

IBM System z Technology Summit



zEnterprise – The First System Of Systems

**Unified Enterprise Application
Development**

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27th Jan 2011



Challenges Of Enterprise Software Development

I need to remove the barriers between development on different platforms

I need Application Lifecycle Management tools that support *ALL* my platforms

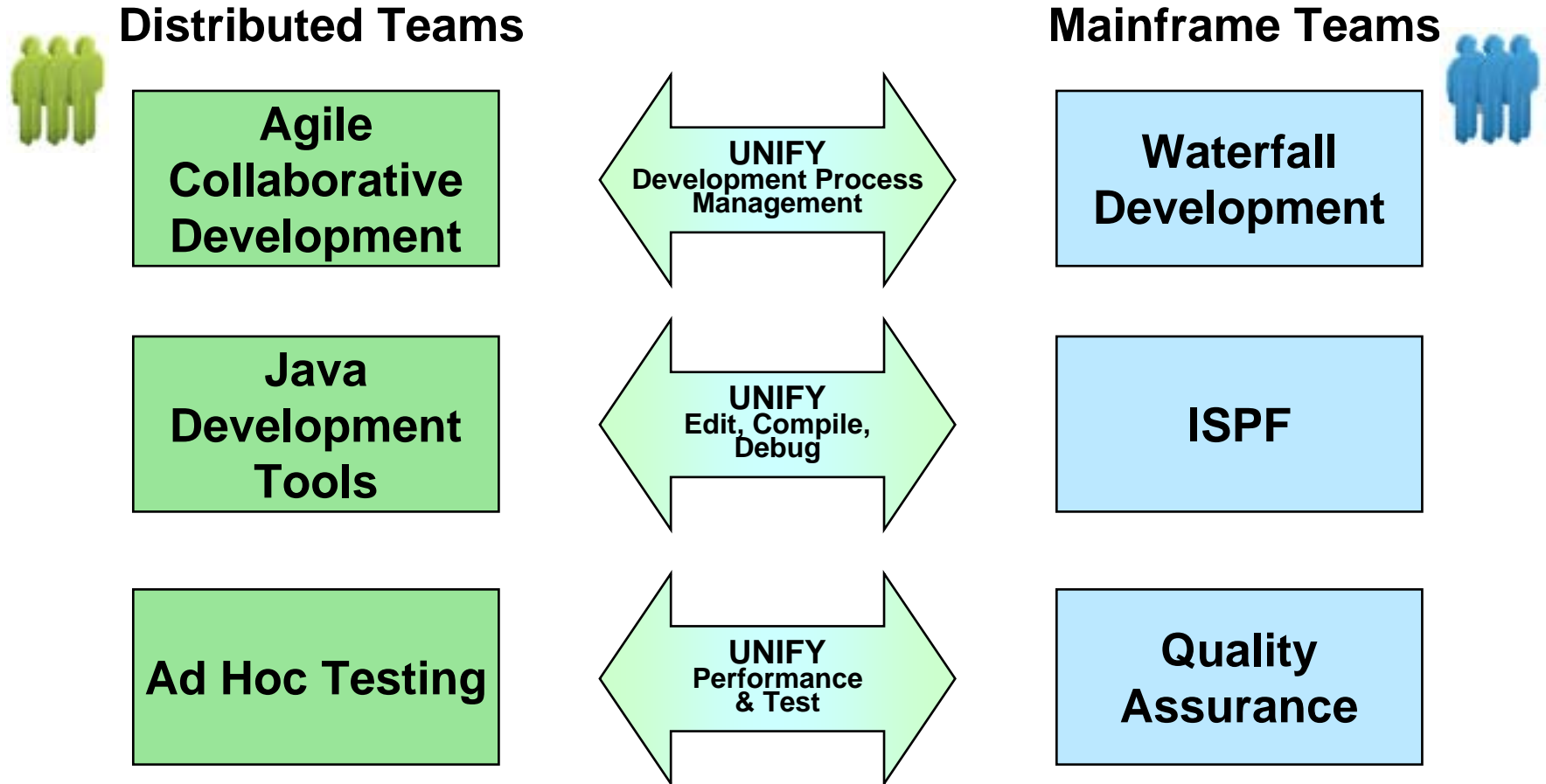
I need to keep older applications but migrate them to newer languages



I need to easily reuse, extend and test what I already have

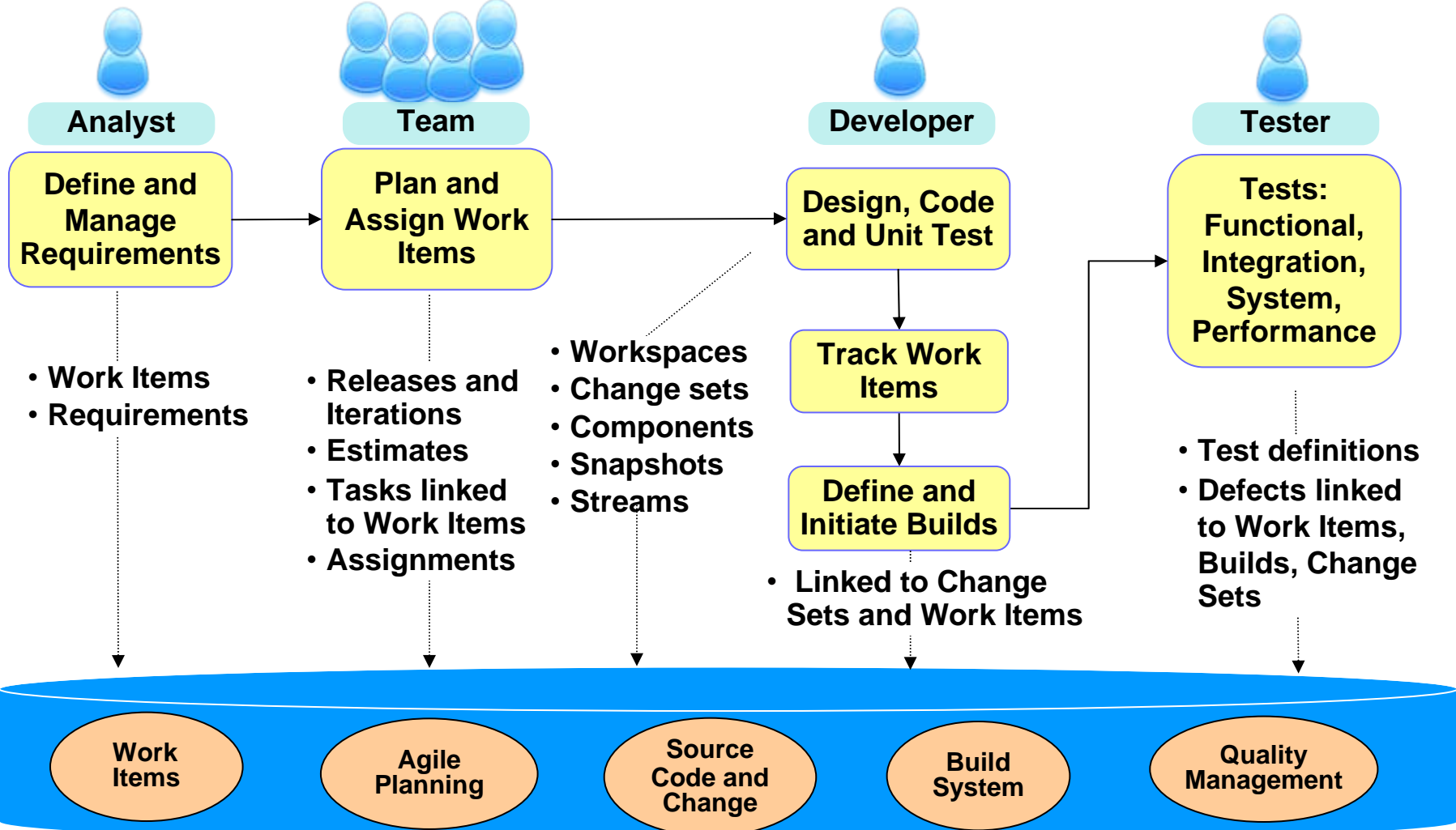
Development Manager

zEnterprise Combines Mainframe And Distributed Environments In One Platform



Common processes and shared tools that look and behave the same way for all platforms

Rational Team Concert Supports Agile Development Processes

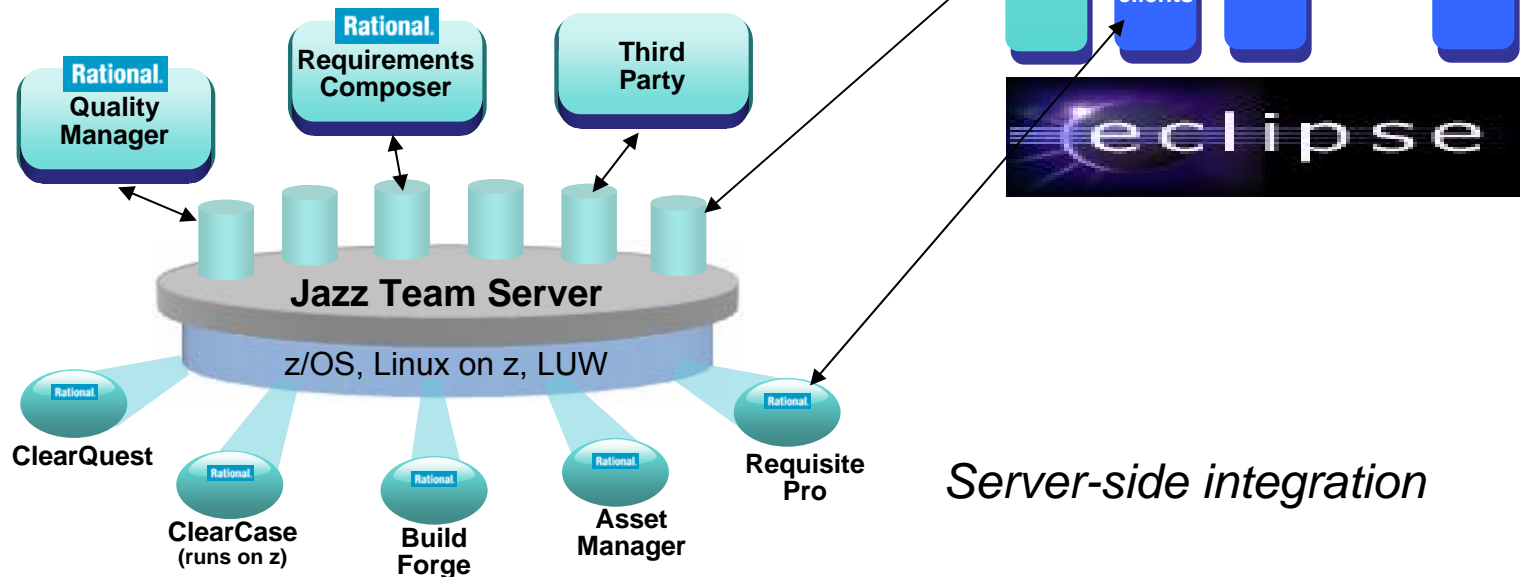


Common repository and data schemas for all environments

Agile Collaboration And Project Management Is Integrated Across All The Eclipse-based Tools

Rational Team Concert

- Based on the *Jazz Platform*
 - ▶ Next generation, open collaborative development platform
- Eclipse-based *agile* client of Jazz
- Integrates with other tools
 - ▶ At server and client



Server-side integration

Unified Development Process Management For All Your Development Teams

■ Rational Team Concert for System z

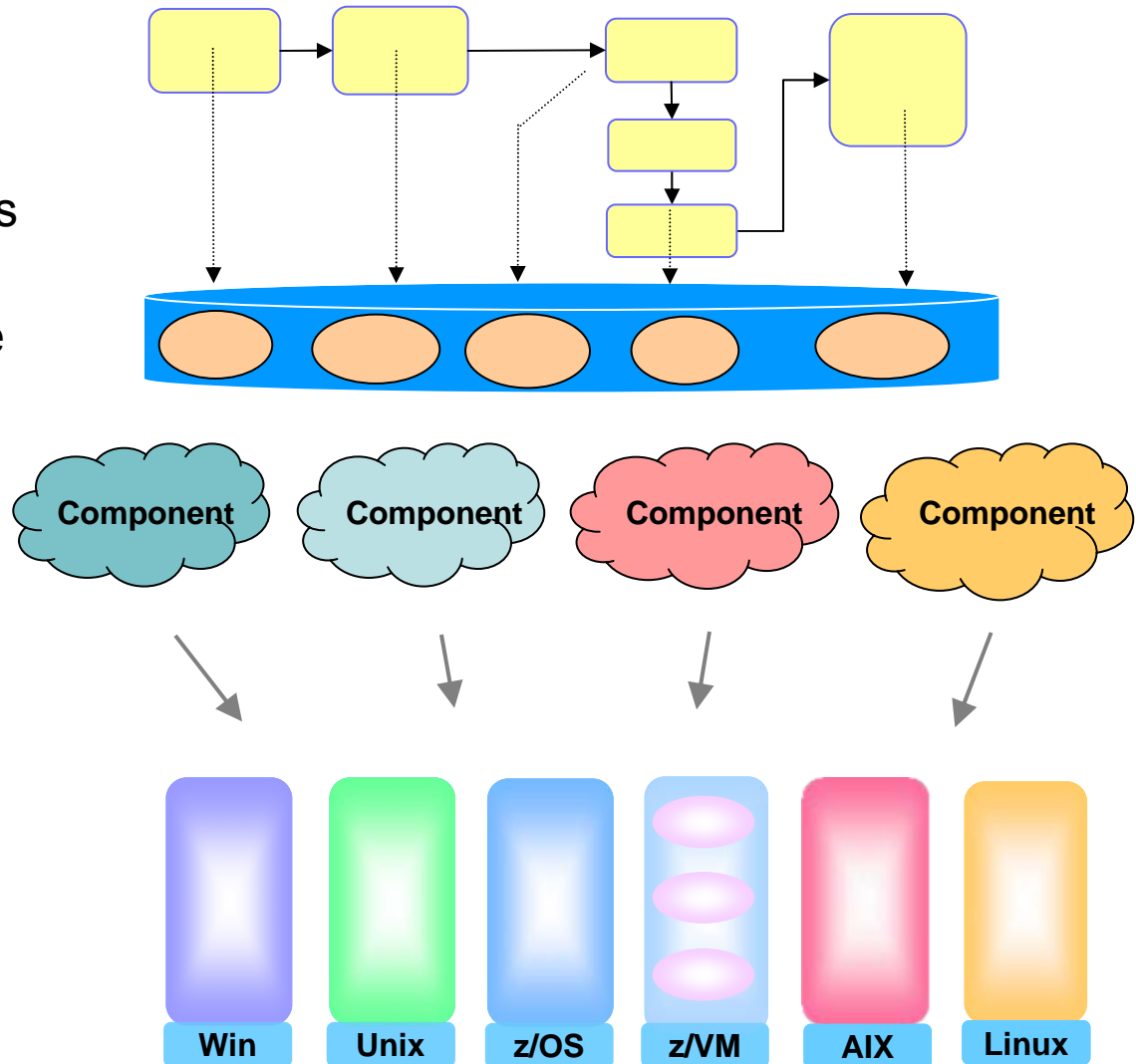
- ▶ Customizable processes
- ▶ Project tracking, awareness, governance
- ▶ Collaboration
- ▶ Repository

■ Same tool for

- ▶ AIX
- ▶ z/OS
- ▶ Linux
- ▶ Windows

■ Single User Interface

- ▶ Manage development for all environments
- ▶ Browser, Eclipse, ISPF clients



DEMO: Rational Team Concert For System z

1. In this demo the Project Manager will create a new Work Item and assign it to a Developer
2. In the next demo the Developer will find the newly assigned Work Item and complete it

The screenshot displays the Rational Team Concert interface. The main window shows a list of work items for 'Team 1's Plan'. A blue oval highlights the work item 'fix defects in two files for Natick' assigned to Haze. The interface includes a left-hand navigation pane, a top menu bar, and a bottom status bar.

ID	Status	P	S	Summary	Owned By	Created By
22	New			fix defects in two files for Natick	Haze	Jess
11	New			Discuss feature list with stakeholders	Li	Jess
10	New			Fix text on splash screen	Monk	Jess
7	New			Define permissions	Jess	ihmucp

Remove Barriers Between Mainframe And Non-Mainframe Programming

I need my mainframe programmers and distributed developers to use the same tools so they can work together



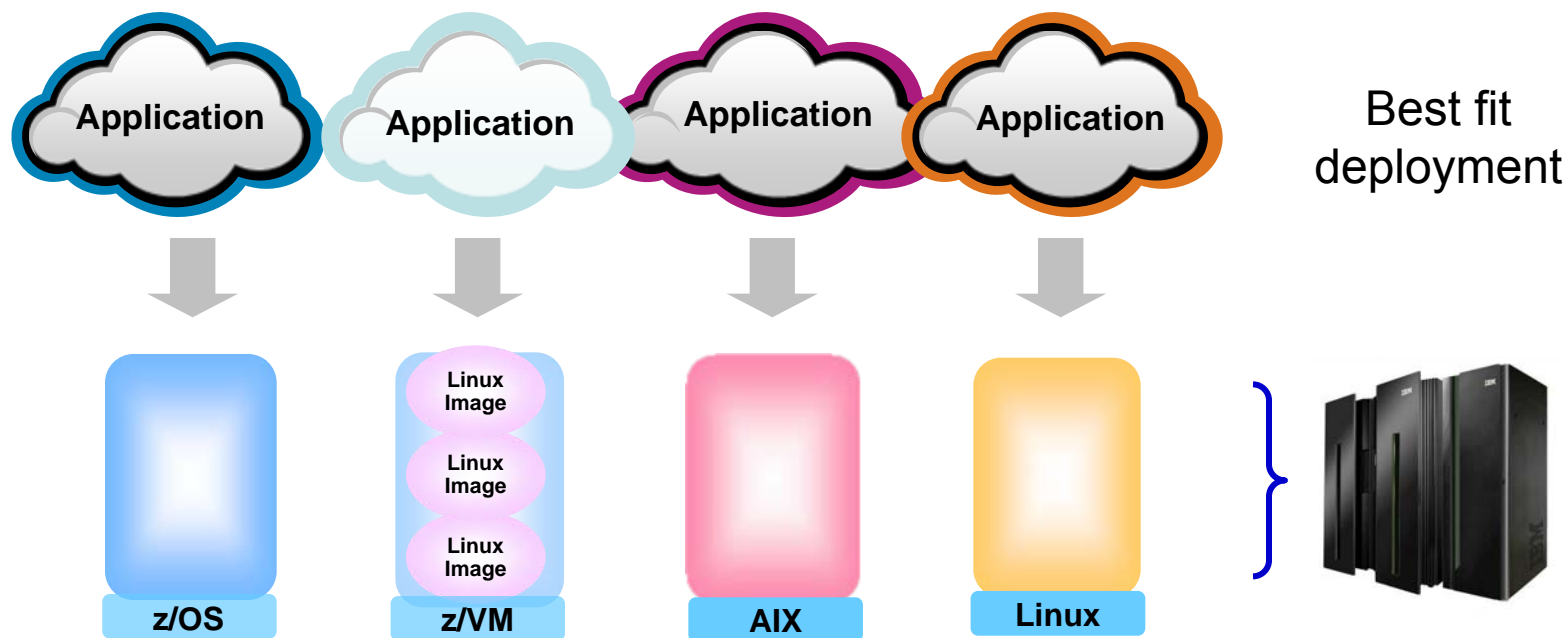
**Development
Manager**

The Rational tools enable end-to-end development and debugging helping to make all developers more efficient

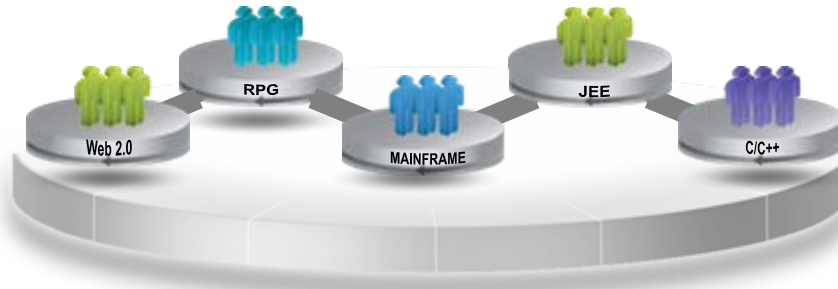


IBM

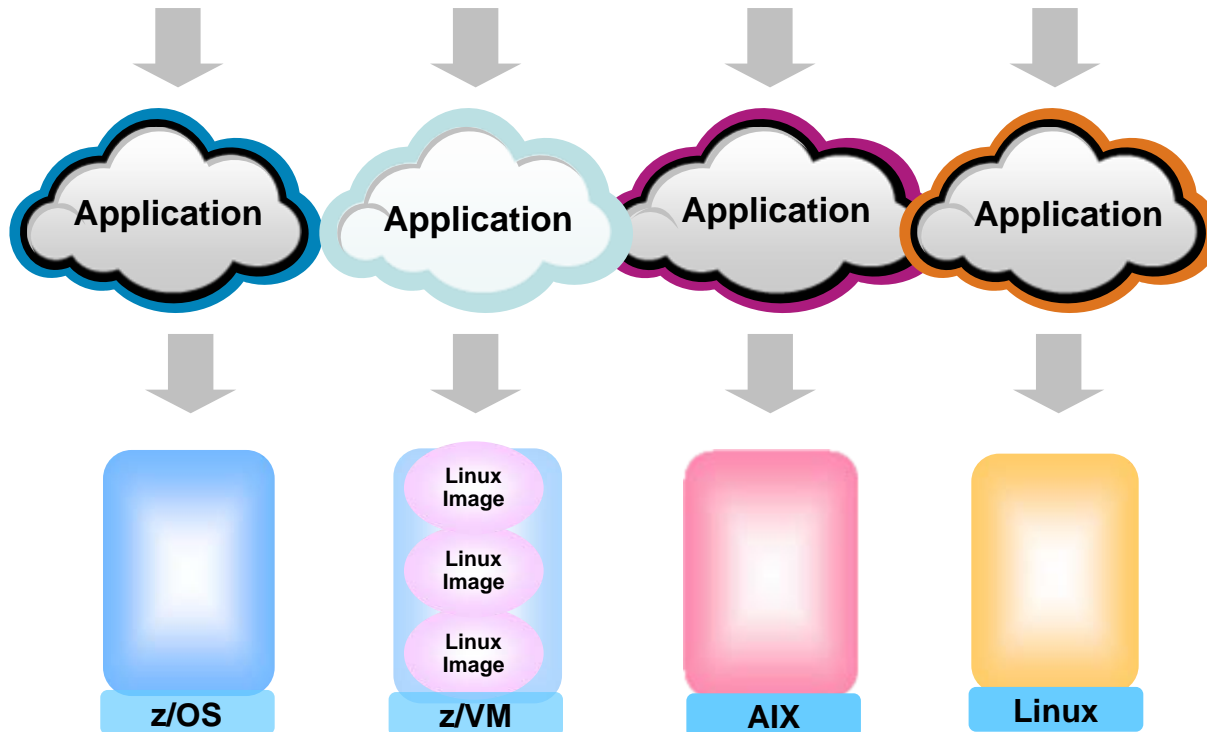
IBM zEnterprise Combines Mainframe and Distributed Environments In One Platform



Rational Delivers a Unified Development Tool Set For All These Environments



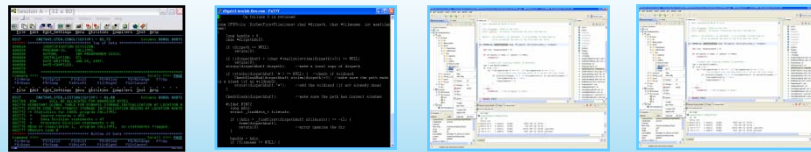
Unified processes
Unified edit, compile, debug
Unified test



Best fit
deployment

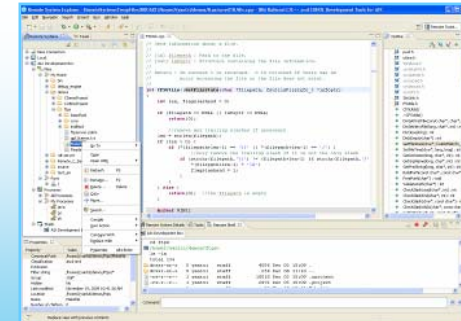
Rational Development Tools For zEnterprise

Before...

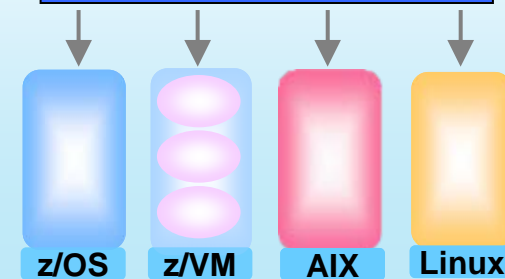


- Separate tools for each platform
- Green screen/command-line editors
- GUI editors

Rational Developer Tools



Eclipse



- Eclipse-based IDEs with modern GUI
- Plug-ins support all environments
- Up to 30% improvement in developer productivity based on studies¹

¹Based on IBM customer study, [“Making a Business Case for IBM Rational Developer for z”](#)

Rational Development Tools

The IBM Rational Developer family of products includes integrated development tools for the major development workloads on z/OS, AIX, and Linux

■ Rational Application Developer (RAD)

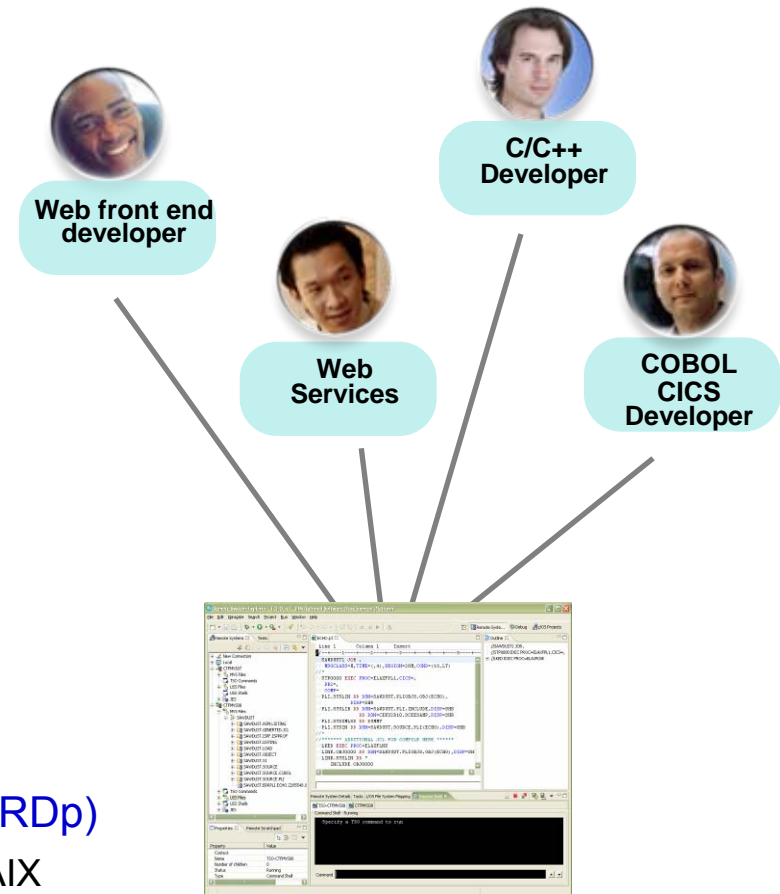
- ▶ Develop Java, JEE, and JavaScript
- ▶ Tools for Web, Web services, and Web 2.0 designers and developers
- ▶ WebSphere Application Server Test Environment

■ Rational Developer for System z (RDz)

- ▶ Develop in traditional mainframe languages, CICS, and IMS applications
- ▶ Tools for Web, Web services, and SOA designers and developers
- ▶ Remote file system access and can include C Developer Tools (CDT) for Linux
- ▶ Includes RAD or RBD

■ Rational Developer for Power Systems Software (RDp)

- ▶ C/C++, COBOL and Fortran development tools for AIX
- ▶ Includes RAD or RBD

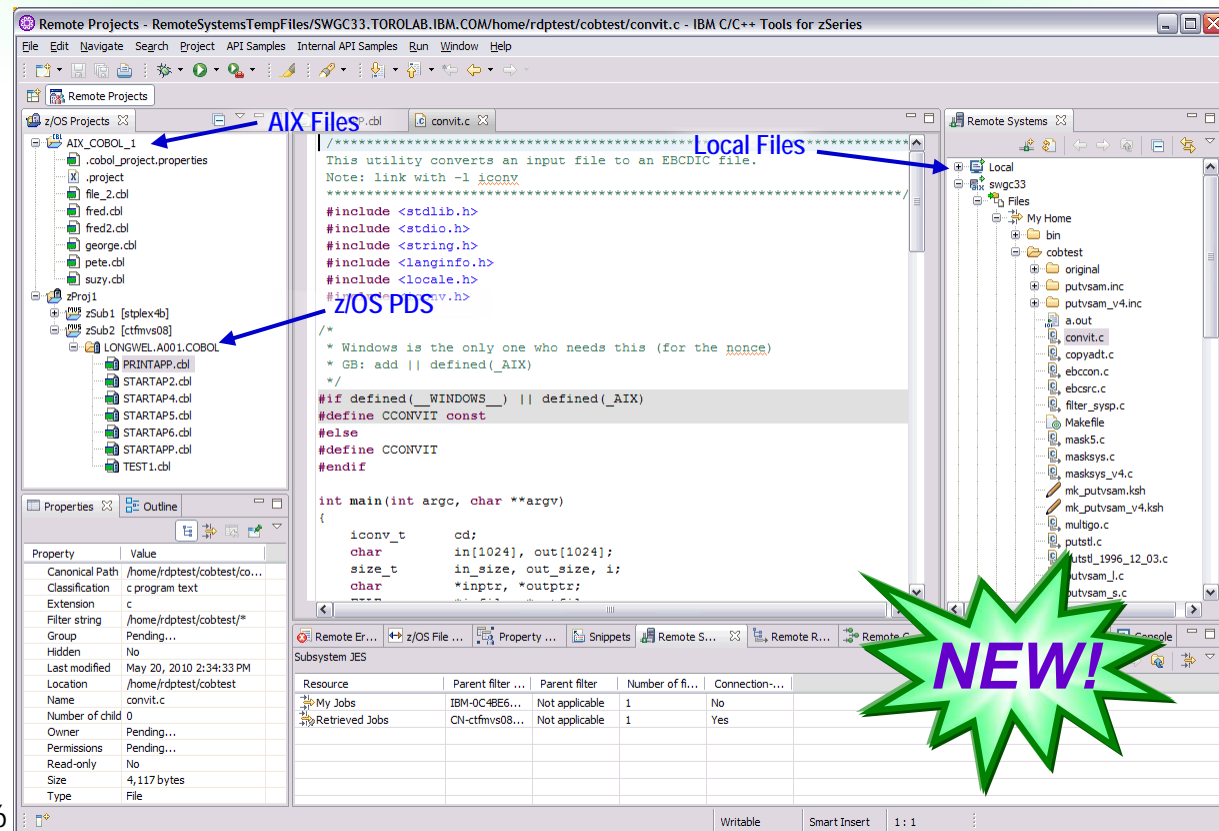


And Rational Developer For zEnterprise

RD zEnterprise



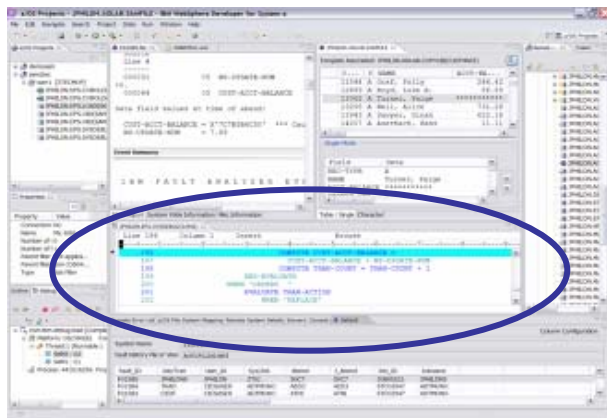
- Combined functionality
 - ▶ RDz with JEE (RAD)
 - ▶ Power Tools (RDp)
 - ▶ EGL (RBD)
- Addresses unique capabilities of the zEnterprise
 - ▶ z/OS, AIX
 - ▶ Linux on x86, Power, System z
- Perfect for the "multiplatform developer"
- End-to-end debugging across all environments



Debug zEnterprise Applications From The Workstation

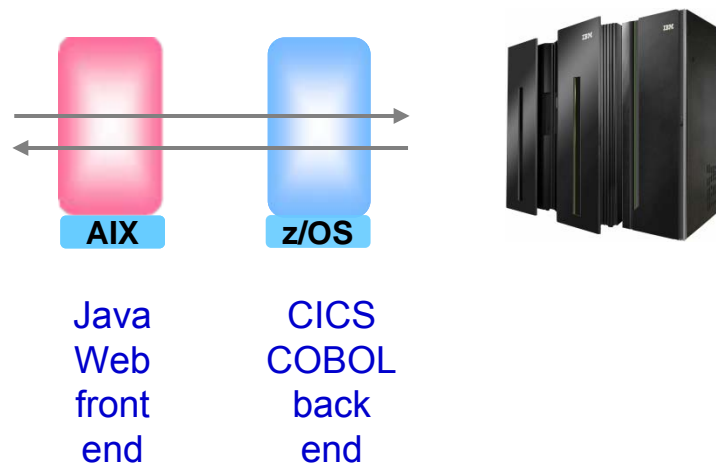
- Debuggers built on the common Eclipse framework enable
 - ▶ Debug step across languages
 - ▶ Debug step across environments
- Collaborative debugging when integrated with RTC

Work with code in the debugger here



Workstation-based
RAD, RDz, RDp, RD zEnterprise

Debug applications running here



Java
Web
front
end

CICS
COBOL
back
end

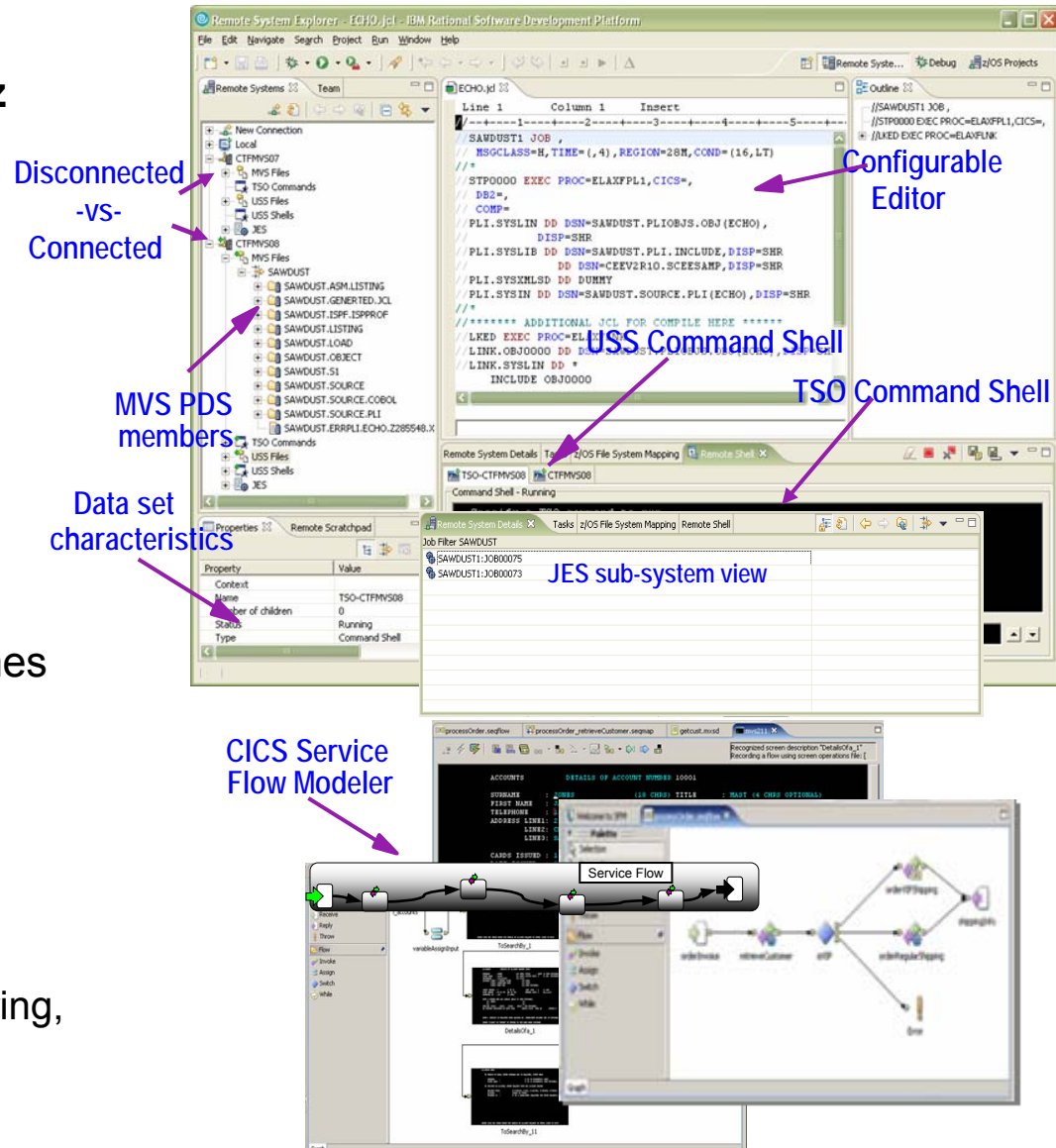
Edit, Compile And Debug With Rational Developer For System z

■ Modern development for System z

- ▶ Works like other IBM tools for distributed platforms

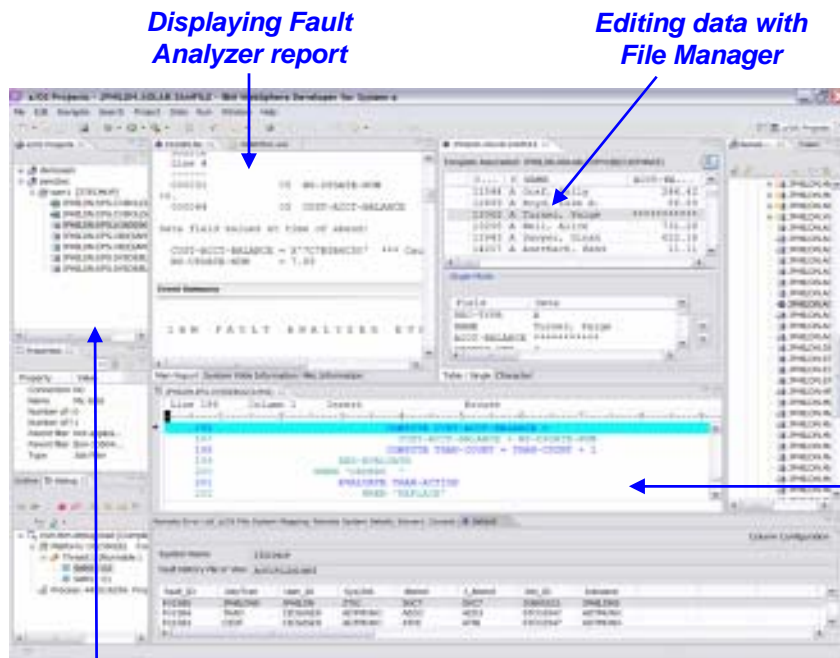
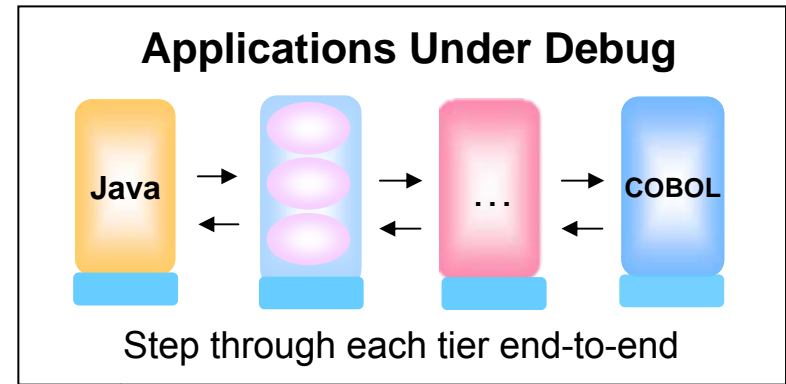
■ RDz supports development and reuse of Enterprise assets

- ▶ Support for COBOL, PL/I, C, C++, HLASM, Java, EGL and Web services
- ▶ Supports existing and new runtimes
 - CICS, IMS, Batch, USS, DB2, WAS
- ▶ Interactive access to z/OS for
 - Development, debug, job generation, submission, monitoring, command execution



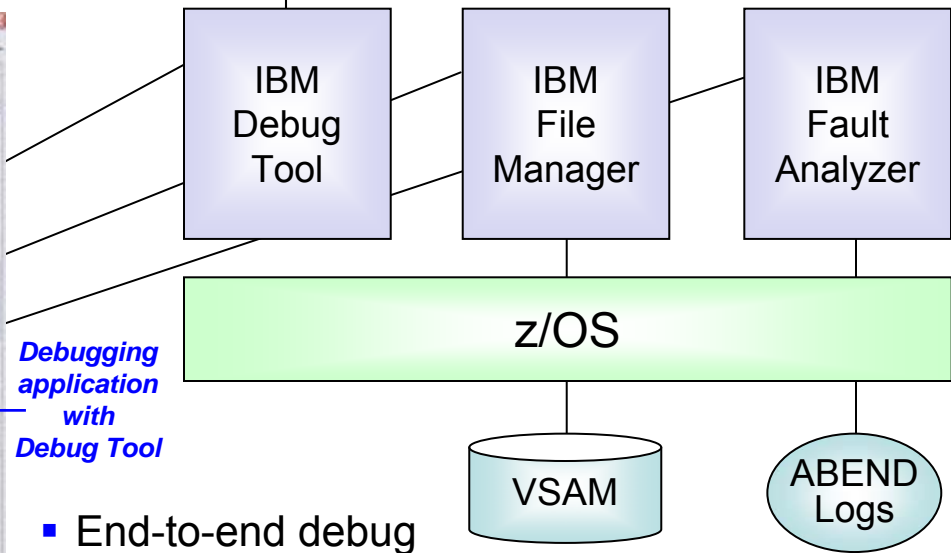
Interactive Problem Determination: RDz Integrates With Host-based Tools

- Work with the PD Tools through the RDz client
- Easy access to all three tools at the same time
- Debug and step through multi-tier applications
 - ▶ Distributed *and* mainframe
 - ▶ Same debugger as for distributed systems



Developing System z application with RDz

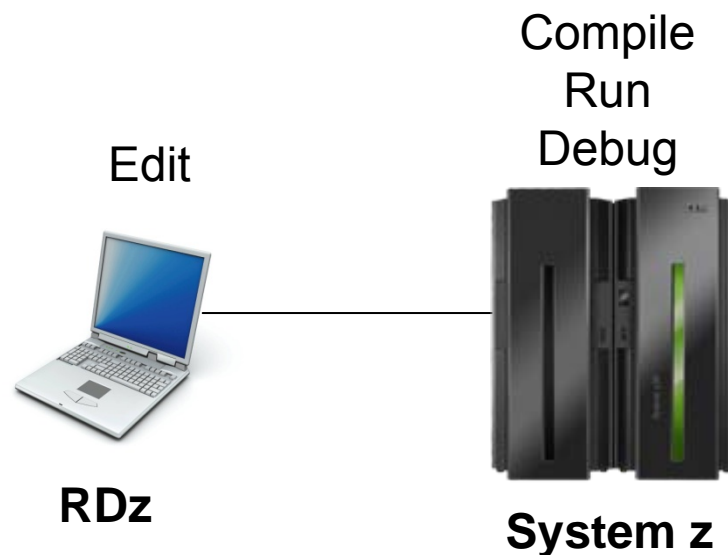
RDz Workstation



- End-to-end debug
- Edit VSAM data
- Analyze ABEND logs!

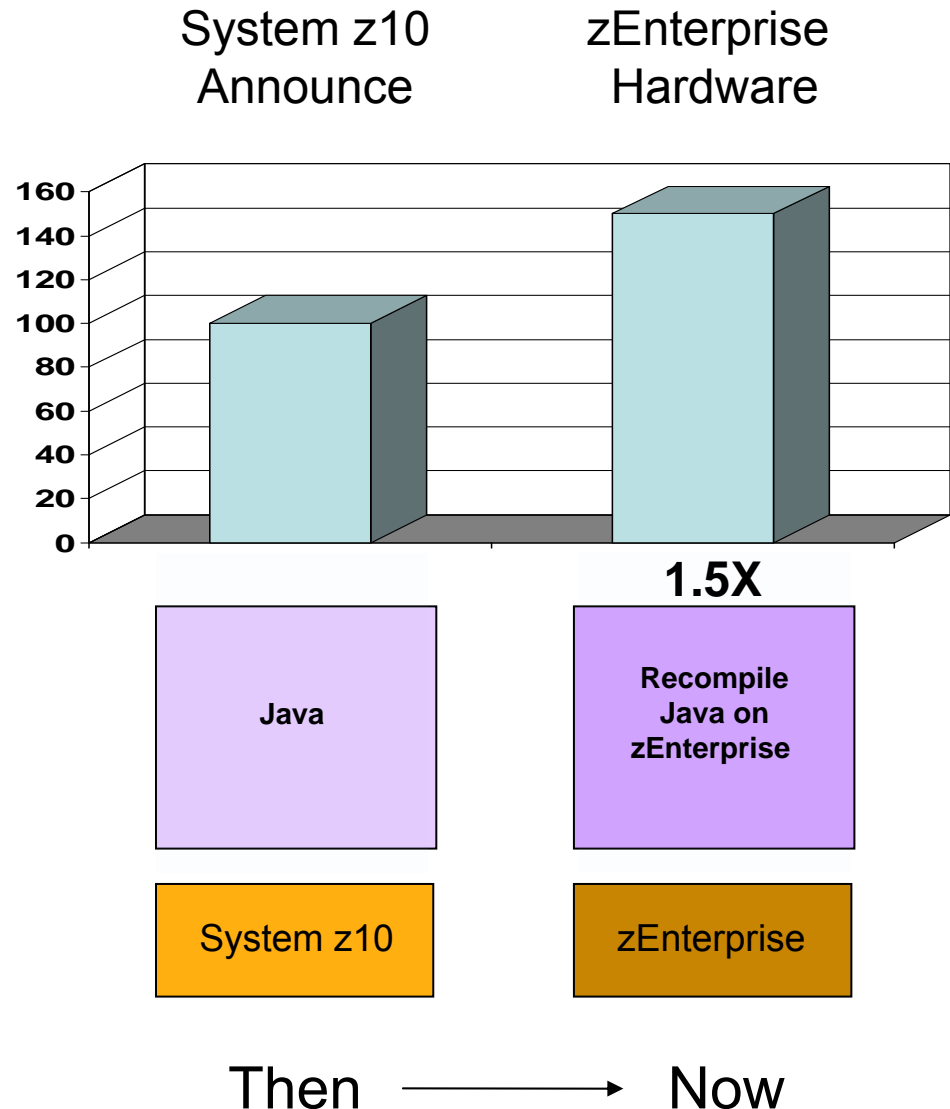
DEMO: Work With COBOL And Java Using Rational Developer For System z

- Perspectives and views
- Remote System Explorer
- Working with host datasets
- Productivity features
- Based on the assigned work item, the Developer will fix the problem code using the language-sensitive COBOL and Java editors



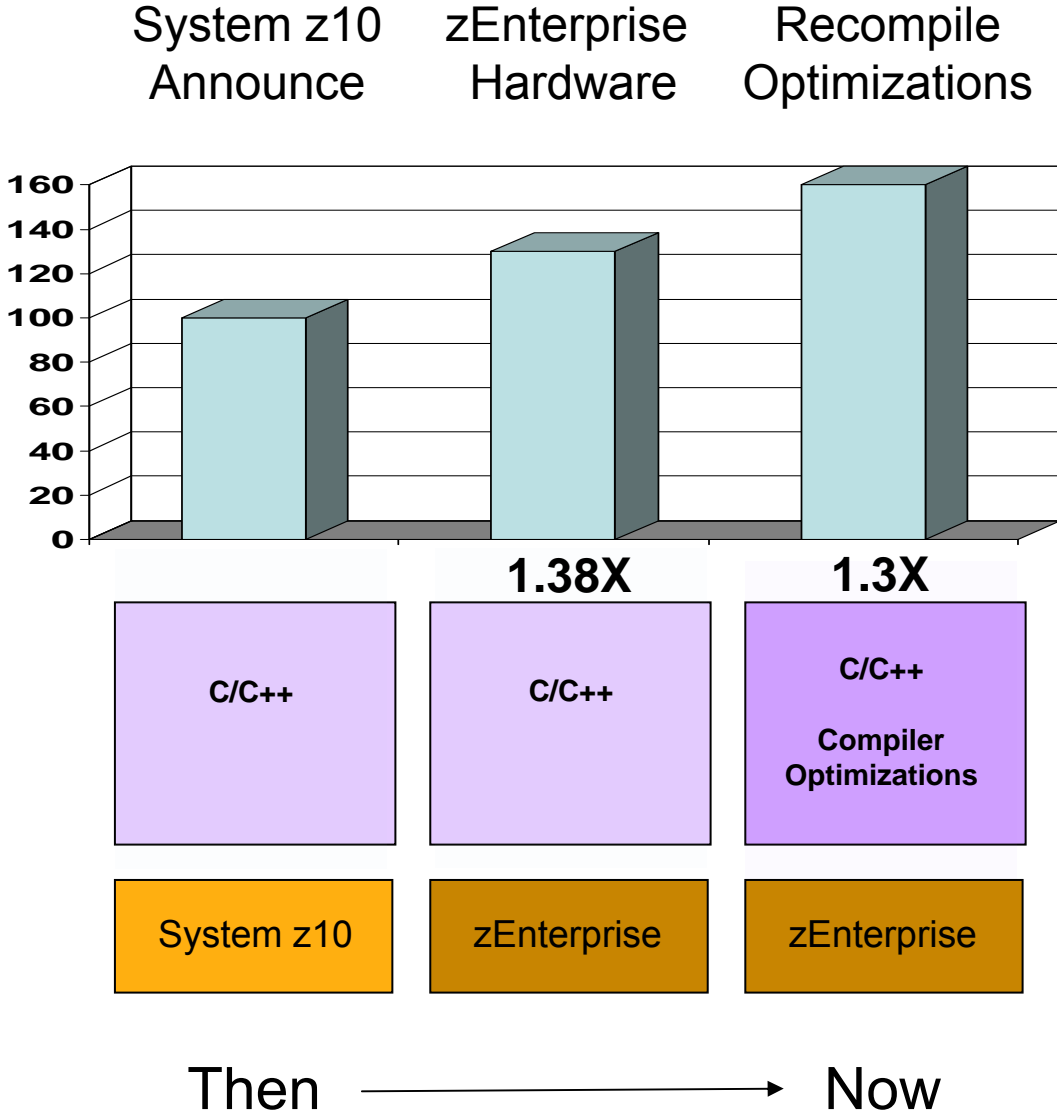
Continued Java Optimizations For z/OS – From Then To Now

- Continued investment to optimize Java software for z/OS environment
 - ▶ Uplevel to zEnterprise hardware and recompile Java produces an average of 1.5 times performance improvement
 - ▶ Per thread performance with Java6SR8
 - ▶ CPU-benchmark +63%
 - ▶ Multi-threaded +45%
 - ▶ ILOG/CONfirm +45%



Continued C/C++ Compiler Optimizations For z/OS – From Then To Now

- Continued investment to optimize key software for z/OS environment
 - ▶ Uplevel to zEnterprise hardware produces 1.38 times performance improvement
 - ▶ Recompile C/C++ using compiler optimization produces 1.3 times performance improvement
 - ▶ From then to now – almost **1.8** times performance improvement

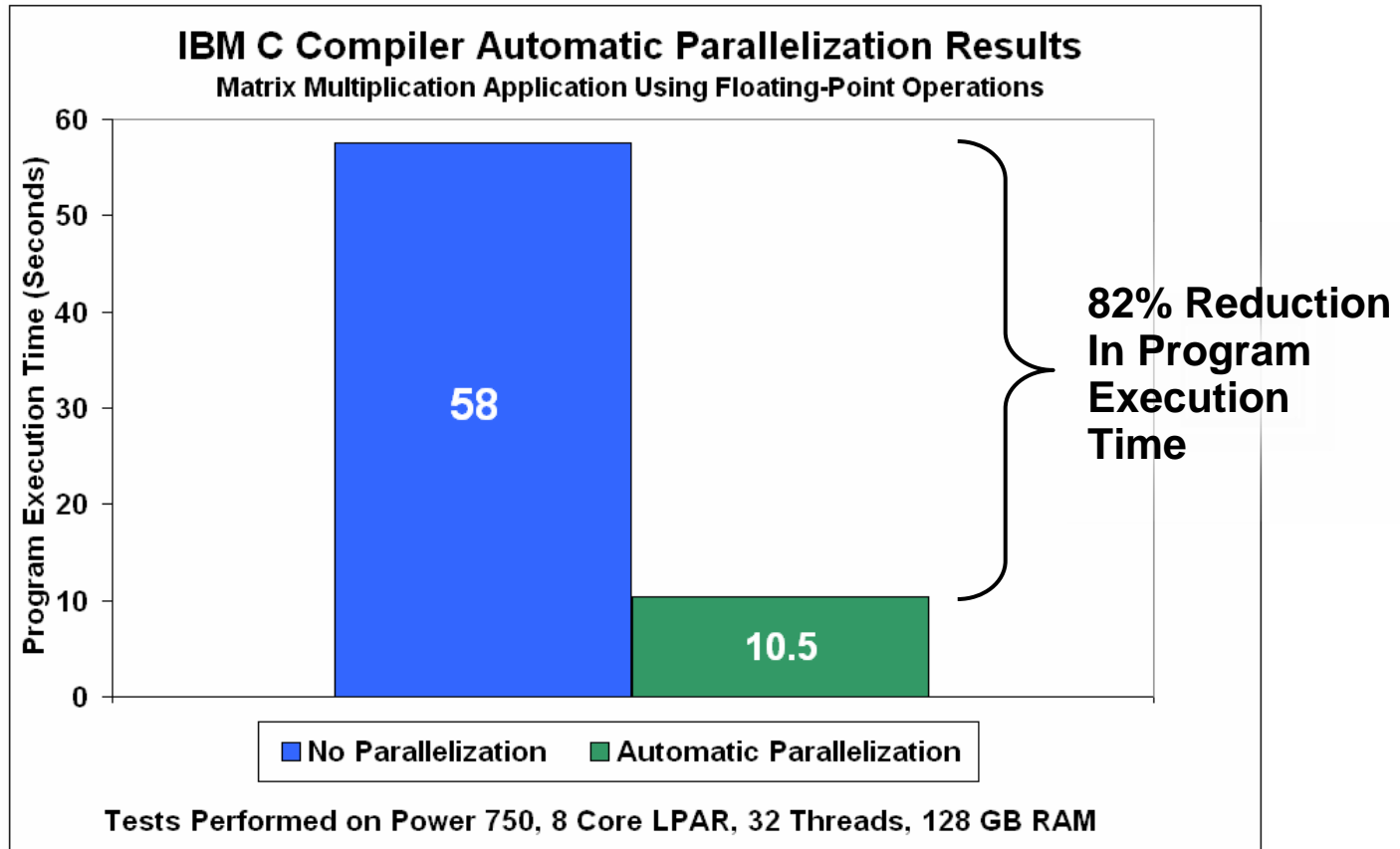


C/C++ Compiler Optimizations For Power Blade On zEnterprise

- **Optimizations** for improving performance (no code changes needed)
 - ▶ Elimination of redundant code
 - ▶ Loop optimization
 - Better loop scheduling
 - High-order loop analysis and transformations
 - ▶ Vectorizes calls to system math functions by calling the equivalent MASS vector functions
 - ▶ Elimination of compile-time memory usage limits
 - ▶ Reorganization or elimination of global data structures
- Parallelization improves performance on multi-core systems
 - ▶ **Automatic parallelization** of iterative program loops (eg. do, while, for, etc.)
 - Iterations are executed concurrently on all available processor cores
 - No code changes needed
 - ▶ **Explicit parallelization** using the OpenMP Application Program Interface Version 3.0 specification
 - Must add API calls

Automatic Parallelization Improves Performance On Multi-Core Power Systems Without Code Changes

Scientific Workload Performance



- Automatic parallelization of iterative program loops
- Iterations are executed concurrently on all available processor cores and threads
- No code changes needed

Source: Internal CPO Study

Migrate Older Code To Newer Languages With EGL And RME

Enterprise Generation Language (EGL)

- 4th generation business language
- Deploy everywhere based on best fit for purpose
- **Rational Business Developer (RBD)**

And RDz and RDp

- ▶ EGL development tools for System z and Power Systems
- ▶ For Web, Web Services, & Web 2.0 designers and developers

■ Rational Migration Extension (RME)

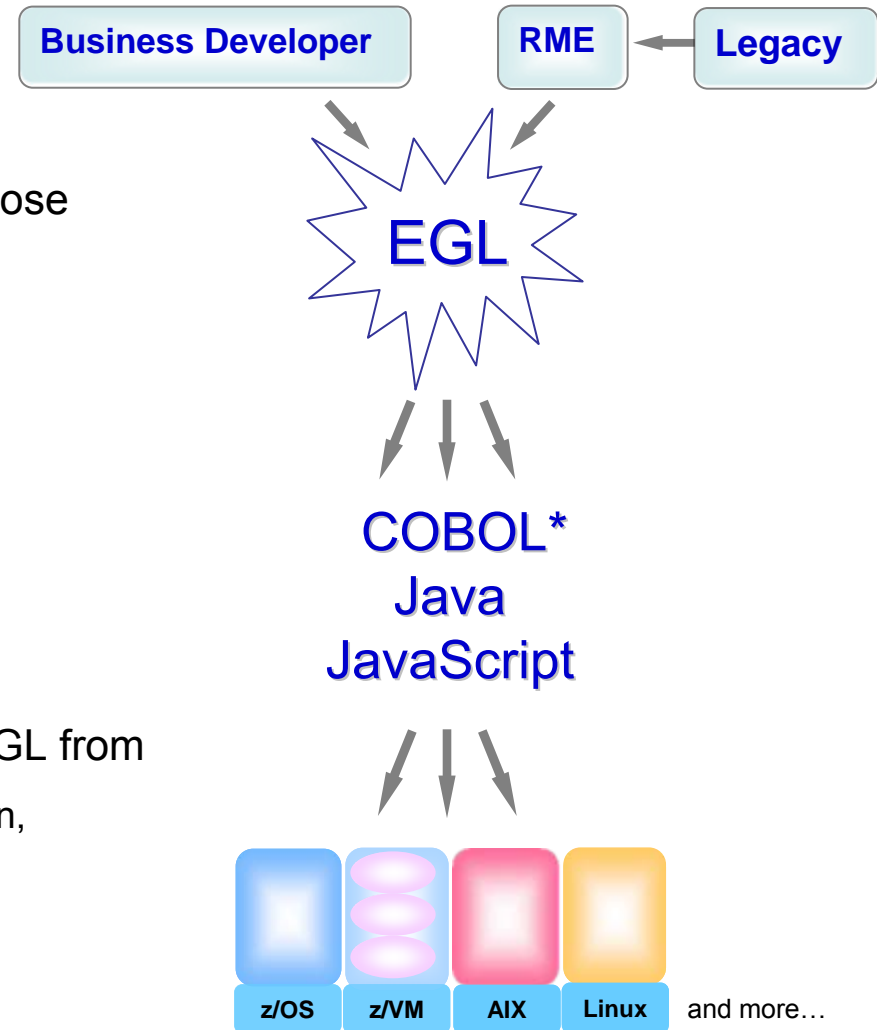
Average over 95% automated migration to EGL from

- ▶ Legacy Synon RPG and COBOL, CA Cool:Gen, Natural Adabas, and green screens

- EGL is **open source** at

<http://eclipse.org/proposals/eql>

- Generate z/OS COBOL with WebSphere **ILOG Rules for COBOL**



* COBOL on z/OS, IBM i

Use Tools To Quickly Reuse, Modernize And Test Code To Extend What You Already Have

a) I need tools that let me easily reuse, modernize and *extend* what I've got now using my existing staff

b) And I have applications I need to keep that are written in old code that I can't maintain

a) It's easy to *transform 3270 green screens* to extend them to a Web browser

b) And EGL and Rational Migration Extension enable you to migrate that old code to Java and COBOL



**Development
Manager**



IBM

Extend Existing Applications With Minimal Cost Using HATS – *Host Access Transformation Services*

What can you do with HATS?

- Quickly and easily create Web, portal, mobile or rich client applications from green-screen applications
 - ▶ Without programming
 - ▶ Low skills requirement
 - ▶ Transformation “on the fly”
 - ▶ Iterative development process
 - ▶ Highly customizable
- Reuse existing assets
 - ▶ As Web services, in an SOA
- Create work flow from multiple apps
- Integrate with other Web, portal, and rich client applications



DEMO: HATS Green Screen Transformation

Let's look at HATS and see how easy it is to take a green screen app and transform it into a Web application

The screenshot displays a web application interface for 'Service Oriented Finance'. The header features the title and an eagle logo. The left sidebar contains navigation links for 'SOF Links' (Personal Banking, Personal Lending, Small Business, Investment & Insurance) and 'Personal Banking' (Checking, Credit Cards, Savings, CDs, Pay Bills). Below the sidebar are buttons for 'Reset', 'Default', 'Refresh', 'Disconnect', and 'Turn Keyboard Off'. The main content area shows a green screen terminal simulation with the following text:

09/13/09 18:11:52 IP Address = 192.168.96.204
VTAM Terminal =
NETID =
PortID = 02574

z/OS 1.8

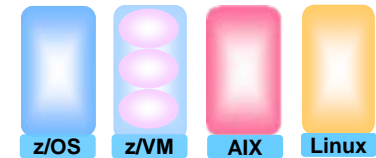
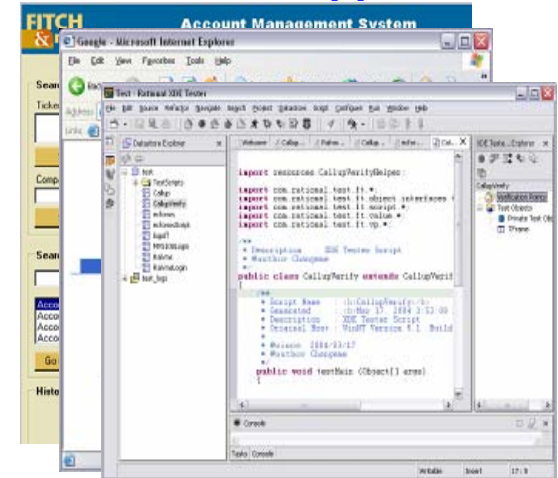
CCCCCCCC	TTTTTTTTTT	LLL
CCCCCCCC	TTTTTTTTTT	LLL
CCC	TTT	LLL
CCC	TTT	LLL
CCC	TTT	LLL
CCCCCCCC	TTT	LLLLLLLL
CCCCCCCC	TTT	LLLLLLLL
Competitive Technology Laboratory		
IBM Software Group, Somers, NY USA		
Use of this system is for IBM management approved purposes only		
Select : TSO / CICS / LOGON applid		

At the bottom right, there is a status bar with a globe icon, a printer icon, and the text '24/001'.

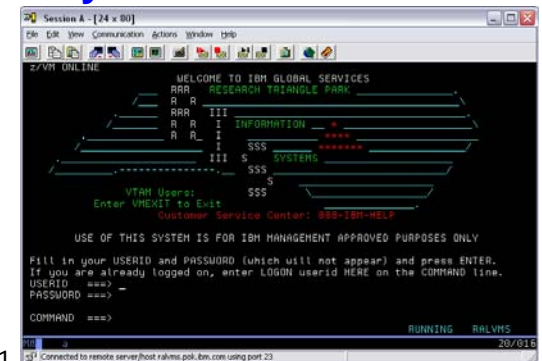
Unified Testing with Rational Functional Tester and Rational Performance Tester

- Eclipse-based tools
- Use **Rational Functional Tester**
 - ▶ Record/Enhance/Execute scripts on Windows/Linux
 - ▶ Functional test any .NET, Web, or Java application (z or non-z)
 - ▶ Use **Rational Functional Tester Extension for Terminal-based Applications**
- Use **Rational Performance Tester** for z/OS
 - ▶ Develop scripts on Windows or Linux
 - ▶ Execute scripts on z/OS
 - ▶ Performance test any **Web application** (z or non-z)
 - ▶ Use **IBM Workload Simulator for z/OS and OS/390** to test terminal-based applications
- Manage tests with **Rational Quality Manager**

Web and GUI Applications

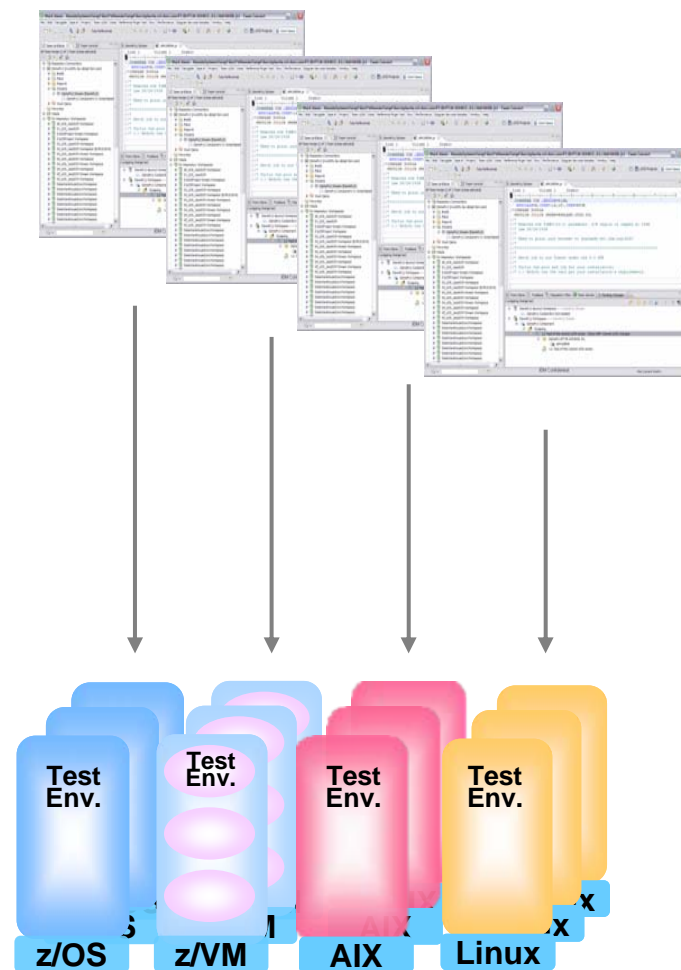


System z Terminal UI



zEnterprise Virtualization Quickly Provides Runtimes For Compile And Test In All Environments

- Virtual machines provisioned for compile/test in each environment
- Special lower cost offerings:
 - ▶ System z Solution Edition for Application Development
 - LPAR-based addition of a customized package of hardware, compiler, middleware, and maintenance for 3 years
 - For compile, unit and system test with z/OS
 - ▶ Solution Edition for Enterprise Linux
 - LPAR-based addition of hardware, z/VM, and maintenance for 3 years
 - Can be used for compile, unit and system test with Linux on System z



Unit Test Option For z/OS Applications On The Workstation



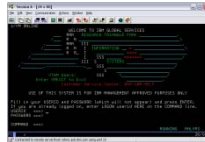
Rational Developer for System z Unit Test (RDz UT)

- z/OS runtime environment runs on x86 Linux workstation
 - ▶ **Compile and unit test** on the workstation - no zEnterprise hardware needed
 - ▶ Emulates System z general purpose processors, zIIPs, and zAAPs
- Reduce development MIPS for z/OS applications
 - ▶ Lower cost and better productivity
 - ▶ Enable new skills quickly
- Includes latest compilers, middleware, server load modules for RDz & RTCz
- Also available for educational institutions



Compare Development Costs Over Three Years

CASE 1



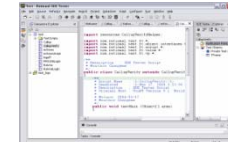
20 programmer team
@ \$140K/yr/person

ISPF for Edit, Compile, Debug

Use production MIPS

- Normal programmer productivity
- Consume MIPS for edit, compile, debug and test
- High cost production MIPS

CASE 2



20 programmer team
@ \$140K/yr/person

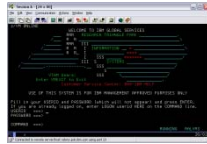
RDz for Edit, Compile, Debug

System z Solution Edition for
Application Development

- 30% better programmer productivity
- No MIPS consumed for edit
- Significantly lower cost MIPS for compile, debug and test

Compare Development Costs Over Three Years

CASE 1



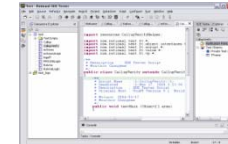
20 programmer team
@ \$140K/yr/person

ISPF for Edit, Compile, Debug

Use production MIPS

- Programmer cost \$8.4M
- MIPS cost \$4.5M
- Total cost \$12.9M

CASE 2



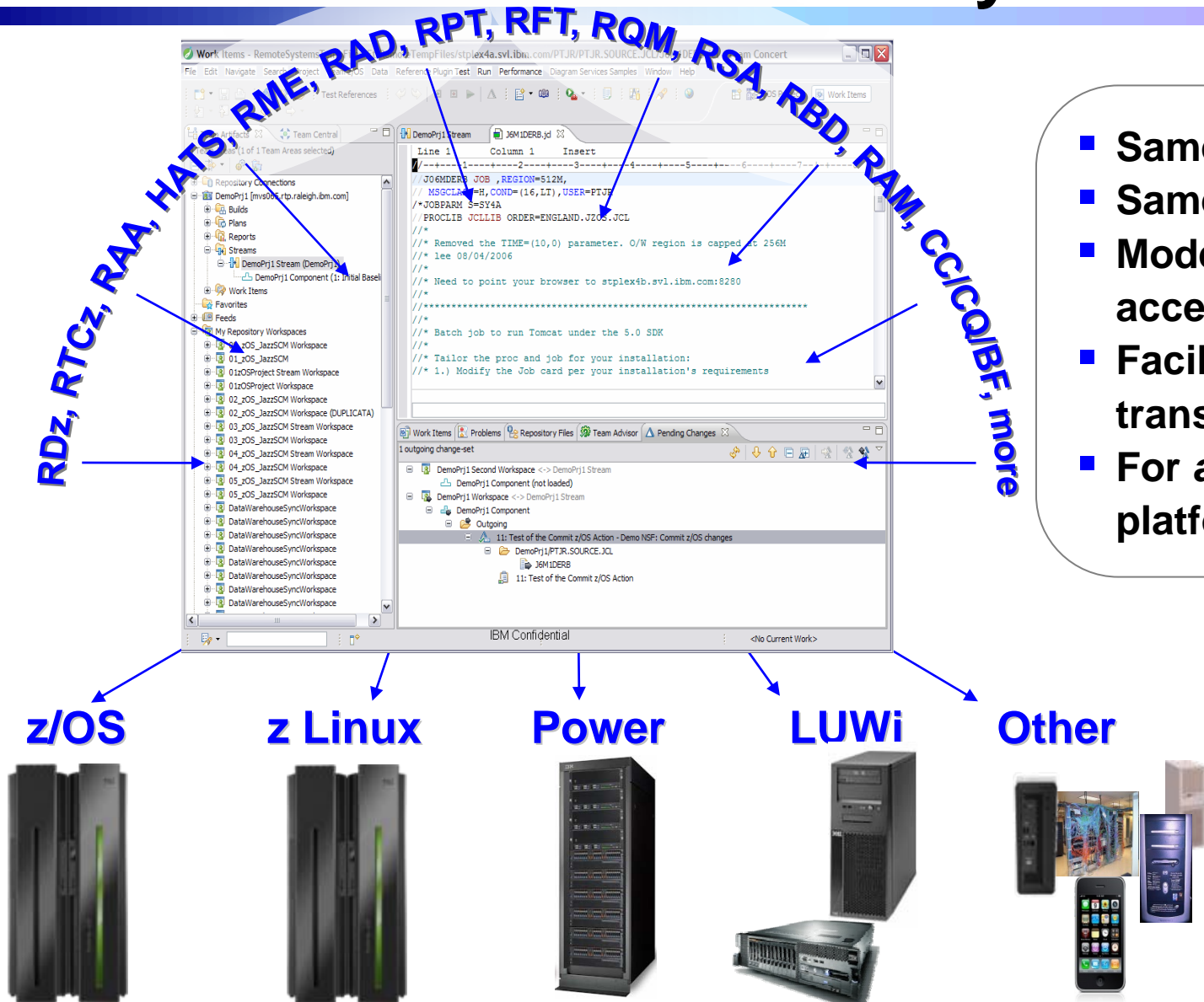
20 programmer team
@ \$140K/yr/person

RDz for Edit, Compile, Debug

System z Solution Edition for
Application Development

- Programmer cost \$6.7M
- Net MIPS cost \$0.2M
- Total cost 47% less \$6.9M

One Set Of Software Delivery Tools For All



- Same look and feel
- Same UI concepts
- Modern productivity accelerators
- Facilitates skill transfer
- For *all* zEnterprise platforms

z/OS



z Linux



Power



LUWi



Other

