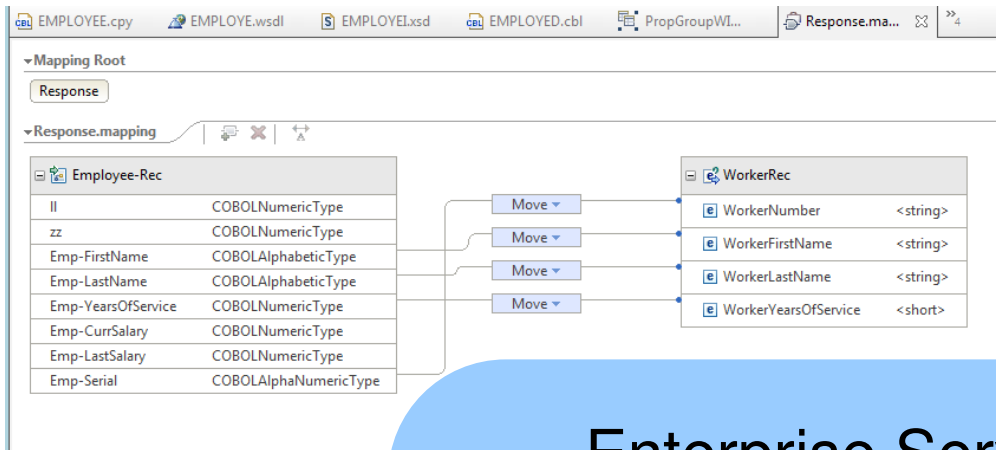


Showing data elements from WARDRPT.cbl

Data Item Name:	Data Type:	Level:	Top-Level Item:	Declaration:	Initial Value:	Line ...	Reference count:	Full Declaration:
PATLISTEST-S-ID	Data	10	PATIENT-MASTER-REC	PIC X(08)		378	0	10 PATLISTEST-S-ID PIC X
PATMSTR	File Descriptor	0	PATMSTR			116	4	FD PATMSTR RECORD CO.
PATMSTR-FOUND	Data	88	FILE-STATUS-CODES			134	1	88 PATMSTR-FOUND VALUE "0
PATMSTR-KEY	Data	5	PATMSTR	PIC X(06)		120	2	05 PATMSTR-KEY PIC X(06).
PATMSTR-REC	Data	1	PATMSTR			119	1	01 PATMSTR-REC.
PATMSTR-STATUS	Data	5	FILE-STATUS-CODES	PIC X(2)		133	3	05 PATMSTR-STATUS PIC X
PATPERSN	File Descriptor	0	PATPERSN			123	4	FD PATPERSN RECORD CO
PATPERSN-FOUND	Data	88	FILE-STATUS-CODES			136	1	88 PATPERSN-FOUND VALUE "
PATPERSN-KEY	Data	5	PATPERSN	PIC X(06)		127	2	05 PATPERSN-KEY PIC X(06).
PATPERSN-REC	Data	1	PATPERSN			126	2	01 PATPERSN-REC.
PATPERSN-STATUS	Data	5	FILE-STATUS-CODES	PIC X(2)		135	3	05 PATPERSN-STATUS PIC
PATSRCH	File Descriptor	0	PATSRCH			98	4	FD PATSRCH RECORDING
PAYMENT-METHOD-TYPE	Data	5	PATIENT-PERSONAL-...	PIC X(02)		313	0	05 PAYMENT-METHOD-TYPE
PEDIATRICS	Data	88	INPATIENT-DAILY-REC			157	0	88 PEDIATRICS VALUE "1010".

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Traditional development and Enterprise web services



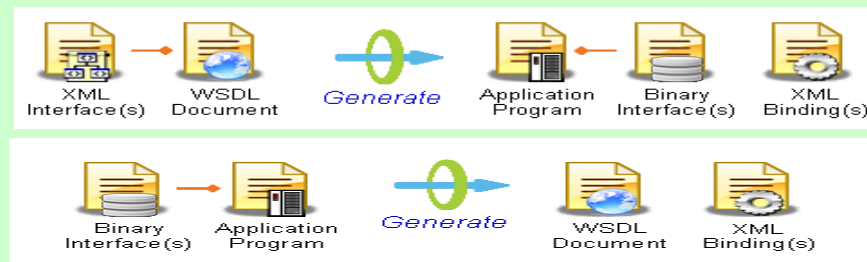
Supports traditional development/maintenance

- Cobol, PL/I, Assembler, JCL

Supports modern architecture development

Enterprise Service Tools

Top down, bottom up, and meet in the middle web service enablement for CICS, IMS, and Batch/TSO environments.



Enable Enterprise Applications for Mobile and Web

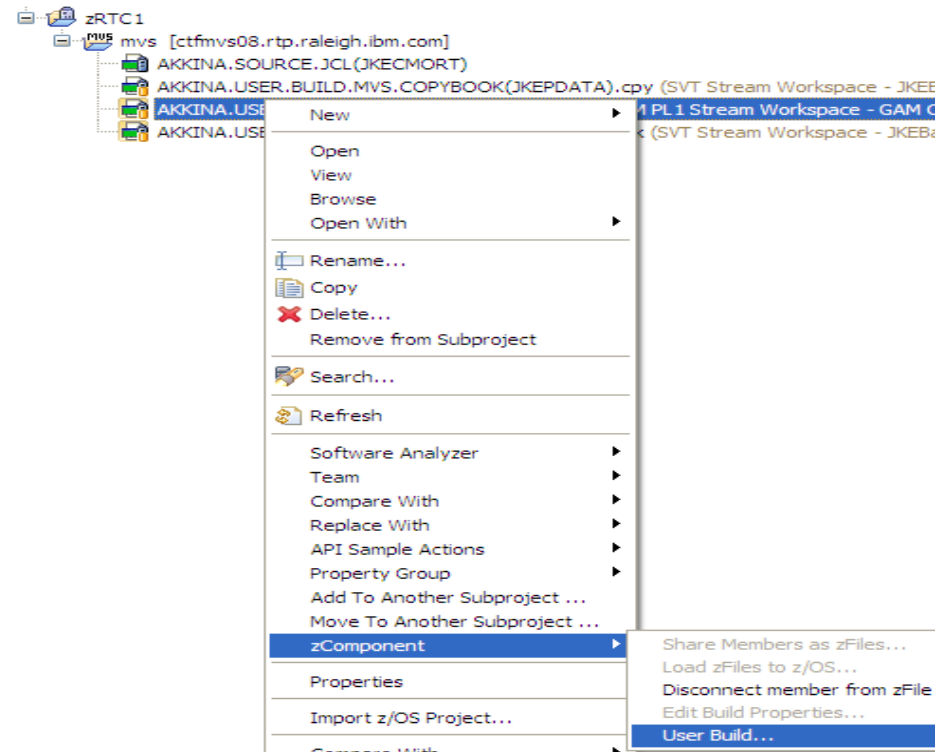
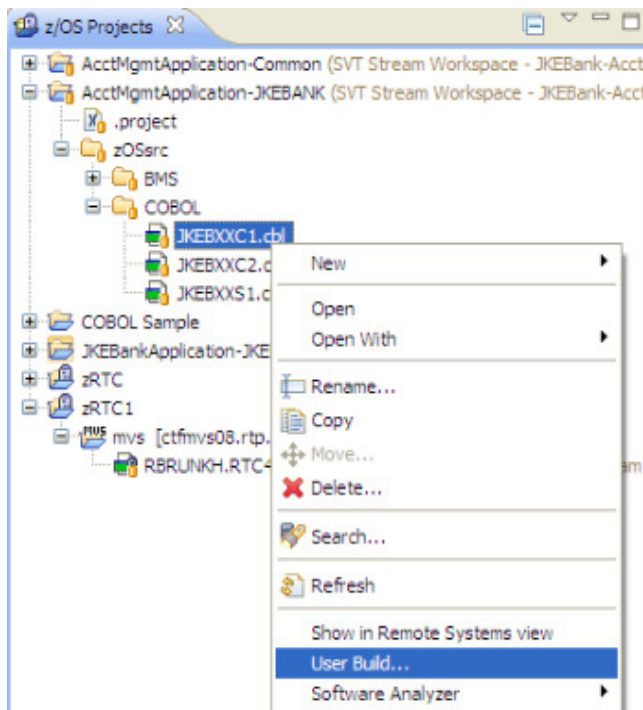
Complete your session evaluations online at www.SHARE.org/Orlando-Eval



User Build from RDz

“User build”, is supported both in zComponent projects and RDz remote z/OS projects

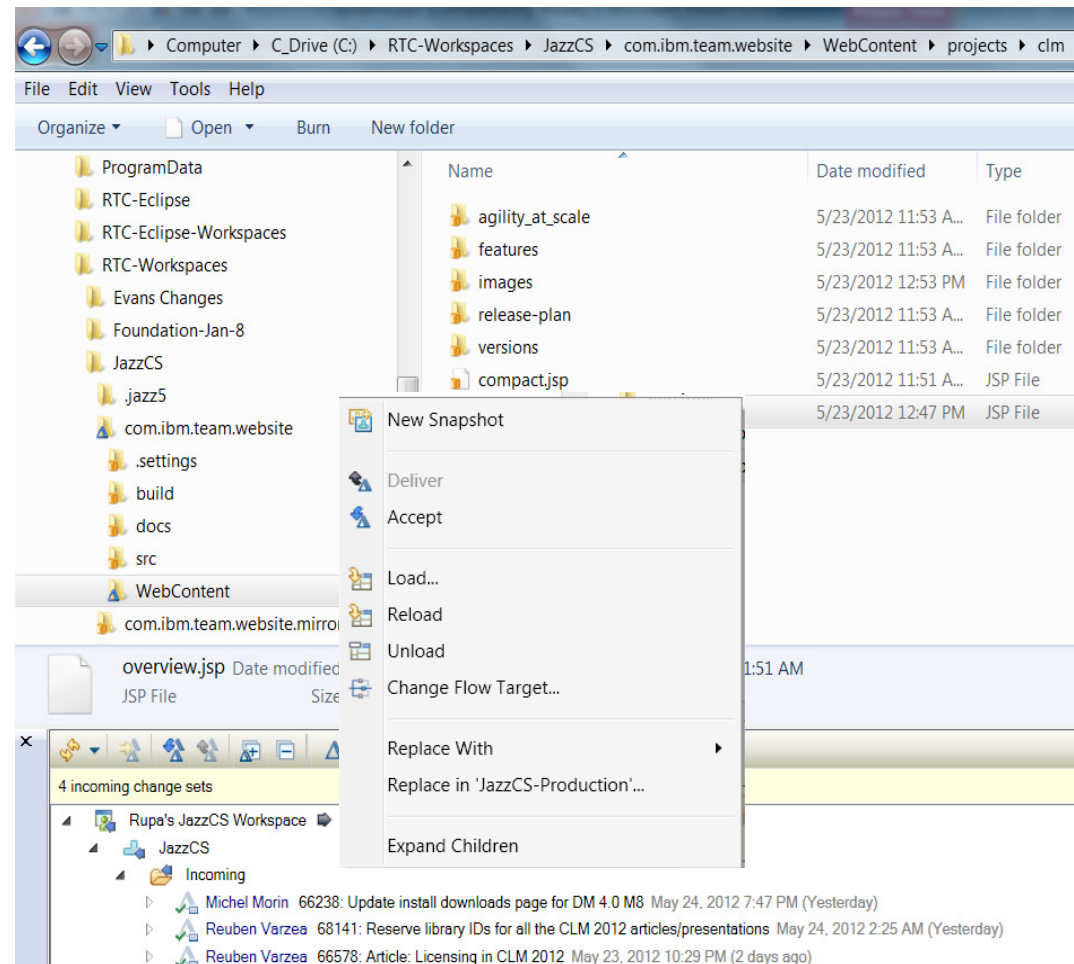
- Builds just one the single file selected, supports Error feedback
- Generates JCL based on the associated RTC Language definitions and Translators



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Pending Changes

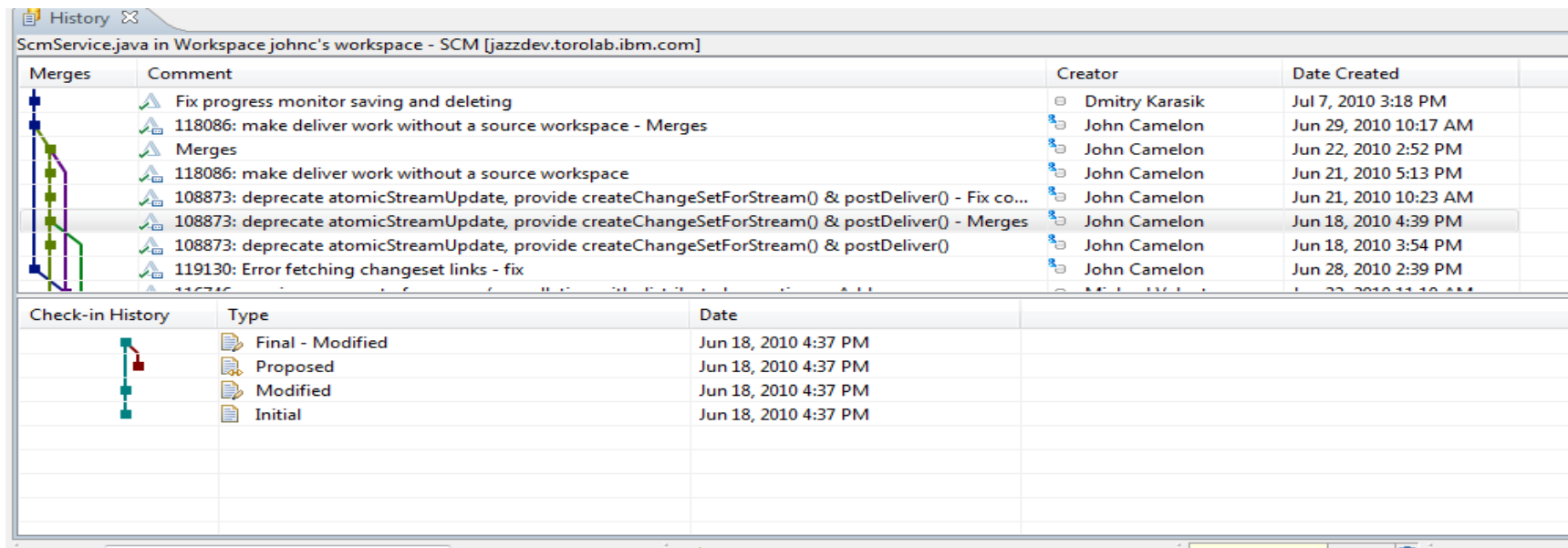
- If you want finer grained control on your SCM operations, then the Pending Changes view is for you
 - Check in, deliver, accept changes
 - Suspend, resume, discard changes
 - Replace, reload out-of-sync
 - Resolve conflicts
 - Open change sets and work items via the web client











Complete your session evaluations online at www.SHARE.org/Orlando-Eval





Traceability : Check-in History

- Someone made a costly mistake merging and you want to understand exactly where the mistake was made
 - Problem : Traditional history commands & UI only show before/after & merge states for a change set ... it does not show intermediates
 - Solution : Use Check-in history in Eclipse, CLI or .NET clients



The screenshot shows the Eclipse SCM History view for the file ScmService.java. It is divided into two main sections: 'Merges' and 'Check-in History'.

Merges	Comment	Creator	Date Created
	Fix progress monitor saving and deleting	Dmitry Karasik	Jul 7, 2010 3:18 PM
	118086: make deliver work without a source workspace - Merges	John Camelon	Jun 29, 2010 10:17 AM
	Merges	John Camelon	Jun 22, 2010 2:52 PM
	118086: make deliver work without a source workspace	John Camelon	Jun 21, 2010 5:13 PM
	108873: deprecate atomicStreamUpdate, provide createChangeSetForStream() & postDeliver() - Fix co...	John Camelon	Jun 21, 2010 10:23 AM
	108873: deprecate atomicStreamUpdate, provide createChangeSetForStream() & postDeliver() - Merges	John Camelon	Jun 18, 2010 4:39 PM
	108873: deprecate atomicStreamUpdate, provide createChangeSetForStream() & postDeliver()	John Camelon	Jun 18, 2010 3:54 PM
	119130: Error fetching changeset links - fix	John Camelon	Jun 28, 2010 2:39 PM

Check-in History	Type	Date
	Final - Modified	Jun 18, 2010 4:37 PM
	Proposed	Jun 18, 2010 4:37 PM
	Modified	Jun 18, 2010 4:37 PM
	Initial	Jun 18, 2010 4:37 PM

Development Life Cycle

Planning	Source Dev	Governance/Unit test	Build
<ul style="list-style-type: none"> • Define the tasks • Create a plan • Create a work item • Assign the work item to a developer 	<ul style="list-style-type: none"> • Load the project/source artifacts from SCM • Navigate, Analyze, Edit, Syntax check source code 	<ul style="list-style-type: none"> • Compile • Quality assurance <ul style="list-style-type: none"> • Debug • Code Coverage • Code review • Unit Testing 	<ul style="list-style-type: none"> • Check-in/Deliver the source code • Build
CLM	RDz RTC	RDz RD&T RTC	RTC RDz

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Integrated Debugger

- **RDz introduced a new feature called Integrated Debugger**
 - ✓ **A GUI-based multi-platform, multi-language debugger**
 - ✓ Full asynchronous mode
 - ✓ Thread-level control of multi-threaded applications
 - ✓ Automonitor support
 - ✓ **RDz v9.0.1 Supported:**
 - ✓ COBOL V5.1, V4, V3.4
 - ✓ Batch, Batch IMS, Batch DB2, CICS 5.1, 4.2, 4.1
 - ✓ Interactive Code coverage – Out of the box
 - ✓ **RDz 9.1 added support for:**
 - ✓ PLI v4.x, v3.9
 - ✓ C/C++ V1R13, V2R1
 - ✓ IMS TM
 - ✓ DB2 Stored procedures

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

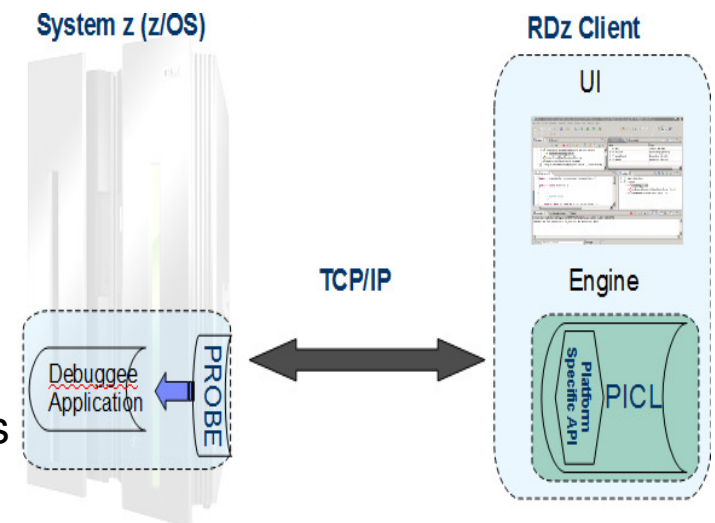
Integrated Debugger

✓ Host-offload architecture:

- ✓ Remote debugger with only a small footprint on the mainframe:
 - Leverages workstation CPUs enabling faster processing of debug information
 - Enables scalability and reliability
- ✓ Debugger client is supported on Windows and Linux

✓ Simple and Secure Connections:

- ✓ Single client can handle multiple debug sessions on multiple hosts or an application the spans multiple systems
- ✓ Client initiated debug – no need to specify client IP address and port (v9.0.1.2)
- ✓ SSL/TLS support



Enhanced Application Quality – Code Coverage



- Line Level Code Coverage - provides tools to measure and report on test coverage of an application
 - Leverages the Integrated Debugger technology
 - Indicating what source code lines were tested and remain to be tested

Code Coverage Report

Code coverage report, generated Oct 18, 2011 12:19:59 PM

Element	Coverage	Covered Lines	Total Lines
SAM1	75%	117	156
SAM1	75%	117	156
VENKATU.COBOL.SYSDEBUG(SAM1).cob	75%	117	156
SAM1()	75%	117	156

Launch Name	Launch Date
SAM1-2011_10_18_121959	Oct 18, 2011 12:19:59 PM
SAM1-2011_10_17_163634	Oct 17, 2011 4:36:34 PM
SAM1-2011_10_17_160130	Oct 17, 2011 4:01:30 PM
SAM1-2011_10_14_132043	Oct 14, 2011 1:20:43 PM
SAM1-2011_10_14_130134	Oct 14, 2011 1:01:34 PM
SAM1-2011_10_14_124502	Oct 14, 2011 12:45:02 PM

```

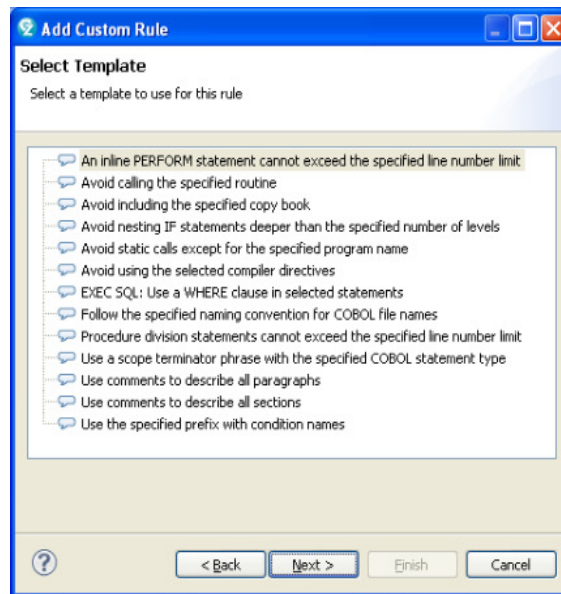
374 -----*A-1-B-----2-----3-----4-----5-----6-----7-----|
375                                     PERFORM 210-PROCESS-ADD-TRAN
376                                     WHEN 'DELETE'
377                                     PERFORM 220-PROCESS-DELETE-TRAN
378                                     WHEN OTHER
379                                     IF TRAN-COMMENT NOT = '*'
380                                     MOVE 'INVALID TRAN CODE:' TO ERR-MSG-DATA1
381                                     MOVE TRAN-CODE TO ERR-MSG-DATA2
382                                     PERFORM 299-REPORT-BAD-TRAN
383                                     END-IF
384                                     END-EVALUATE
385                                     END-IF
386                                     MOVE TRAN-KEY TO WS-PREV-TRAN-KEY
387                                     IF WS-TRAN-OK = 'Y'
388                                     PERFORM 830-REPORT-TRAN-PROCESSED
389                                     END-IF
390                                     END-IF .
391
392 200-PROCESS-UPDATE-TRAN.
393   ADD +1 TO NUM-UPDATE-REQUESTS.
394   PERFORM 720-POSITION-CUST-FILE.
395   IF CUST-KEY NOT = TRAN-KEY OR WS-CUST-FILE-EOF = 'Y'
396     MOVE 'NO MATCHING KEY:' TO ERR-MSG-DATA1
397     MOVE TRAN-KEY TO ERR-MSG-DATA2
398     PERFORM 299-REPORT-BAD-TRAN
399   ELSE
400     *
401     *   Subroutine SAM2 will apply an update to a customer record
402     *
403     CALL 'SAM2' USING CUST-REC, TRANSACTION-RECORD,
404                      WS-TRAN-OK, WS-TRAN-MSG
405   IF WS-TRAN-OK NOT = 'Y'
406     MOVE WS-TRAN-MSG TO ERR-MSG-DATA1
407     MOVE SPACES TO ERR-MSG-DATA2
408     PERFORM 299-REPORT-BAD-TRAN
  
```

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Enhanced Quality & Structure Analysis – Code review

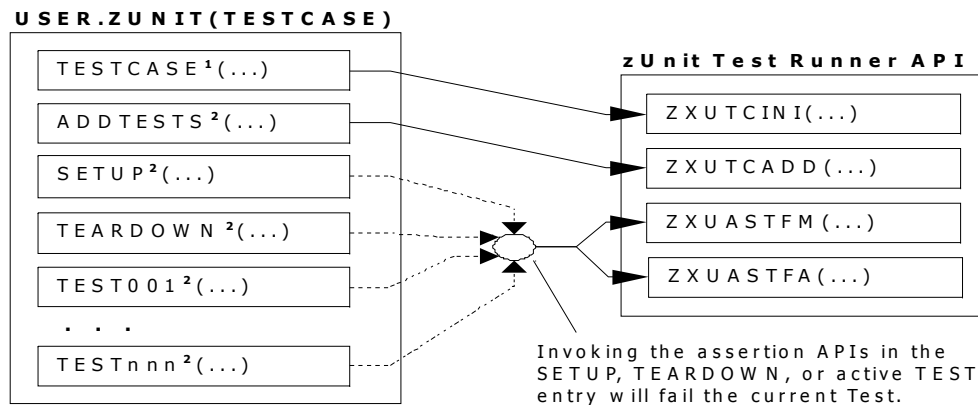
- Code Review/Governance - provides predefined rules and templates for COBOL and PL/I applications
 - Ensure adherence to corporate standards
 - Custom rules for COBOL and PL/I



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zUnit – Unit testing framework for z/OS

- Frameworks that assist developers in writing code to perform repeatable, self-checking unit tests are collectively known as xUnit.
- [xUnit](#) defines a set of concepts that together provide a light-weight architecture for implementing unit testing frameworks.
 - JUnit, for example, is a very popular instance of the xUnit architecture.
- **zUnit** is a xUnit instance for System z
- Goal is to encourage the **continuous integration and continuous testing** methodology for System z Application development and maintenance



¹Language-specific details:

- In COBOL, this is the first program appearing in the Test Case source file and it will be invoked by the Test Runner for Test Case initialization.
- In PL/I, this is the procedure declared with option(fetchable) in the Test Case source file and it will be invoked by the Test Runner for Test Case initialization.

²Language-specific details:

- In COBOL, these are expected to be subprograms (non-nested and therefore compatible with FUNCTION-POINTER).
- In PL/I, these are expected to be internal procedures that are declared at the package level (non-nested).

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zUnit Capabilities

- zUnit Test Runner
 - Runs on z/OS
 - Installed and configured on z/OS as part of RDz Host install and customization
 - Fetches and runs the Test Suite referred to in a zUnit configuration file

- zUnit Wizard used to generate Test Cases
 - RDz client feature
 - Eclipse based wizards allow creation of:
 - Template Test Cases are generated in COBOL or PL/I
 - Simple pass/fail **assertion** API

(RDz v9.1) Complete COBOL test cases:

- Identify the interface or set of copy book(s)
 - Generate XML Schema to represent the interface
 - Generate XML files where you would specify test input and expected output
 - Generate a Test Case based on the XML file
 - (Optionally) Generate stubs for called programs
- RDz viewers/editors for unit test XML results



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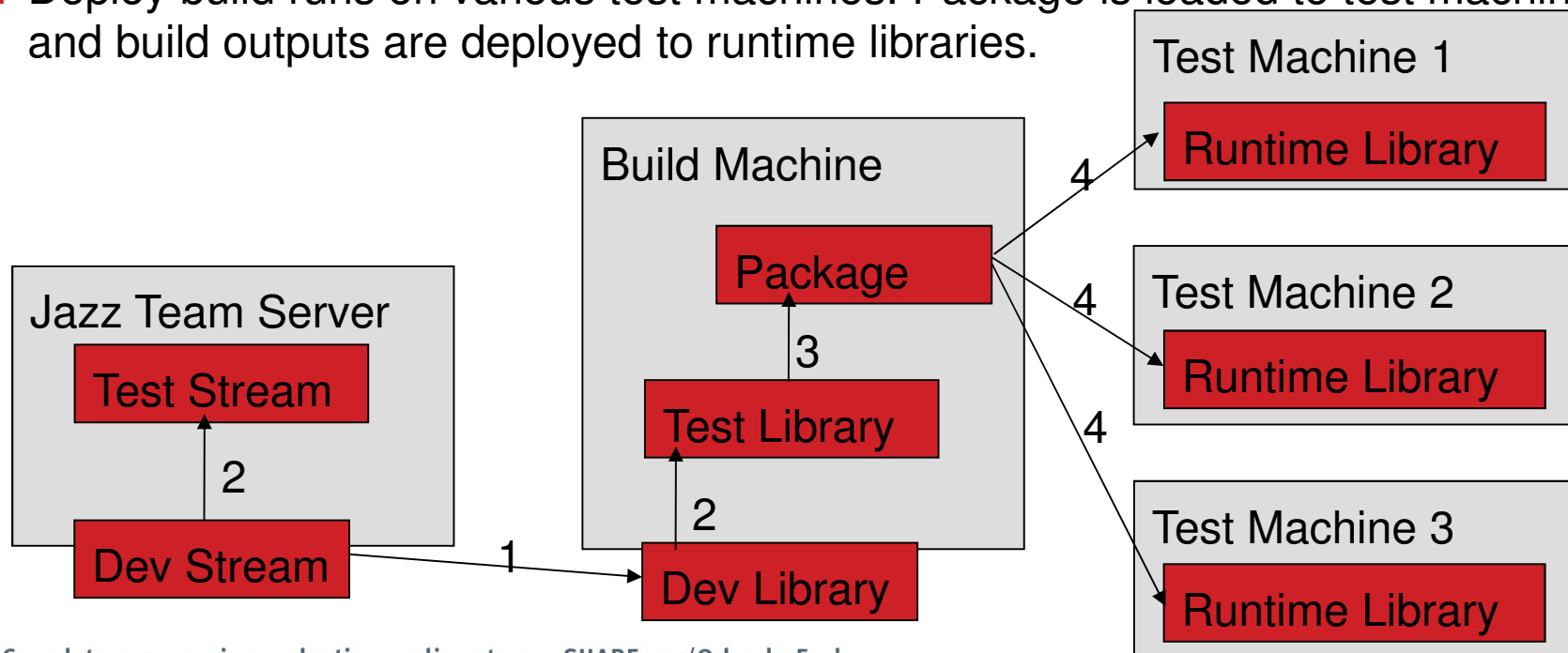
Development Life Cycle

Planning	Source Dev	Governance/Unit test	Build
<ul style="list-style-type: none"> • Define the tasks • Create a plan • Create a work item • Assign the work item to a developer 	<ul style="list-style-type: none"> • Load the project/source artifacts from SCM • Navigate, Analyze, Edit, Syntax check source code 	<ul style="list-style-type: none"> • Compile • Quality assurance <ul style="list-style-type: none"> • Debug • Code Coverage • Code review • Unit Testing 	<ul style="list-style-type: none"> • Check-in/Deliver the source code • Build
CLM	RDz RTC	RDz RD&T RTC	RTC RDz

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The big picture

1. Dependency build runs on build machine. Source is loaded from Dev Stream and outputs are built in Dev Library.
2. Promotion build runs on build machine. Source is promoted from Dev Stream to Test Stream and build outputs are copied from Dev Library to Test Library.
3. Package build runs on build machine. Test Library build outputs are archived in a package.
4. Deploy build runs on various test machines. Package is loaded to test machine and build outputs are deployed to runtime libraries.



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in Orlando **2015**



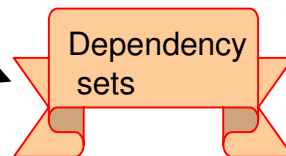
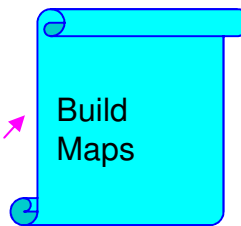
Dependency Build Summary

Server

1- Scan
Scan new or changed files
Extract their logical information and dependencies

2- Preprocessing
For changed files:
impact on build maps

Calculate dependency sets

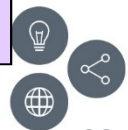


Mainframe (Build machine)

Build processing

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Snapshots for every build

Build MVS Dependency Build Test 20120619-0908330825

✓ **Completed**

Duration: 53 seconds
Start Time: June 19, 2012 9:08:33 AM
Completed: June 19, 2012 9:09:27 AM



Contribution Summary

Changes: [Show changes](#)
Downloads: [7 downloads](#)
Logs: [1 log](#)
Snapshot: [MVS Dependency Build Test 20120619-0908330825](#)
Work items: [3 included in build](#)

Associated Release

Released builds are available as ch

[Create a release to associate v](#)

Reported Work Items

Work items reported against this build to help stabilize it.

- None reported against this build
- [Create a new work item](#)
- [Associate an existing work item](#)

General Information

Requested by: ADMIN
Build Definition: [MVS Dependency Build Test](#)
Build Engine: [Setup engine 15560](#)
Build History: [19 builds](#)
Tags:

Snapshot

Name:*

Details

Created by:  [ADMIN](#)
Created on: Jun 19, 2012 9:08 AM
Modified on: Jun 19, 2012 9:08 AM
Description:

Links

- [Create a new repository workspace](#)
- [Create a new stream](#)
- [Compare with snapshot](#)
- [Compare with repository workspace or](#)

Components

Shows the components in this snapshot.

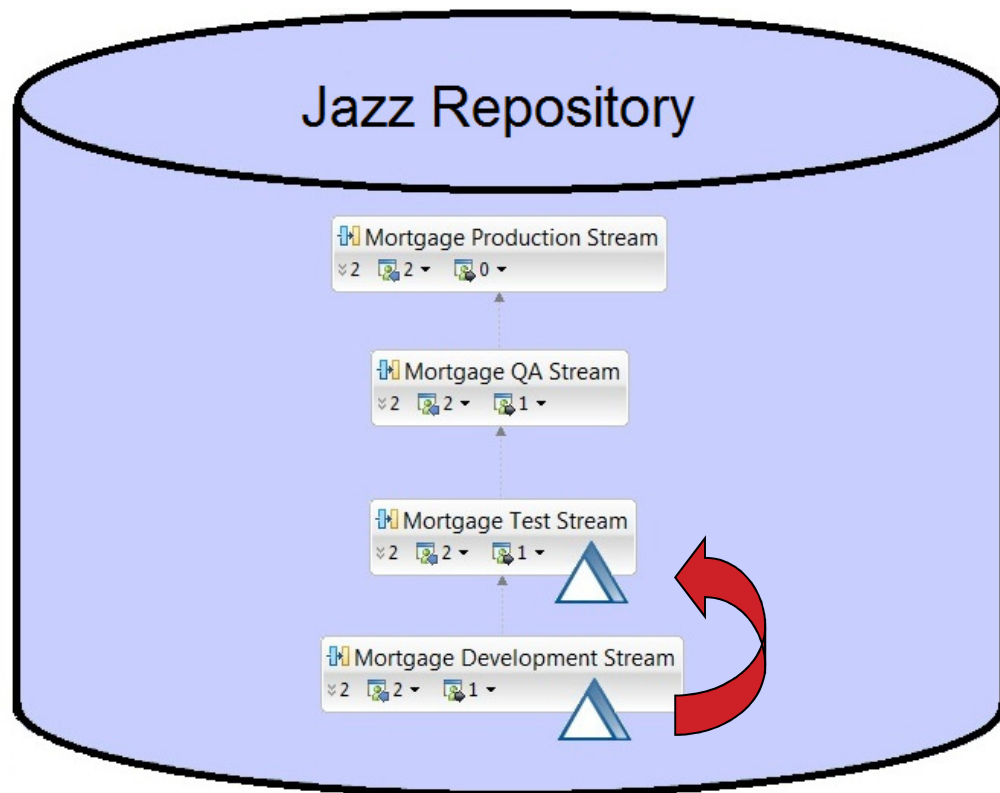
- [Liam Test RWS \(4: MVS Dependency Build Dev_20111108-0955580222\)](#)
- [Mortgage Component \(69: MVS Dependency Build Dev KA_20120619-0853550520\)](#)
- [plx test \(2: MVS Dependency Build Dev_20110328-0857420358\)](#)

Show Repository Files

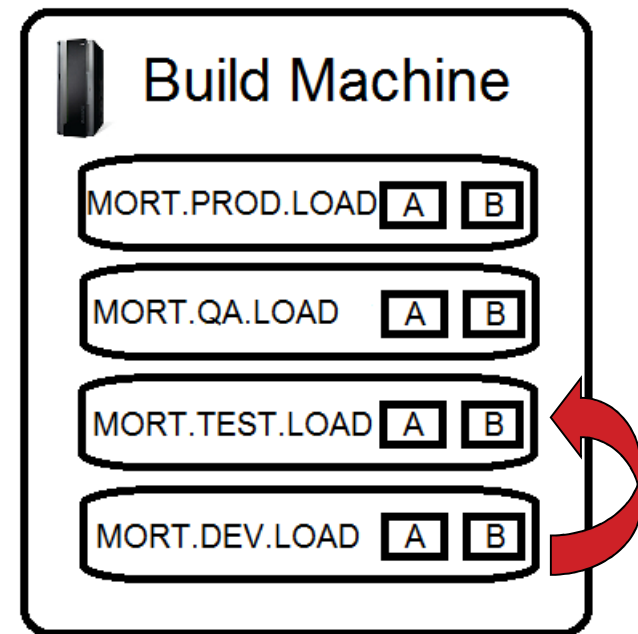
Complete your session e

Promotion

- Flow source code changes and build outputs through the development hierarchy



Source



Outputs

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Development Tools: RTC, RTC ISPF Client, RDz - Hands-on Lab

*Liam Doherty, Rosalind Radcliffe,
Venkat Balabhadrapatruni
IBM Corporation
Session 17458*



Liberty Profile on Windows and z/OS (Among Other Things) Hands-On Lab

*David Follis, Michael Stephen, Ken Irwin, Gary Picher
IBM Corporation
Session 17367*



Tuesday August 11th, 2015



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Lab choices

- **RDz**
 - **RDz**
 - Part 1: COBOL development on System z (~**25 min**)
 - Part 2: Generating, deploying, and testing a CICS Web service (~**25 min**)
 - **What's new in RDz Lab**
 - Option 1: Navigating PDS on the Remote Systems view (**5-10 minutes**)
 - Option 2: Retrieve data set / Retrieve job (**5-10 minutes**)
 - Option 3: The new Eclipse-based editors for COBOL and PL/I (**15-30 minutes**)
- **RTC**
 - Source Code Management using IBM Rational Team Concert
 - Module 1 – Using the Eclipse Client
 - Module 2 – Using the ISPF Client
- **WebSphere**
 - Liberty!
 - For developers – Windows and z/OS
 - For sysprogs - z/OS
 - WAS V8 Timeouts
 - WAS V8 High Performance Extensible Logging (HPEL)
 - SMF
 - Debugging Timeouts
 - Debugging Java Out of Memory Exceptions (OOM)