



Modern environment for z/OS development

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> Feb 4, 2013 Session: 12503





Four key barriers preventing optimal return on IT investments



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"We don't understand the effort, risk and impact of modernizing our legacy applications."



"We need to enable our teams to collaborate across platforms, languages, and environments." Islands of skills, languages and platforms



"Our skills gap keeps growing. How do we stay current with all the language and technology changes?"



"We need a cost effective way to improve our infrastructure efficiency and free up capacity to handle more workload."

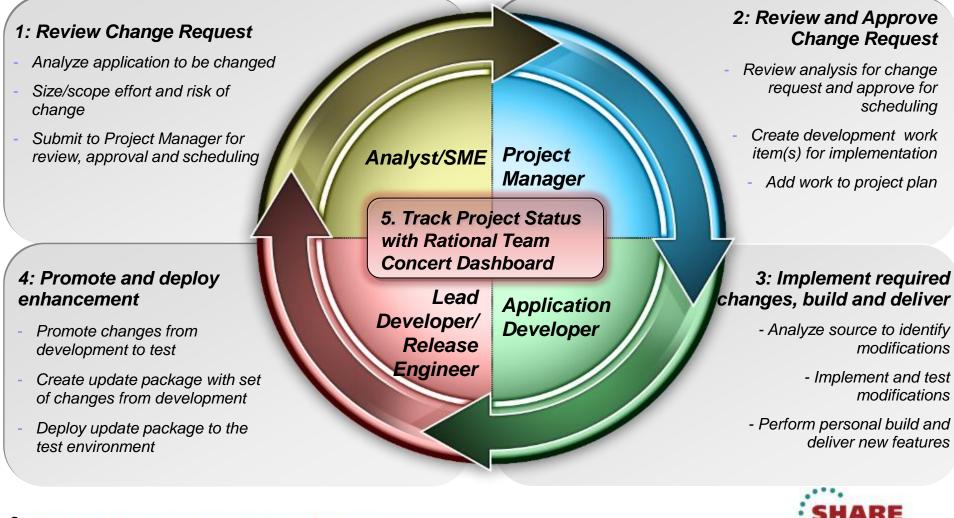
Overview of Supported Production Scenario



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Project Manager or Support Team has submitted Project Change Request

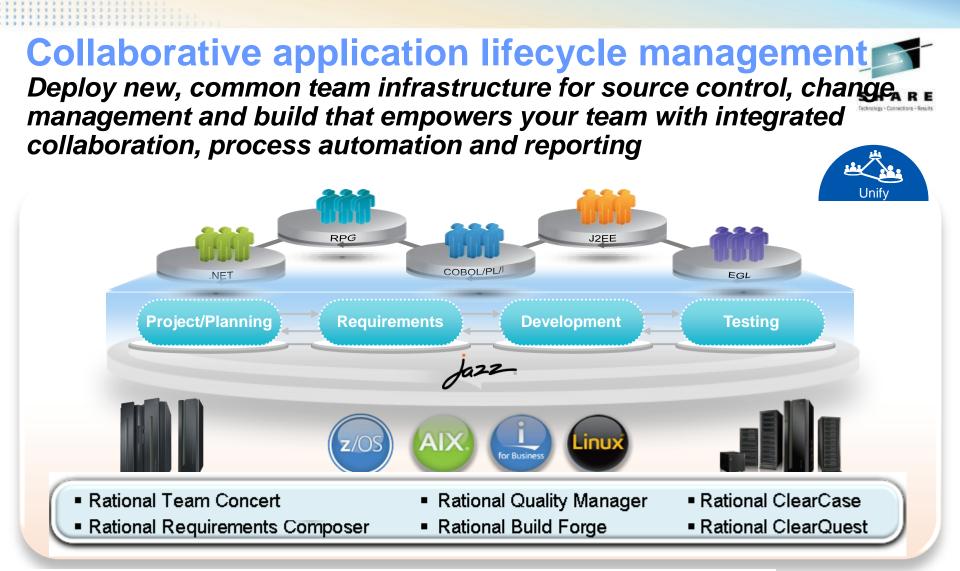


			. Technology - Connections - Results
Planning	Source Dev	Governance/Unit test	Build
 Define the tasks Create a plan Create a work item Assign the work item to a developer 	 Load the project/source artifacts from SCM Navigate, Analyze, Edit, Syntax check source code 	 Compile Quality assurance Debug Code Coverage Code review Unit Testing 	 Check-in/Deliver the source code Build
CLM	RDz RTC	RDz RD&T RTC	RTC RDz



Development Life Cycle





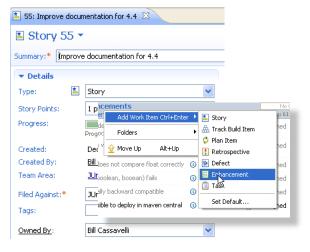
"Building an agile development team requires a multiplatform approach, and Sodifrance uses Rational Developer for System z and Rational Team Concert for System z to help application teams synchronize their efforts and improve collaboration. Rational on System z offers a powerful and valuable combination 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



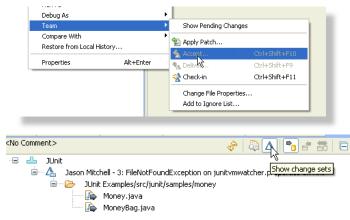
Planning

🞲 JUnit Plan [4.4 m2] 🛛		
🕏 JUnit Plan 🝷		
Team Area: JUnit Team Iteration: 4.4 m2	(5/2/09 - 6/1/09)	10 Close
Bill Cassavelli Closed items: 5 Open items: 3		Load: 2 / 4
Improve documentation for 4.4		Una
timeout doesn't work properly	G 2 hours	🕞 Una
for >=2 cases in junit4.3?	30 minutes	-
Jason Mitchell	1 hour	
Closed items: 2 Open items: 5	2 hours	ad: 136
assertEquals throws NPE while	4 hours	📙 High
comparing null elements	1 day	[
 Improve documentation for 4.4 	2 days	Una
	3 days	
assertEquals array comparison doesn't handle null elements	1 week	Una

Dashboards & Reporting

JUnit Project General - Add New Ta Welcome to .II Init Project 😡 JUnit Project Teams (1) Current .IUnit Project PL (2) Welcome to the project dashboard. This JUnit Team Current Iteration: 4.4 m2 dashboard was created from a template JUnit Plan and has not yet been customized By JUnit Project Queries JUnit Release Plan Recently created (0) Support State S Recently modif... (3) Category Recently modified (3) A Team Concert example project area Recently closed (0) based on the JUnit project New unassigned (6) This example project area illustrates the JUni 💷 Useful Links use of work items. SCM, builds and other JUn Team Concert components in a project... Eclipse Jazz It exemplary shows project work on the next-IUnit release 4.4 : Server Status Recently modified (3) Priority 💋 Jazz News (33 new) Database: Connecter When can you get the Jazz based Rationa Services: 32% free of 83MB allocated / 700MB Max Memory: IBM Rational Takes 'Jazz' Collaboration 1.0 (120080618-1642) Version: Suite on a Roll Jun 9, 2008 📕 High IBM seeks consensus on ALM architecture Uptime: 5 hours, 57 minutes Uhassi IBM Gets Jazzy with Web 2.0 Jun 2, 2008 Page 1 of 9

Source Control



Method Enforcement and Automation



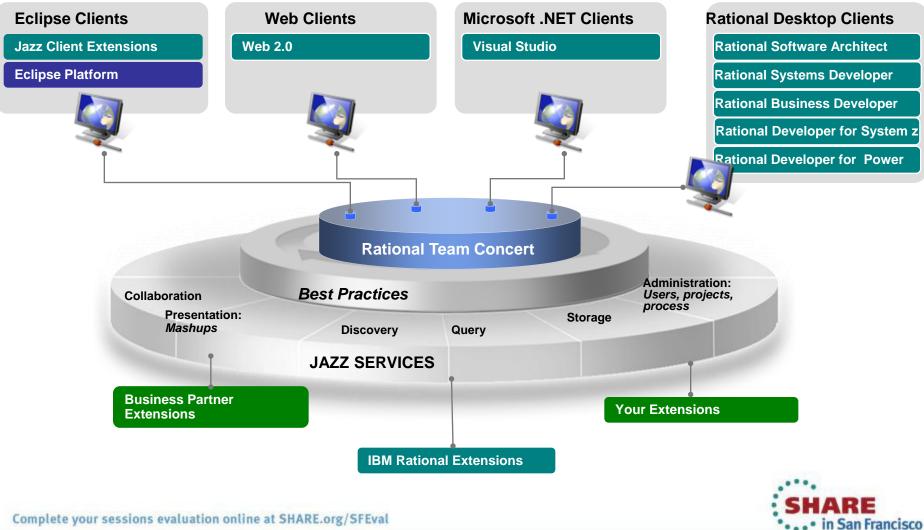
Builds – Continuous

📥 I20080708-1553 🛛	3	
Build junit	I20080708-1553 -	
Completed Duration: 33 sect Start Time: July 8, Completed: July 8, Status Trend:	2008 3:53:58 PM	Reported Work II
Contribution Sum	mary	General Informal
Downloads:	1 download	Requested by: Ja
External Links:	<u>1 link</u>	Build Definition: ju
Logs:	<u>1 loq</u>	Build Engine: jui
Repository Worksp	ace: <u>JUnitBuild</u>	Build History: 4
Work items:	None included	Tags:
Compile:	0 errors, 15 warnings	V Deletion allowed
JUnit:	31 tests, 0 failures, 0 errors	

2013

Rational Team Concert: Built on an open, Web 2.0 platform Technology - Connections - Ar

Supporting a broad range of desktop clients, IDE's and languages



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<section-header><section-header><section-header><text><text><text><image><image>

<image>

Analysis

Integration with Debug Tool for Development and Test A modern IDE for productive development of cross-platform applications written in COBOL, Integration with File PL/I, ASM, Java, EGL or C/C++ in System z Manager for file and test CICS, IMS, DB2, Batch applications data handling Integration with RD&T for flexible access to System z environment

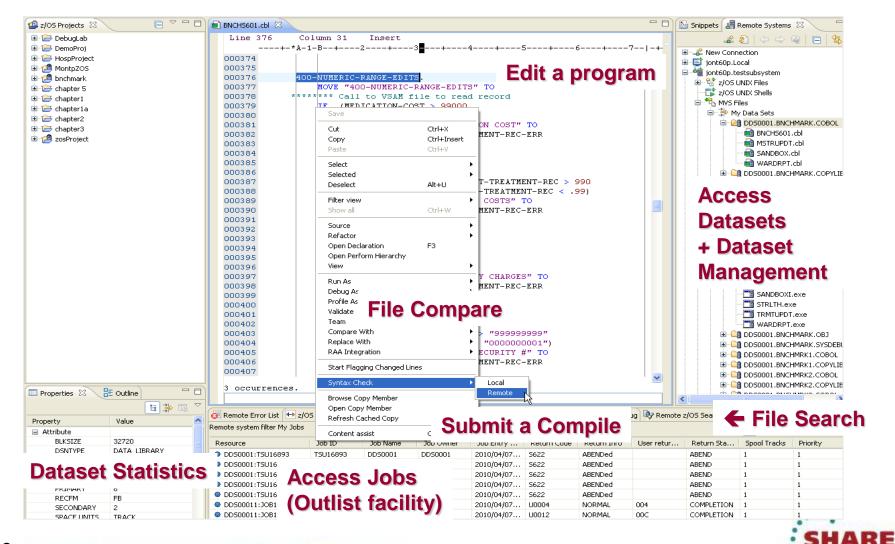
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The Benefits of a RDz's IDE

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





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Traditional development and Enterprise web services



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Column 1

IDENTIFICATION DIVISION.

WORKING-STORAGE SECTION.

PROGRAM-ID. GAMOVDB.

DATA DIVISION.

COPY GAMOBMD.

COPY GAMOBDD.

COPY GAMOBED.

COPY GAMOBCD.

COPY GAMOBPD.

XML

Web

Interface(s) Document

Binary

Interface(s)

Supports traditional development/maintenance

Cobol, PL/I, Assembler, JCL

Supports modern architecture development

Enterprise Service Tools

Single service projects

WSDL

Application Program

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

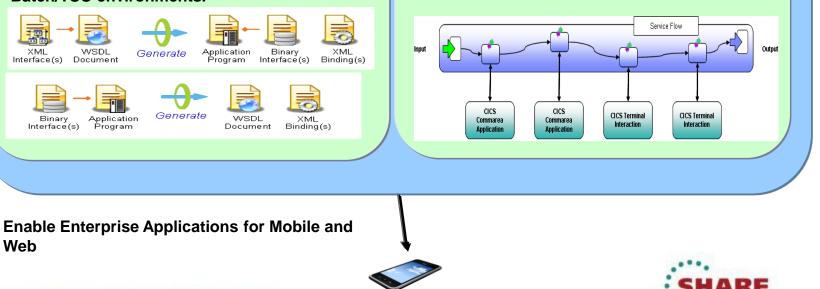
Generate

Generate

Application Program

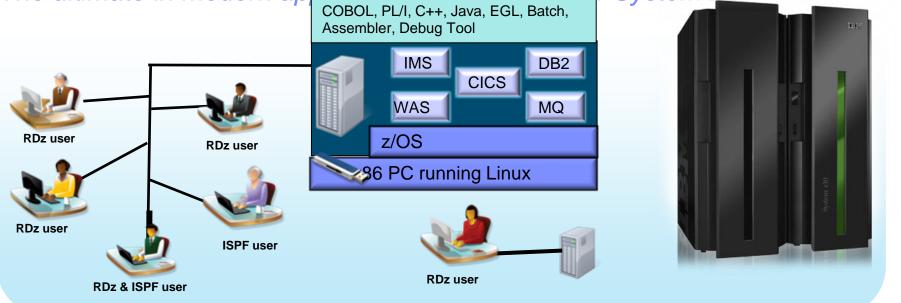
Service flow projects

Graphical composition of CICS applications chained together to form a new business service.



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

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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 a robust development workloads including without limitation production module builds, pre-production testing, stress testing, or performance testing.

Centralized administration

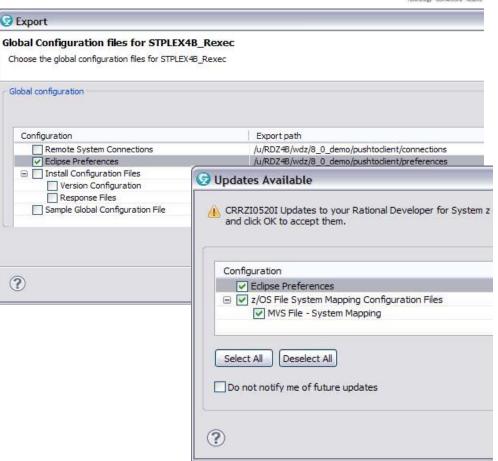
Push to Client - Configuration Files management and product updates

Desktop configuration setup

 upon connecting to the host, a user is notified if they have incoming changes to their configuration files.

Product updates

- triggered from central place to all the users connecting to the host
- An Export Wizard to help an Admin configure various settings on RDz client and upload it to a central location.
- Settings are grouped by function into configuration files such as remote connections or system mappings.





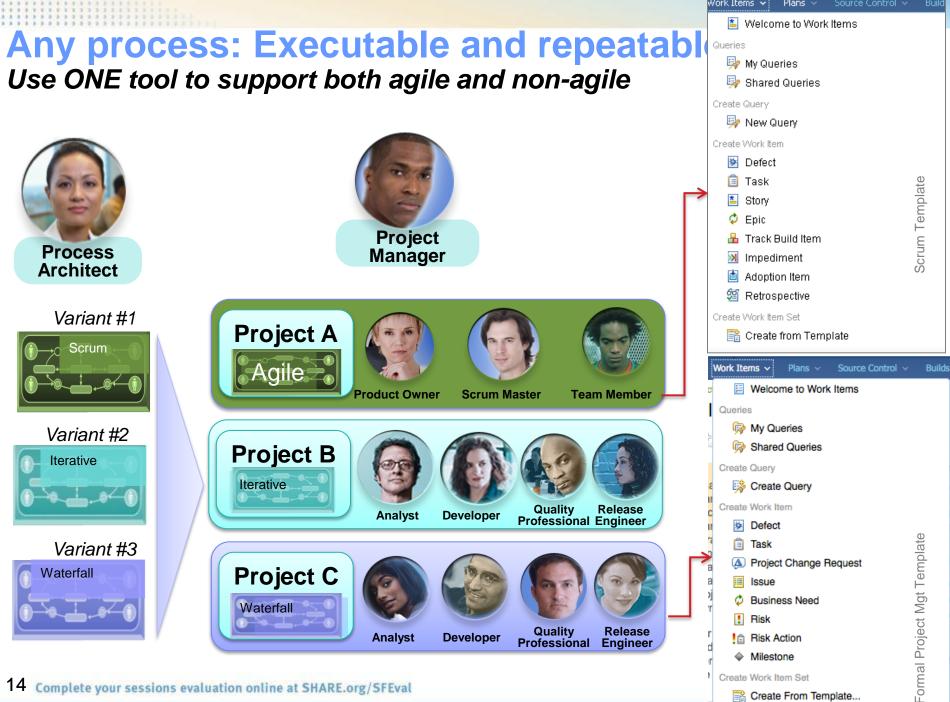


Development Life Cycle



Planning	Source Dev	Governance/Unit test	Build
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CLM	RDz RTC	RDz RD&T RTC	RTC RDz





Multiple plan views facilitate continuous planning

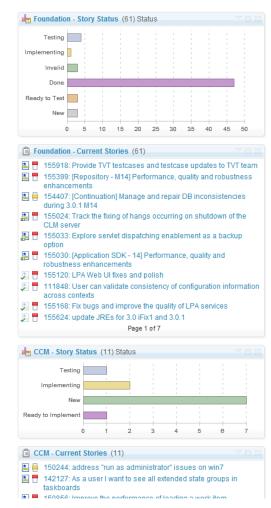


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	28 items:	25 open, 3 closed Ends in: 10 days										
	Plan De	talls									Edit	
	Planned I		shboard Notes									
	View As:	Roadmap 📫 🖆 🗶 🔅 🕶	(3 items filtered)		~ ~ -					Add	Work Item -	
					• • •	⊹ 📥 ↔	March 13, 201	ch 2011	N	larch 20, 20	April 2	
	Actions	Summary		Effective E	Owned By	Rank	S M T				WTF	
		* Donors Can Choose to Support N	Multiple Organization	-	A Deb	1						
		* Donor Dividend Allocation Criteria	а	-	A Marco	3						
		Widget Disposed Exception		1.2 weeks	🔓 Bob	-						
BRM Sprint 2 (1.0) Plan		Browser Exception		2 hours	🔓 Bob	-						
		* Requests sent in form of email		-	🖁 Tanuj	4						
) items: 25 open, 5 closed Ends in: 6 days		Some messages are not external	lized	3 days	🖁 Bob	-						
Plan Details		SWT Exception		1.5 days	A Marco	-						
Plan Details		* Frequency of dividend transfer		-	🔓 Deb	-						
anned Items Links Snapshots Dashbo As: Taskboard 🗸 🖆 🛣 🗶 🍰 -	ard No	tes	Details									
Story => Open		In Progress	ed Items	Links	Snap	shots	Dashboa	rd	Notes			
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-				Clos	ed Items: 0	Open Ite	ems: 1		1	.oad: 0/8	3 +8 h	
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Frequency of	e	Implement -			ed Items: 0	Open Ite	ems: 1			.oad: 0/8	3 +8h	
dividend transfer		Frequency of	6	Del	h				ſ			
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- comptete your sessions evaluation o	nune al.	STIARCOIS/ STEVA		Clos	sed Items: 0	Open Ite	ems: 0			Load: 0/8	3 I +8 h	

Progress Tracking - Everyone can see live project status SHARE Technology - Connections - Results

Story Status Current Iteration

Shows the status of all stories planned for the current iteration

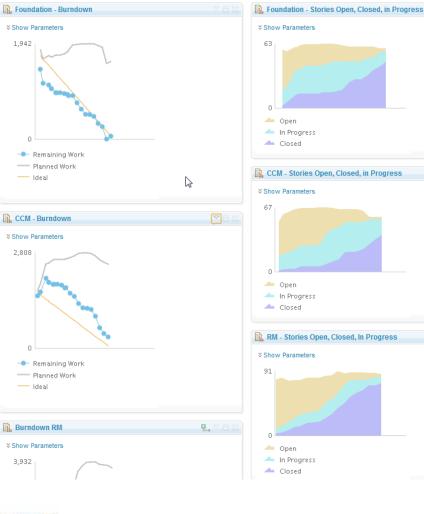


Burndown Current Iteration

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.







HARE

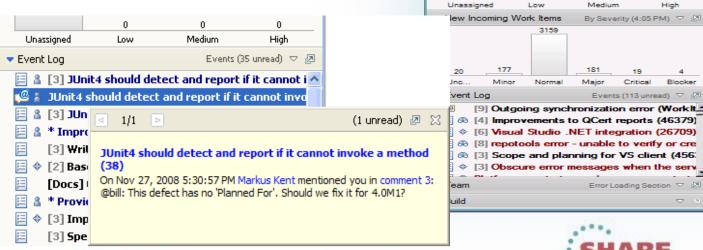
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In-context Collaboration – Team View

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



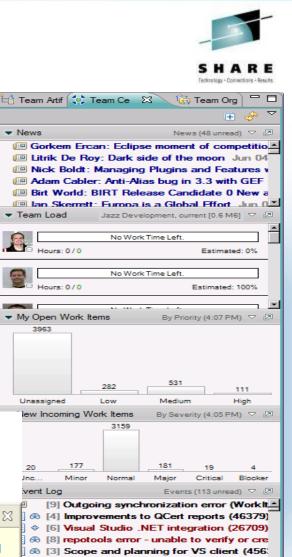
News

Team Load

Hours: 0/0

My Open Work Items

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Development Life Cycle



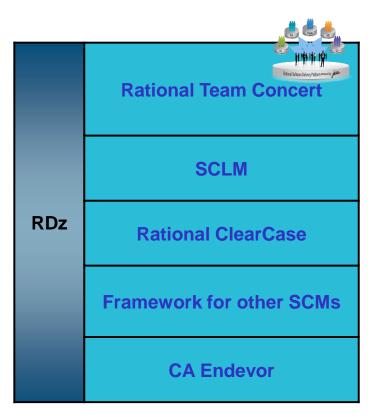
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RDz Source Code Integration



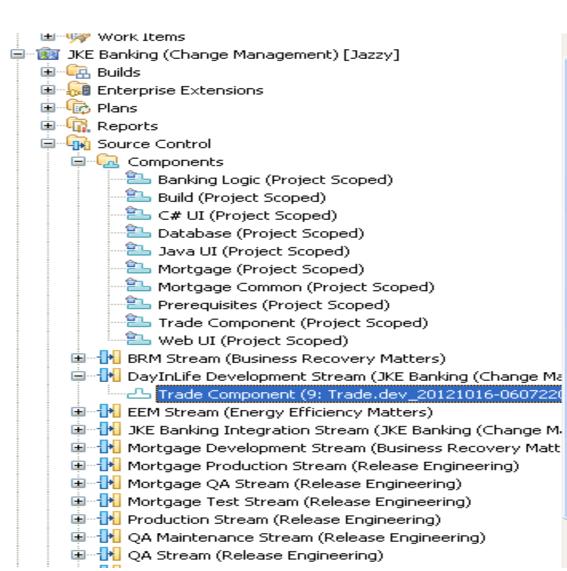
- Rational's Strategic Source Code tooling is RTC and RDz provides tight integration
- RDz offers integration into a variety of other Source Code Management (SCM) tools as well as a framework for creating SCM integration on your own (CARMA)
- Variety of vendors supply plug-ins to RDz to provide easy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





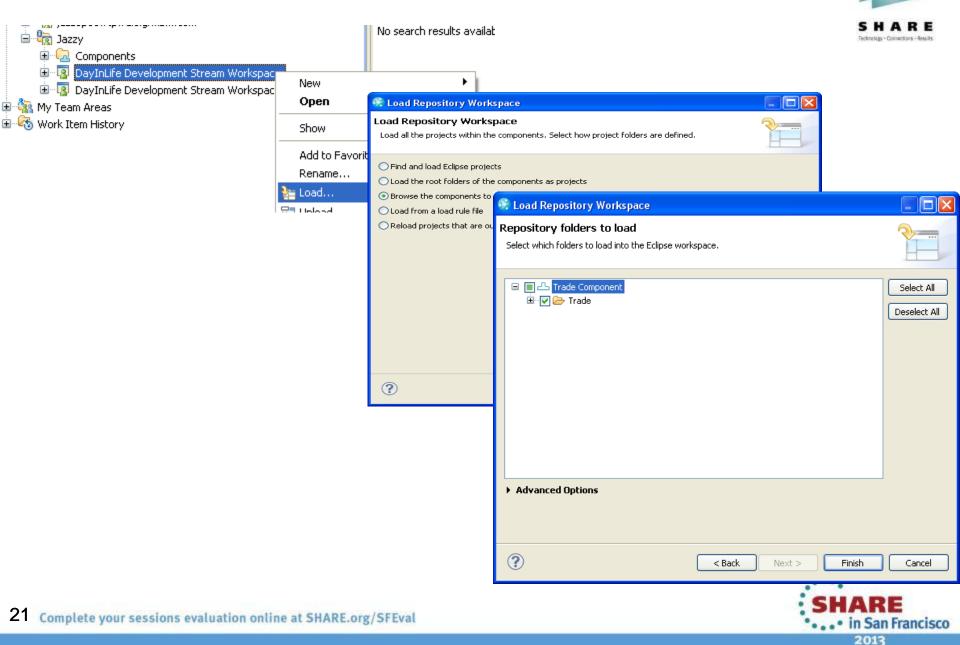
Source Control Management





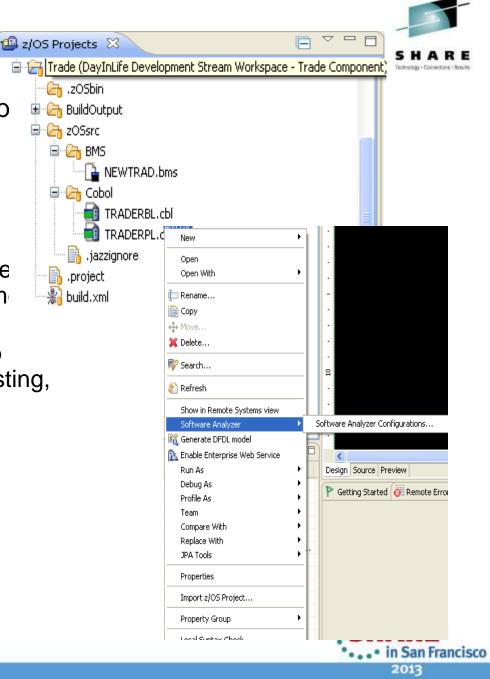


Load the source artifacts



RDz and RTC together

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



Create a Property Group

SHARE
Generate property groups for your project based on RTC build definition

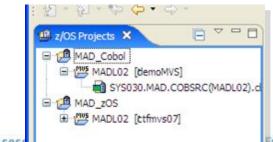
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Allows RDz to resolve the dependencies and thus offer all the tooling

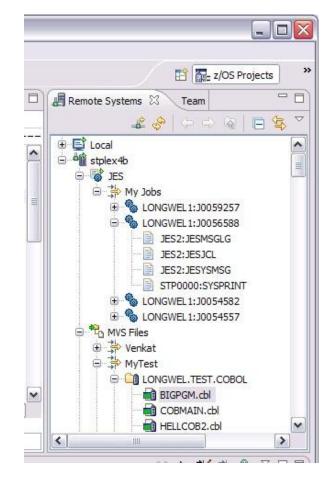
Cenerate Property Group	
Configure Property Group Generation	
Specify how to generate the property group.	
Generate using build definition (optional):	
GAM zOS Dependency Build	
Property group generation	
✓ Local COBOL Settings	
✓ Local PLI Settings	
Generate remote library paths for this connection (optional):	
mvs114.rtp.raleigh.ibm.com 🔻	
(?) <u>Einish</u>	Cancel
	CHAI

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





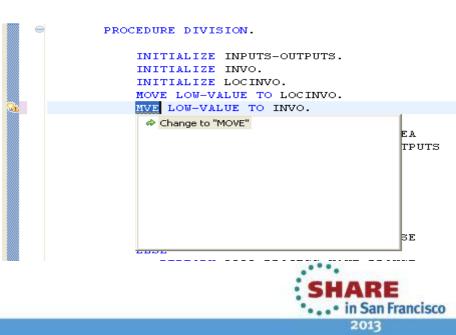




Edit capabilities in RDz

- 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 and PLI advanced editors
 - Based on the Eclipse editor infrastructure, provide more advanced edit capabilities like quick fixes, hyperlinking, hover, easy navigation between various edit sessions or within the same edit session.
 - Supports real time syntax checking, content assist, key word highlighting etc.

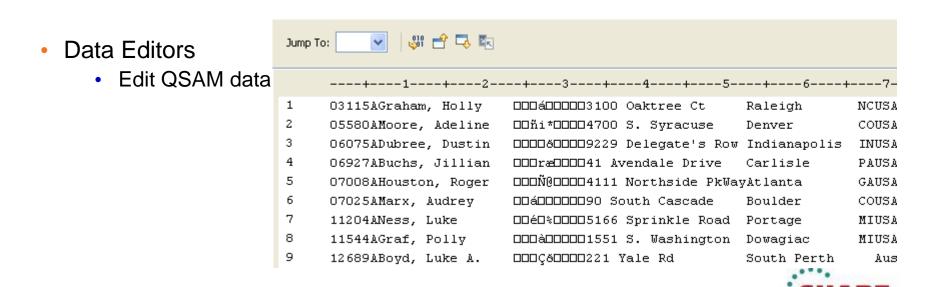
	SHARE
Line 49	Column 1 Insert
	+-*A-1-B+2+3+-
000027	*
000028	* * * * * * * * * * * * * * * * * * * *
000029	IDENTIFICATION DIVISION.
000030	PROGRAM-ID. GAMOVDB.
000031	
000032	DATA DIVISION.
000033	
000034	WORKING-STORAGE SECTION.
000035	
000036	COPY GAMOBMD.
000037	COPY GAMOBDD.
000038	COPY GAMOBED.
000039	COPY GAMOBCD.
000040	COPY GAMOBPD.
000041	01 DATABASECONNECTION.
000042	49 SCHEMA PI
000043	49 PIC X VALUE '.'.
000044	
000045	O1 ITABLEPREPARE.
000046	49 ITABLE-VAR-LEN PIC S
000047	49 ITABLE-VAR-TXT PIC 1
000048	
12	01 INVENTORYPREP.
000050	02 PIC X(12) VALUE 'INSER'
000051	O2 INVNTDBCON PIC X(9).
000052	O2 TABLENAME PIC X(11).



Edit capabilities in RDz

- RDz at a high level has different types of editors
 - WYSYWIG editors
 - Creation, edit of BMS and MFS maps
 - Has the source and design view allows drag and drop of fields in the design view which generates the appropriate source



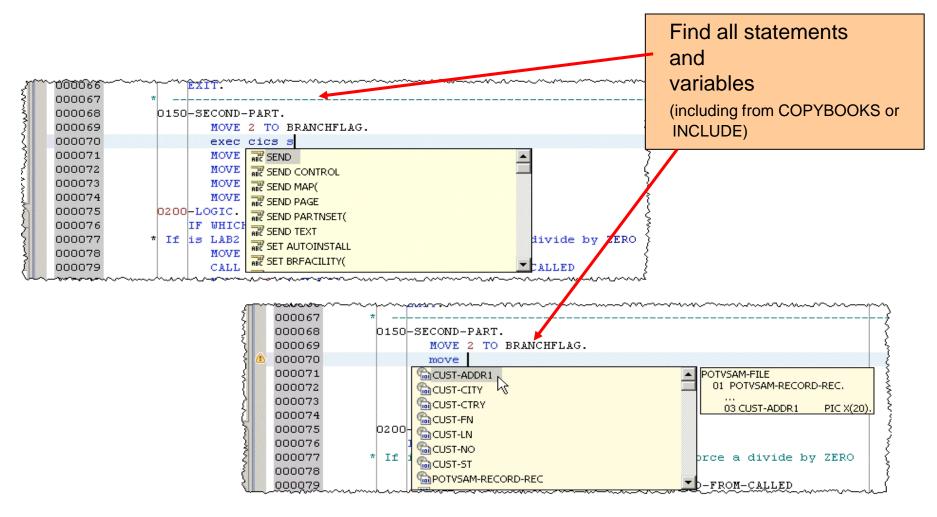


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Editor Productivity features - Develop code more efficiently







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Editor Productivity Features – real time syntax checking



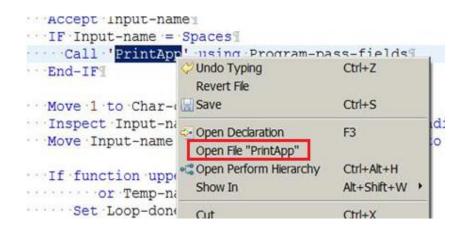
Real-time syntax check without requiring code compile or save

	CUSBATCH	.сы 🛛	
	Line 1	183 Column 31 Insert	
	-	+-*A-1-B+2+3	
(🚯)	Unable to r	resolve reference to NON-DEFINED-NAME / MOVE ' ' TO NON-DEFINED-NAME.	
(d.)	000179	MOVE ' ' TO CUST-LN-DATA.	
	000180	MOVE ' ' TO CUST-ADDR1-DATA.	
	000181	MOVE ' ' TO CUST-CITY-DATA.	
	000182	MOVE ' ' TO CUST-ST-DATA.	
	000183	MOVE ' ' TO CUST-CTRY-DATA.	
	000184	GET-CUST-INFO-EXIT.	
	000185	EXIT.	
	000186	NO-CUST-INFO.	
	000187	IF EXITNOW THEN	
	000188	STOP RUN	
	000189	ELSE	
	000190	MOVE WCUSTNO to CUSTNOO	
	000191	END-IF.	
	000192	NO-CUST-INFO-EXIT.	
	000193	EXIT.	
	000194	*	
	000195	FILL-CUST-DATA.	-

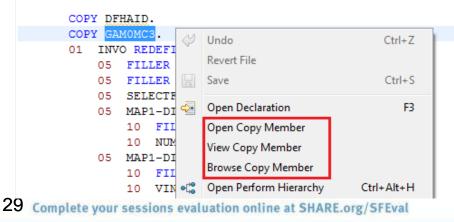


Editor Productivity Features

• Provide "Open Called Program" action

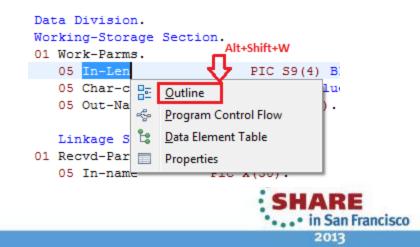


• Hyper linking support for Open/ Browse/ View copybooks/include files



. Show In > Outline action to COBOL and PL/I Editor

Proc	edure Division using Rec	vd-l	Parms.		1			
	Move spaces to Out-Nam	Ý	Undo	Ctrl+Z	L			
	Move 0 to Char-count Inspect Function Rever		Revert File Save	Ctrl+S				
	Tallying Char-count Compute In-Len = 30 -	</th <th>Open Declaration Open Perform Hierarchy</th> <th>F3 Ctrl+Alt+H</th> <th></th> <th></th> <th></th> <th></th>	Open Declaration Open Perform Hierarchy	F3 Ctrl+Alt+H				
	Move "Thanks to " to O		Show In	Alt+Shift+W ▶	맖	Outline		
	Move In-name(1:In-Len) Move " for succeeding! Display Out-name.		Cut Copy	Ctrl+X Ctrl+C	*	Data Elem		
	Call 'TESTDBG'. Goback.		Paste	Ctrl+V		Properties	;	





Editor Productivity Features

Mark "Write occurrences" capability
 to the supported EXEC statements

 Occurrences within EXEC statements known to be "writes" are highlighted with a BROWN background

 All "read" statements will continue to be highlighted with a GREY background

```
* PHRASE and NEWPHRASE are read-only data areas;
* ESMREASON and ESMRESP are write
EXEC CICS
CHANGE PHRASE(data-area) PHRASELEN(data-value)
NEWPHRASE(data-area) NEWPHRASELEN(data-value)
USERID(data-value)
ESMREASON(data-area) ESMRESP(data-area)
END-EXEC.
```

```
/* INTO is write, LENGTH is read */
EXEC DLI STATISTICS
 USING PCB(expression)
 INTO(area1)
 LENGTH(area1)
 VSAM
FORMATTED
;
```

* INTO :hv1:ind1, :hv2:ind2 are WRITE, :hv3 is READ EXEC SQL FETCH ABSOLUTE :hv3 CURSOR1 INTO :hv1:ind1, :hv2:ind2 END-EXEC.

* all READ EXEC SQL FREE LOCATOR :hv1, :HV2, :HV3 END-EXEC.



Search for Occurrences Action



2013

> Once a variable is selected the user triggers the "Find Occurrences" action using the Menu under search or keyboard shortcut "Ctrl+Shift+U"

> The occurrences are shown in the "Search results" page

Search Project Run Window Help		
Search	Ctrl+H	
- 😡 File		
	ome to z/OS Projects 🛛 🖅 WRITEOCD.pli 🔀	
- 🌮 Remote		
Text	<pre>01 expression CHAR(1),</pre>	
	01 expression1 CHAR(1)	
Occurrences in Compilation Unit Ctr	I-Shift+U 01 name CHAR(1),	
	01 areal CHAR(1),	
	01 chkpid CHAR(1),	=
	01 patarea CHAR(1),	
	01 tretarea CHAR(1),	
	01 patno1 CHAR(1),	
	01 illarea CHAR(1);	
	areal = patarea;	
	/* INTO and KEYFEEDBACK are write */	
	EXEC DLI	
	GN SEGMENT (segname)	
	INTO (areal)	
	KEYFEEDBACK(areal)	
	FEEDBACKLEN (areal)	
	/* INTO is write */	
	/* INIO IS WRITE */	-
	🕢 Remote Error List 🔁 z/OS File System Mapping 🖳 Property Group Manager 🔂 Snippets 🚚 Remote System Details 🕸 I	Debug 🕸 Remote z/OS Search 🔗 Search
	'area1' - 22 matches in compilation unit of 'WRITEOCD.pli'	
	WRITEOCD.pli (22 matches)	
	24 8: 01 areal CHAR(1),	
📃 🖓 🔍 🖈 🕲 🕅 🖓 🖓	4 15: area1 = patarea;	
RE OPTIONS (MAIN) ;	/ 20: INTO(areal)	
	21: KEYFEEDBACK(areal)	
	🕰 22: FEEDBACKLEN(areal)	
	40: AREA1 (area1) LENGTH1 (expression1)	
	6 41: AREA2(area1) LENGTH2(expression1)	
	42: AREA3(area1) LENGTH3(expression1)	
	6 43: AREA4(area1) LENGTH4(expression1)	
	6 44: AREA5(area1) LENGTH5(expression1)	
	6 45: AREA6(area1) LENGTH6(expression1)	
	65 46: AREA7(area1) LENGTH7(expression1)	
	46: AREA7(area1) LENGTH7(expression1) 4: 52: AREA1(area1) LENGTH1(expression1)	
	4 52: AREA1 (area1) LENGTH1 (expression1) 4 53: AREA2 (area1) LENGTH12 (expression1) 54: AREA3 (area1) LENGTH32 (expression1)	
te vou sessions evaluation u	52: AREA1 (area1) LENGTH1 (expression1) 53: AREA2 (area1) LENGTH2 (expression1)	•••• in San

Copy book and Include file resolution



- Hover over a COPY book name or a INCLUDE file to see the contents
 - Pressing F2 when hovering will "pin" the hover as shown
 - The window can then be dragged to expand, the Pencil icon shown below can be used to edit the copy book

000630				00004440	
		CCOUNT.		00004450	
201710	COPY	000640****	ACCOUNT CURRENT ENTRIES		00006200 🔥
	DT D DT	000650****	SALES-AVAIL-ADJ FIELDS		00006210
001720 01	PLATE	000660****	INTEREST FIELDS		00006220
001730	BILL-	000670			00006300
001740		000680 01 PL.	ATFRM-ACCOUNT-CURRENT-REC	REDEFINES	00006400
001750	05 F	000690 BI	LL-LADING-REC.		00006500
01760	05 F	000700			00006600
01770	05 F	000710 05	RDZ987-TRAN-CODE	PIC 9(03).	00006700 🔜
001780	05 F	000720 05	RDZ987-PRICE-NUMBER	PIC 9(03).	00006800
001790	05 F	000730 05	FILLER	PIC X(07).	00006900
001800	05 F	000740 05	RDZ987-SUPPLR-NUMBER	PIC X(05).	00007000
001810	05 F	000750 05	RDZ987-ACCT-NUMBER	PIC 9(15) COMP-3.	00007100
001820	05 F	000760 05	RDZ987-ENTRY-NUMBER	PIC 9(03).	00007200
001830	05 F	000770 05	FILLER	REDEFINES	00007300
001840	05	000780	RDZ987-ENTRY-NUMBER.		00007400
01850	F	000790	10 DD7087_RANK_NHMRFD	PTC 9/031	00007500
001860	L				>
001870	1 <	두 🔿 🖢 🐺 🥒 🗉			.::
01880	1		/ · · ·	000004050	
01890		\smile		00004650	



33 6

JCL Template Support

> Templates are provided for standard JCL statements, and users can create their own Templates

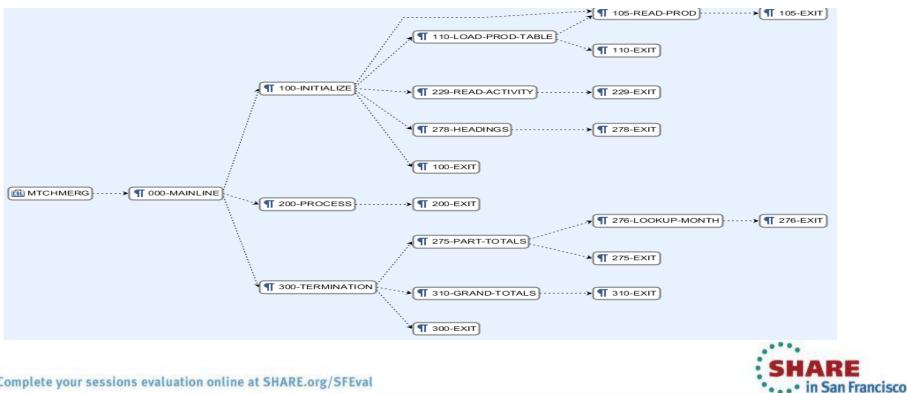
> When editing .jcl file using "Ctrl+Space" in the editor will trigger a pop list allowing the user to select the template to insert into the editor contents

e filter text	Templates		\diamond • \diamond • •			
LPEX Editor	Create, edit or remove templates:					
Appearance		New				
Block	Name	Context	<u><u>N</u>evv</u>			
Compare	Comment Statement	JCL	Edit			
Controls	Delimiter Statement	JCL				
- Find Text	EXEC Procedure Statement	JCL	Remove			
Parsers	EXEC Program Statement	JCL				
- Print	JCLLIB Statement	JCL	Restore Removed			
Save	JOB Statement	JCL				
System z LPEX Edi	JOBCAT Statement	JCL	Revert to Default			
Autosave ≡ ⊕ C/C++ Parser	JOBLIB Statement	JCL				
	Null Statement	JCL	Import			
COBOL Parser	STEPCAT Statement	JCL				
Controls	STEPLIB Statement	JCL	Export			
- Find Text	<	2				
HLAsm Parser						
JCL Parser	Preview:					
Templates			~			
- Line Breaks	<pre>// JCLLIB ORDER=(\${cursor})</pre>					
⊕ PL/I Parser						
Save						
Dave						
Sequence Num						
Sequence Num			2			
Tabs			×.			
· · · · · · · · · · · · · · · · · · ·			2			
Tabs		Restore De	faults Apply			
Tabs User Actions		Restore De	faults Apply			
User Actions						
Tabs User Actions		Restore De	faults <u>Apply</u> Cancel			
User Actions			Cancel			
User Actions						



Enhanced Application Quality & Structure Analysis

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





2013

Enhanced Structure Analysis – Data Element Table



🐮 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 W	ARDRPT.cbl			Search:				
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".



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

► Computer ► C_Drive (C:) ► RTC-Workspaces ► JazzCS ► com.ibm.team.website ► WebContent ► projects ► clm File Edit View Tools Help Organize • Open 🔻 Burn New folder 📗 ProgramData Name Date modified Type RTC-Eclipse 🝌 agility_at_scale 5/23/2012 11:53 A... File folder RTC-Eclipse-Workspaces 🝌 features 5/23/2012 11:53 A... File folder **RTC-Workspaces** 5/23/2012 12:53 PM File folder 🝌 images 📙 Evans Changes 🝌 release-plan 5/23/2012 11:53 A... File folder Foundation-Jan-8 versions File folder 5/23/2012 11:53 A... JazzCS compact.jsp 5/23/2012 11:51 A... JSP File .jazz5 5/23/2012 12:47 PM JSP File 👗 com.ibm.team.website New Snapshot 🐁 .settings 🔒 build Deliver docs Accept src . 🗼 WebContent 🎦 Load... l. com.ibm.team.website.mirror Reload 같 🗆 overview.jsp Date modified: 5, М JSP File Size: 1: 🔚 Unload Change Flow Target... 4× 4× F F Λ 4 incoming change sets Replace With Rupa's JazzCS Workspace 📫 🧔 JazzCS Replace in 'JazzCS-Production'... Incoming A Michel Morin 66238: Ur M (Yesterday) Expand Children 🙏 Reuben Varzea 68141: ay 24, 2012 2:25 AM (Yesterday)

Reuben Varzea 66578: Article: Licensing in CLM 2012 May 23, 2012 10:29 PM (2 days ago





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

erges	Comn	nent		Creator	Date Created
	🔬 Fix	progress monitor saving and deleting	 Dmitry Karasik 	Jul 7, 2010 3:18 PM	
	118	8086: make deliver work without a source work	John Camelon	Jun 29, 2010 10:17 AM	
h l	🔬 Me	erges	🌯 John Camelon	Jun 22, 2010 2:52 PM	
A A A A A A A A A A A A A A A A A A A A	118	8086: make deliver work without a source work	John Camelon	Jun 21, 2010 5:13 PM	
+ 1	108	8873: deprecate atomicStreamUpdate, provide	🌯 John Camelon	Jun 21, 2010 10:23 AM	
₩	108	8873: deprecate atomicStreamUpdate, provide	createChangeSetForStream() & postDeliver() - Merges	🌯 John Camelon	Jun 18, 2010 4:39 PM
+h	108	8873: deprecate atomicStreamUpdate, provide	🌯 John Camelon	Jun 18, 2010 3:54 PM	
	119	9130: Error fetching changeset links - fix	⁸ John Camelon	Jun 28, 2010 2:39 PM	
NLI	A 447	<u> </u>	ALL PARTY OF ALL ALL ALL ALL ALL ALL ALL ALL ALL AL	S MELLINEE	1 00 0010 11 10 444
Check-in H	History	Туре	Date		
	N	Final - Modified	Jun 18, 2010 4:37 PM		
	1	🛼 Proposed	Jun 18, 2010 4:37 PM		
	÷	Modified	Jun 18, 2010 4:37 PM		
	i	Initial	Jun 18, 2010 4:37 PM		

			SHARE Technology - Connections - Results
Planning	Source Dev	Governance/Unit test	Build
 Define the tasks Create a plan Create a work item Assign the work item to a developer 	 Load the project/source artifacts from SCM Navigate, Analyze, Edit, Syntax check source code 	 Compile Quality assurance Debug Code Coverage Code review Unit Testing 	 Check-in/Deliver the source code Build
CLM	RDz RTC	RDz RD&T RTC	RTC RDz



Development Life Cycle

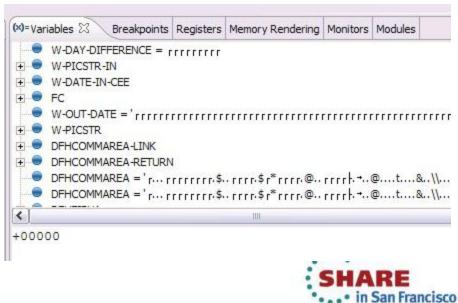


Debug Multiple Runtimes – using IBM Debug too

- Use the cross-platform debugger to debug end-to-end systems as they execute in the runtime
 - IMS
 - CICS
 - DB2
 - Batch
 - WAS
 - 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!



2	DEMOMVS.hc	e 🥹 Web Brow	wser	SYS030.EPS.SYSE	EBUG(MADL02)	
	Line 88	Column	1	Insert	Bro	owse
	+	-12-	+	<mark>3</mark> +	4+5	+ <mark>6</mark> +7
	86	A00	0-MAI	NLINE.		
	87		MOVE	DFHCOMMAREA T	O DFHCOMMAREA	-LINK
×	88		PERF	ORM A100-OBTAI	N-CURRENT-DATI	E
	89		PERF	ORM A200-CALCU	LATE-DAY-DIFF	ERENCE
	90		PERF	ORM A300-FORMA	T-DATE	
	91		MOVE	DFHCOMMAREA-R	ETURN TO DFHC	OMMAREA
	92		GOBA	CK		
	93		×			
	94	*				
	95	A10	0-OBT	AIN-CURRENT-DA	TE.	
	96		MOVE	FUNCTION CURR	ENT-DATE(1:8)	TO W-CURRENT-DATE
	97		COMP	UTE W-CURRENT-	DATE-TNT = .	



Enhanced Application Quality – Code Coverage

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

Property-Group-1	e Coverage Report (Oct 18, 2011 12:19	:59 PM) 🔀 🗖 V	ENKATU.COBOL.SYSDEBU	IG(SAM1).cob	Property-Group-1	U% Code Coverage Report (Oct 18, 2011 12:19:59 PM)	VENKATU.COBOL.SYSDEBUG(SAM1).co
Code Coverage Repor	t				375	'A-1-B+2+3++4+ PERFORM 210-PROCESS-A WHEN 'DELETE'	DD-IKAN
Code Coverage Summary					376	PERFORM 220-PROCESS-D WHEN OTHER	ELETE-TRAN
Code coverage report, generate	d Oct 18, 2011 12:19:59 PM			E 1	▼ 378 379	IF TRAN-COMMENT NOT = MOVE 'INVALID TRAN	CODE: ' TO ERR-MSG-DATA1
Element 💌		Coverage	Covered Lines	Total Lines	380	MOVE TRAN-CODE TO E PERFORM 299-REPORT-	
🖃 📂 SAM1		75%	117	156	382	END-IF	
SAM1		75%			383	END-EVALUATE	
			117	156	384	END-IF	
🖃 🛍 VENKATU.COBOL	SYSDEBUG(SAM1).cob	75%	117	156	385	MOVE TRAN-KEY TO WS-PREV-TRAN-	KEY
🛸 SAM1()		75%	117	156	386	IF WS-TRAN-OK = 'Y'	
					387	PERFORM 830-REPORT-TRAN-PR	OCESSED
					388	END-IF	
					389	END-IF .	
					390		
					391 392 ⊖	AND REAGENCE HERAN	
					392	200-PROCESS-UPDATE-TRAN.	
					394	ADD +1 TO NUM-UPDATE-REQUESTS. PERFORM 720-POSITION-CUST-FILE.	
					395	IF CUST-KEY NOT = TRAN-KEY OR WS-C	UST_FILE_FOE = IVI
					396		O ERR-MSG-DATA1
Report					397	MOVE TRAN-KEY TO ERR-MSG-DATA	
Keport					398	PERFORM 299-REPORT-BAD-TRAN	-
🛜 Remote Error List 🕂 2/OS Eile 9	System [🙀 Property Group M 📔 Sr	pippets 🗐 🖷 Pemote S	ivetem D 🕒 Demote Der	concile 🔞 Coverage L:	unch 399	ELSE	
	System 🖓 Hoperty Gloop 🖓 🔚 Si	ippees and kemote s	Notified to		400 *		
					401 *	Subroutine SAM2 will apply an	update to a customer record
					402 *		
	inch Date 🔻				403	CALL 'SAM2' USING CUST-REC, TR	ANSACTION-RECORD,
	18, 2011 12:19:59 PM				404		-OK, WS-TRAN-MSG
	17, 2011 4:36:34 PM				405	IF WS-TRAN-OK NOT = 'Y'	
SAM1-2011_10_17_160130 Oct 17, 2011 4:01:30 PM		406	MOVE WS-TRAN-MSG TO ERR-MS	G-DATA1			
	14, 2011 1:20:43 PM				407	MOVE SPACES TO ERR-MS	G-DATA2
	14, 2011 1:01:34 PM				408	PERFORM 299-REPORT-BAD-TRA	N
	AM1-2011_10_14_124502 Oct 14, 2011 12:45:02 PM						
EXMINENT 10 14 100040 LOAP	14 SOTT 15.05.40 GM						

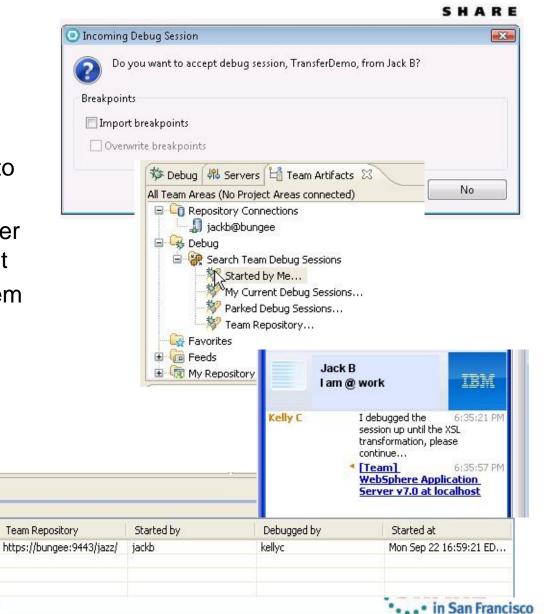


Innovative Debugging using Collaboration

- Collaborative debug with RDz and IBM Debug Tool via the Rational Team Concert Server!
 - Share breakpoints and monitors with other team members
 - Transfer debug session control to other users
 - Save debugging sessions for later retrieval in the team environment
 - Works for WAS (JEE) and System z applications

Debug Target

VM [justinko.torolab.ibm....



justinko.torolab.ibm.com

🖳 Console 🎡 Team Advisor 🖓 Team Debug 🔀

Host

Found 1 debug sessions - Started by Me...

Debug Session

TransferDemo



review	COBOL Code Review [0/43] Device a program name that matches the source file name	SHAR Technology - Convections -
 Code Review/Governance - provides predefined rules and templates for COBOL and PL/I applications Ensure adherence to corporate standards 	Performance [0/9] Avoid INITIALIZE statements. Use elementary MOVE statements or VALUE clauses. Avoid OCCURS DEPENDING ON phrases Avoid outing subscripts to access a table. Use indexes. EXEC SQL: Avoid SELECT * EXEC SQL: Use an ORDER BY clause when declaring a cursor EXEC SQL: Use an ORDER BY clause when declaring a cursor EXEC SQL: Use an ORDER BY clause when declaring a cursor EXEC SQL: Use an ORDER BY clause when declaring a cursor EXEC SQL: Use an ORDER BY clause when declaring a cursor EXEC SQL: Use an ORDER BY clause when declaring a cursor Use an EVALUATE statement rather than a nested IF statement Use binary subscripts Program Structures [0/33] Avoid ACCEPT statements Avoid ALTER statements Avoid ALTER statements Avoid CALLE statements Avoid CALLE statements Avoid CALLE statements Avoid CANCEL statements Avoid COPY SUPPRESS statements Avoid ODISPLAY statements Avoid ODISPLAY statements Avoid DISPLAY statements Avoid DISPLAY statements Avoid DISPLAY statements	
2 Add Custom Rule	Avoid EXIT PROGRAM statements	
Select Template Select a template to use for this rule An inline PERFORM statement cannot exceed the specified line number limit. Avoid caling the specified routine Avoid including the specified copy book Avoid including IF statements deeper than the specified number of levels Avoid static calls except for the specified program name Avoid using the selected compiler directives EXEC SQL: Use a WHERE clause in selected statements Follow the specified naming convention for COBOL file names Procedure division statements cannot exceed the specified COBOL statement type Use a compents to describe all paragraphs Use the specified prefix with condition names	 Avoid GO TO statements, except those that reference an EXIT paragraph Avoid IF without ELSE Avoid NEXT SENTENCE phrases Avoid PERFORM, except PERFORM section Avoid RESERVE clauses in FILE-CONTROL paragraphs Avoid STOP RUN and STOP literal statements Avoid Using level-88 entries in data descriptions Avoid using more than one EXIT statement per section Avoid using SECTION in the procedure division Avoid XML PARSE statements EXEC CICS: Check EIBRESP after NOHANDLE EXEC CICS: Use the RESP option EXEC SQL: Check the value of SQLCDDE after an EXEC SQL statement Use an EXIT paragraph in each section Use a WHEN OTHER phrase with an EVALUATE statement 	



< <u>B</u>ack

Next >

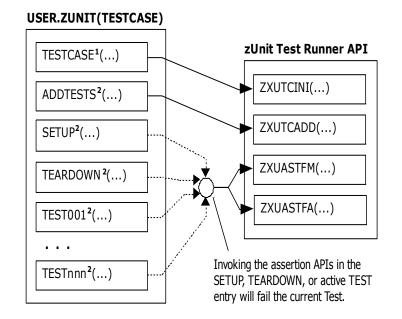
Cancel

Einish

?

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 *x*Unit.
- <u>xUnit</u> 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, the 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).





Development Life Cycle

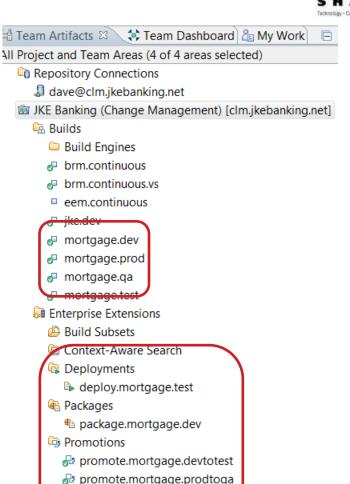


Planning	Source Dev	Governance/Unit test	Build
 Define the tasks Create a plan Create a work item Assign the work item to a developer 	 Load the project/source artifacts from SCM Navigate, Analyze, Edit, Syntax check source code 	 Compile Quality assurance Debug Code Coverage Code review Unit Testing 	 Check-in/Deliver the source code Build
CLM	RDz RTC	RDz RD&T RTC	RTC RDz



Enterprise Extensions Specific Functions

- Dependency build
 - "Smart build" of z/OS and IBM i applications, based on what has changed
- Promotion
 - Flow of source code changes and build outputs through development hierarchy
- Packaging and deployment
 - Package build outputs and deploy to another system (e.g. test environment, QA, production, etc)



promote.mortgage.gatoprod

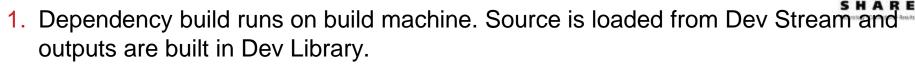
promote.mortgage.qatotest
promote.mortgage.testtodev
promote.mortgage.testtoga

🖗 Source Code Data

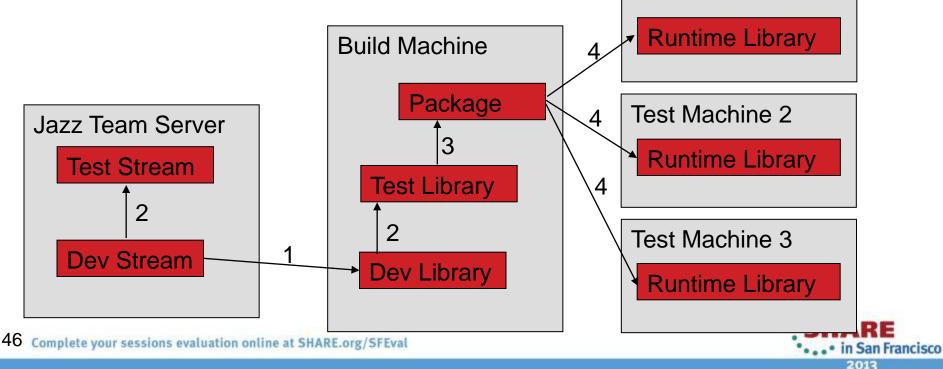


in San Francisco

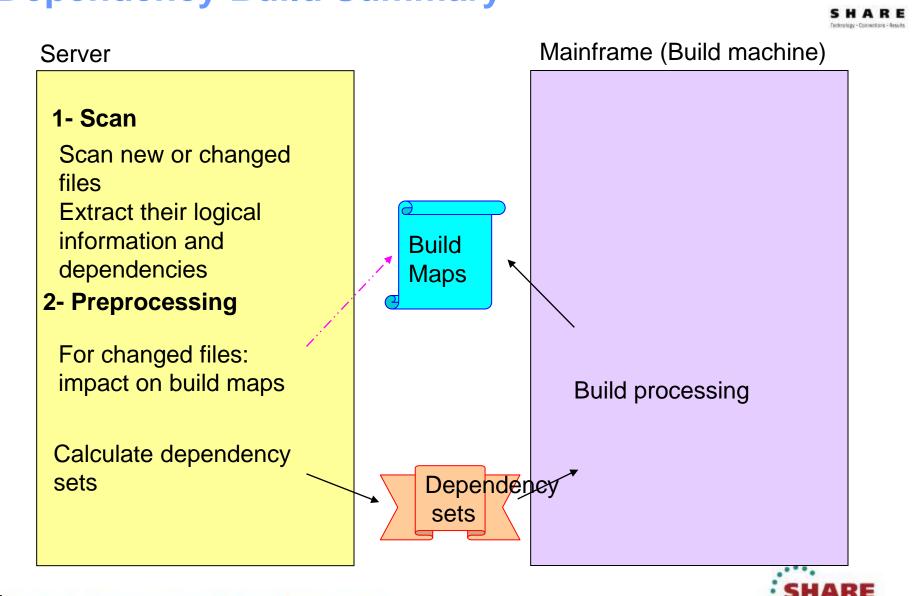
The big picture



- 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. Test Machine 1







Dependency Build Summary



San Francisco

Snapshots for every build

Logs:

48



🖈 🤞

A Build MVS Dependency Build Test 20120619-0908330825 🔻 Reported Work Items Completed Work items reported against this build to help stabilize it. Duration: 53 seconds None reported against this build Start Time: June 19, 2012 9:08:33 AM 😫 Create a new work item Completed: June 19, 2012 9:09:27 AM QQ. Associate an existing work item Status Trend: Contribution Summary General Information Changes: Show changes Requested by: ADMIN Build Definition: Downloads: 7 downloads MVS Dependency Build Test Build Engine: Setup engine 15560 1 log Build History: Snapshot: MVS Dependency Build Test 20120619-0908330825 19 builds Tags: Work items: 3 included in build 🖆 Snapshot 🔻 Associated Release Name:* MVS Dependency Build Test_20120619-0908330825 Released builds are available as ch Create a release to associate v Links Details RŸ Create a new repository workspace Created by: ADMIN - 1 Create a new stream Created on: Jun 19, 2012 9:08 AM Compare with snapshot Modified on: Jun 19, 2012 9:08 AM 😤 Compare with repository workspace or Description: Snapshot created by automated build Components Shows the components in this snapshot. Liam Test RWS (4: MVS Dependency Build Dev_20111108-0955580222) L Mortgage Component (69: MVS Dependency Build Dev KA_20120619-0853550520) __ plx test (2: MVS Dependency Build Dev_20110328-0857420358) Complete your sessions evaluation online at SHARE.org/SFEVal

• . . • in San Francisco 2013

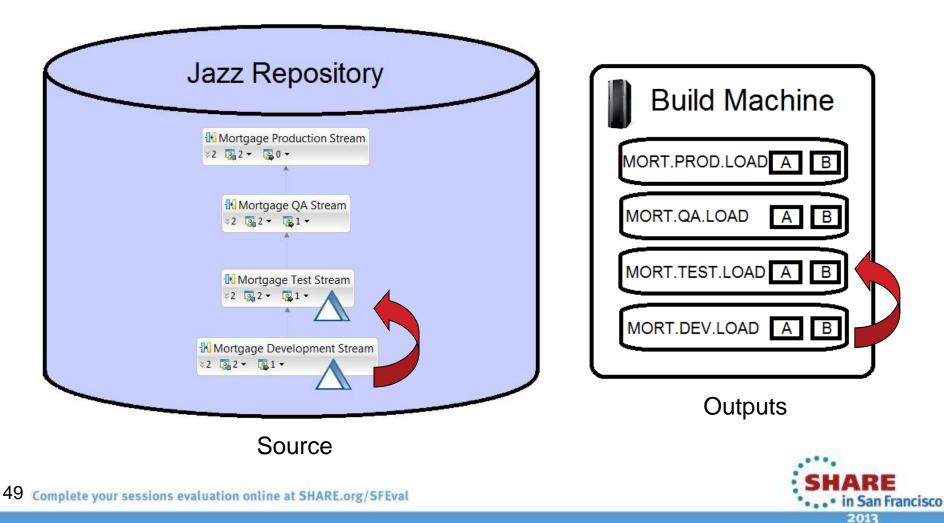
Show Repository Files

Save

Promotion



 Flow source code changes and build outputs through the development hierarchy



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 <u>www.ibm.com/rational/modernization</u>



• • • in San Francisco 2013



- Try latest System z software for free
- Sign up for free web-based training
- Join IBM Rational Cafe Communities
- Get prescriptive service solutions
- 51 Complete your sessions evaluation online at SHARE.org/SFEval

- Success stories
- Latest news on System z twitter
- Latest customer videos
- Latest skills: System z job board





