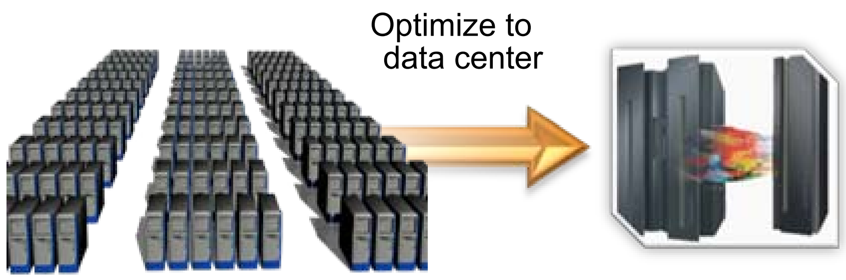
zEnterprise – The Ideal Platform For Smarter Computing

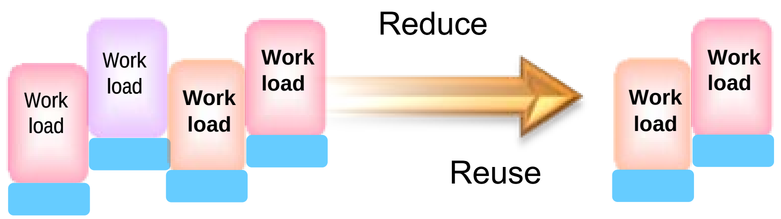
Developing Hybrid Applications For zEnterprise

Smarter Computing Is Redefining The Data Center

Consolidate Infrastructure



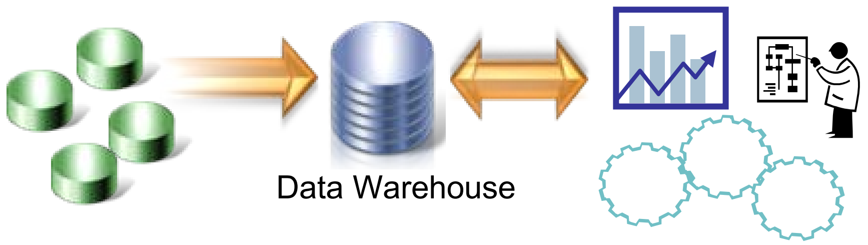
Eliminate Redundant Software



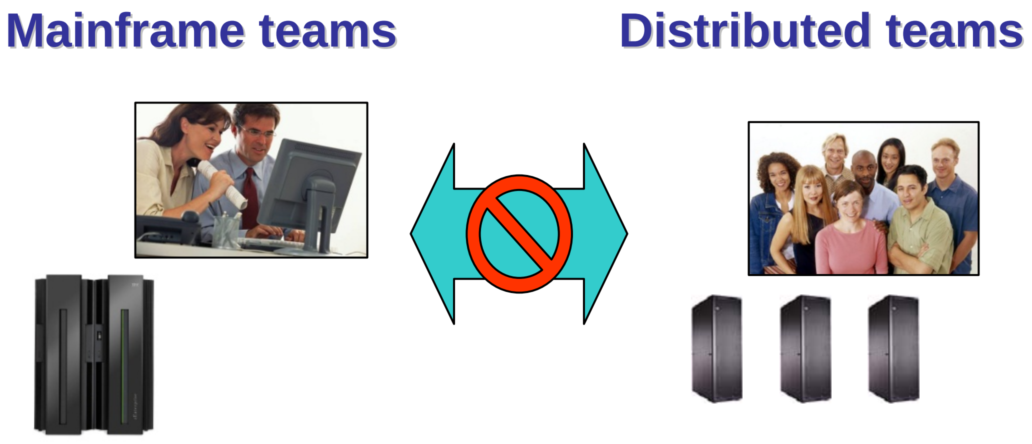
Improve Service Delivery

Integrated Service Management
Visibility
Control
Automation
Cloud Computing

Leverage Data to Optimize Business



Smarter Computing Means Breaking Down Cultural Boundaries That Inhibit Optimum IT



- Cultural barriers preclude fit for purpose optimizations
- Separate teams produce separate solutions
- Different skills inhibit optimum use of human resource

zEnterprise enables cultural integration

- Consolidate development and test around common tool set
- Optimize development process
- Reduce costs and overhead

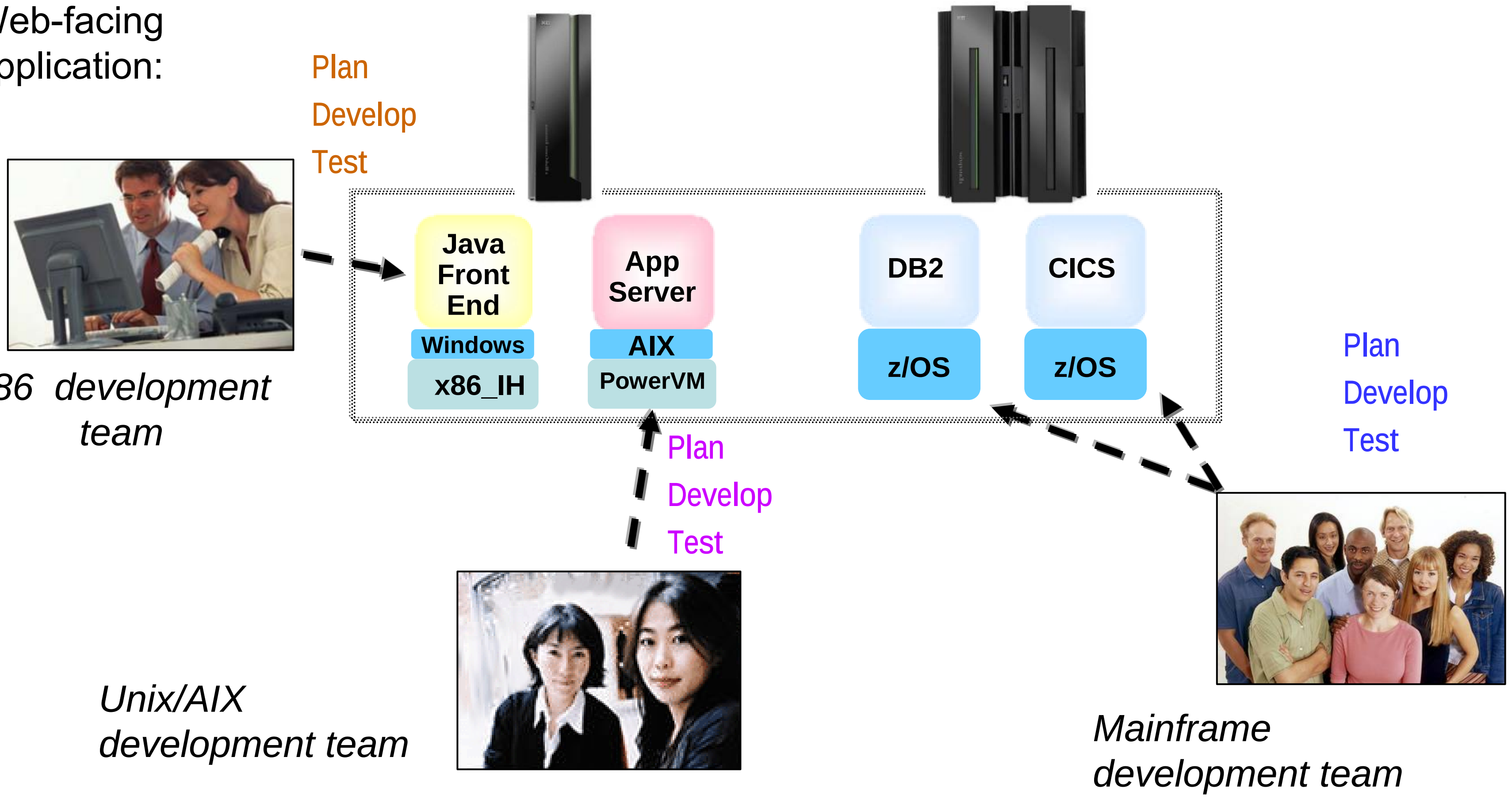
Traditionally, Different Platforms Meant Different Teams, Processes And Tools

	Mainframe	UNIX	Intel /x86
Requirements gathering	Formal	Informal	Informal
Collaboration across members	Limited	More formal (e.g., Agile Programming)	More formal (e.g., Agile Programming)
Tools for edit, compile and debug	Specialized (e.g., ISPF)	More formal (e.g., Emacs)	Various and informal (e.g., .NET)
Rigorous end-to-end testing methodologies	More formal	Moderate	Limited

How Will These Different Teams Productively Coordinate A zEnterprise Solution?

- Today's business applications are complex and multi-tiered

Typical 3-tiered Web-facing application:



What’s Needed?

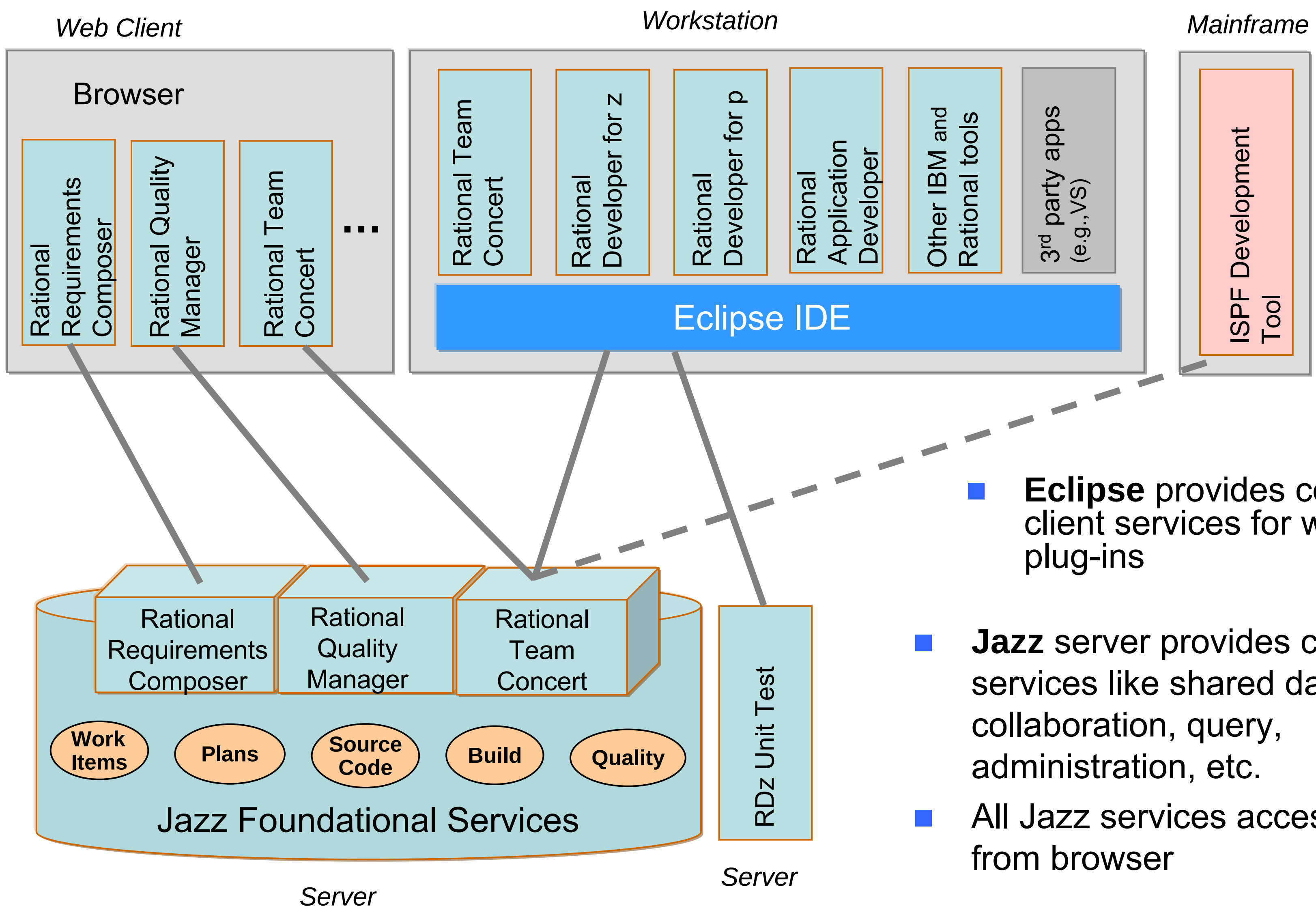
Requirements gathering	Formalized with centralized repository
Collaboration across members	Common and build-in
Tools for edit, compile and debug	Integrated across all platforms
Rigorous end-to-end testing methodologies	Extensive, high-quality

Intel/x86
UNIX
Mainframe

- Integrated platform that enables teams to develop hybrid solutions together
- Extensible and unified set of tools that support all teams and all platforms
- Lower cost, more rigorous approach to testing
- Collaborative approach

IBM Rational provides all this…

Rational Includes All Components For Developing zEnterprise Hybrid Applications



- **Eclipse** provides common client services for workstation plug-ins
- **Jazz** server provides common services like shared data, collaboration, query, administration, etc.
- All Jazz services accessible from browser

Importance Of Collaboration In Solutions Development

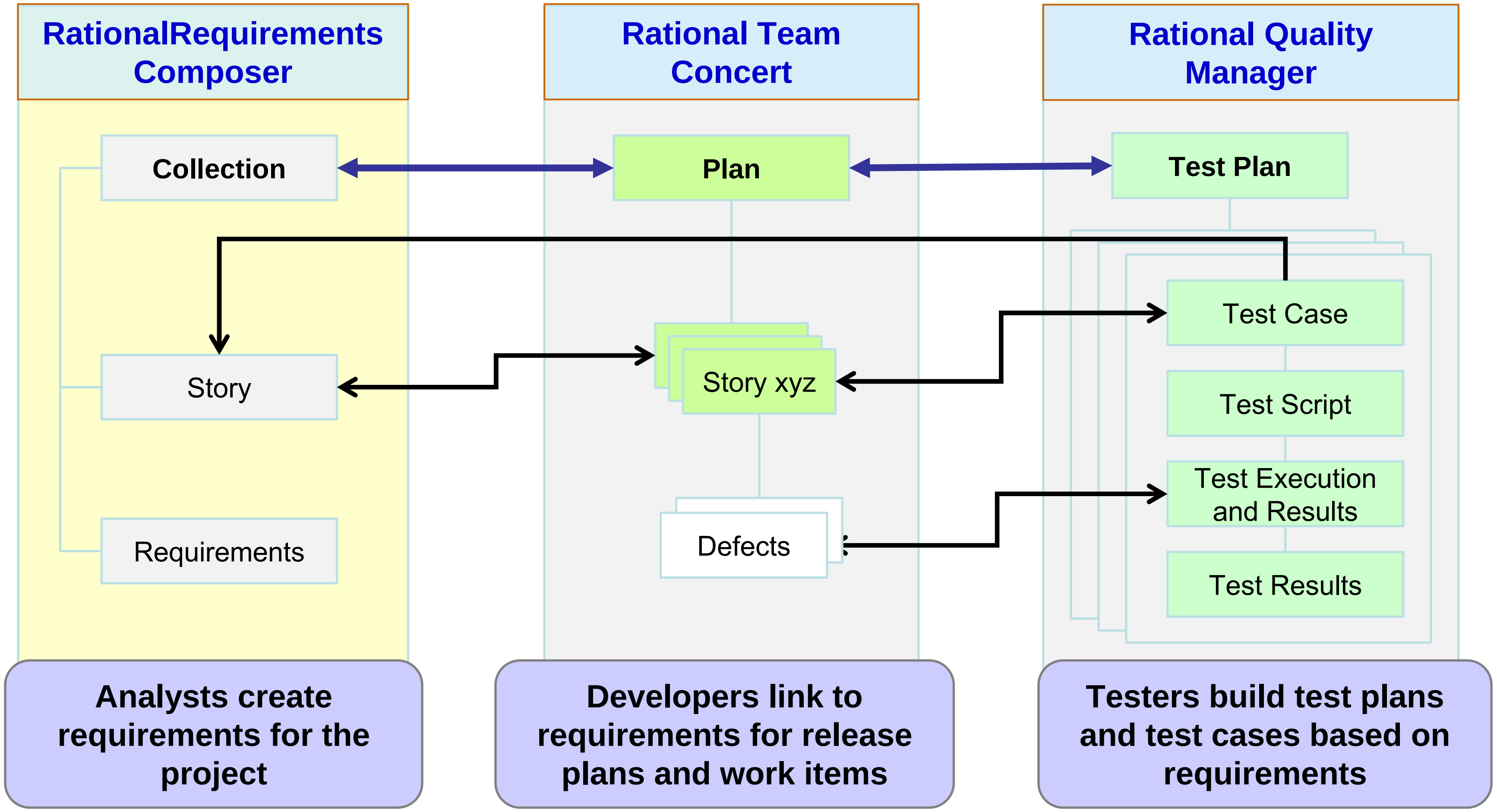
- 63% of stakeholders are *not* satisfied with the speed of internal application development1…
- 58% are *not* satisfied with the quality1…
- 50% of outsourced projects *under-perform*2…

- Collaboration-based development yields **better quality** and **more timely delivery**:
  - Align project teams that are geographically dispersed
  - Insure more efficient parallel development
  - Collaboration-based process rules lead to fewer mistakes
  - For hybrid applications, collaboration across teams means shared knowledge and skills

Source: [1]Forrester, [2]Gartner

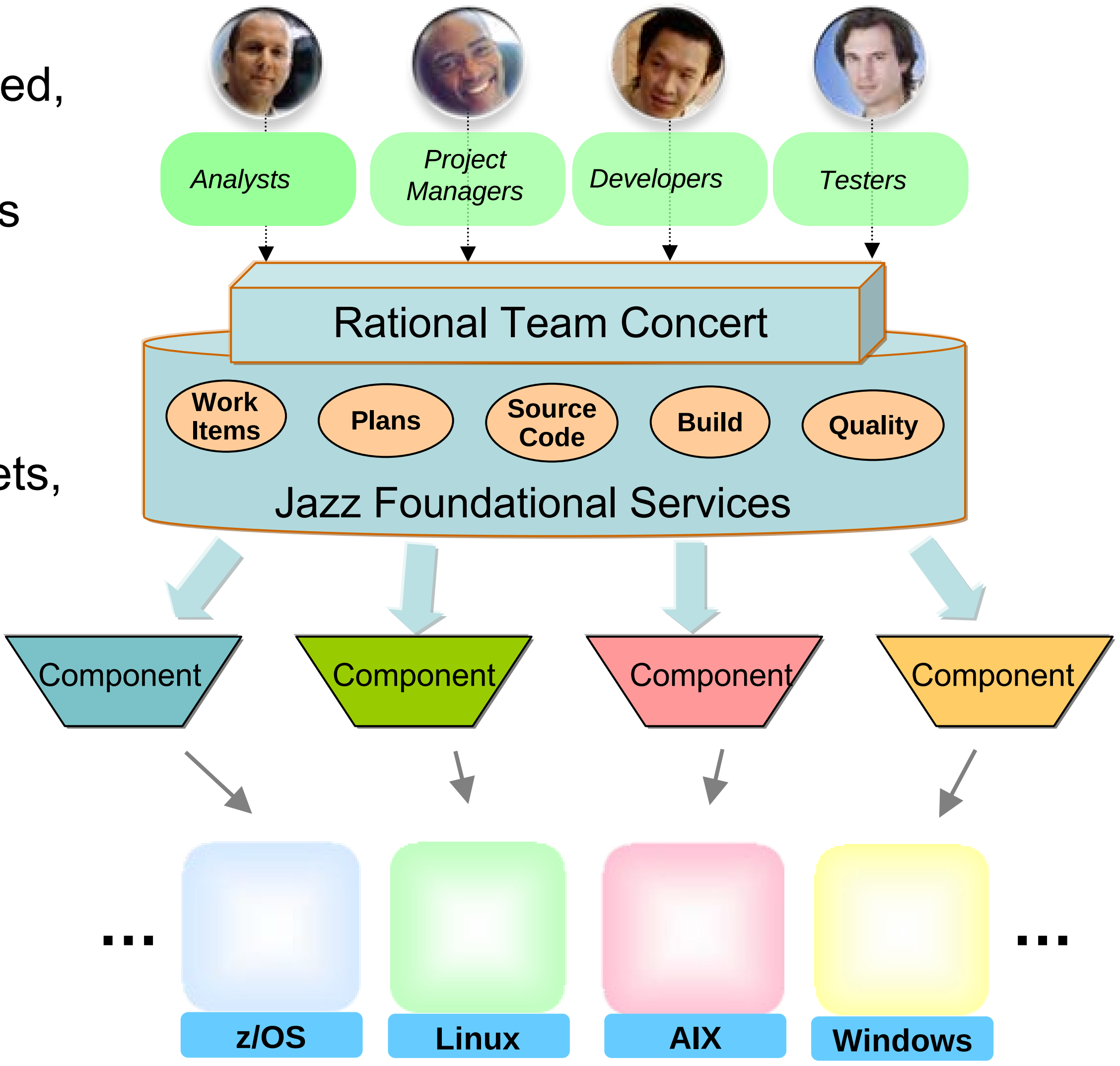
DEMO: Multi-tiered Software Projects Begin With Requirements And Plans

- Simplify the planning process through a unified effort


RationalRequirements Composer
Rational Team Concert
Rational Quality Manager
Collection
Plan
Test Plan
Story
Story xyz
Test Case
Test Script
Test Execution and Results
Test Results
Requirements
Defects
Analysts create requirements for the project
Developers link to requirements for release plans and work items
Testers build test plans and test cases based on requirements

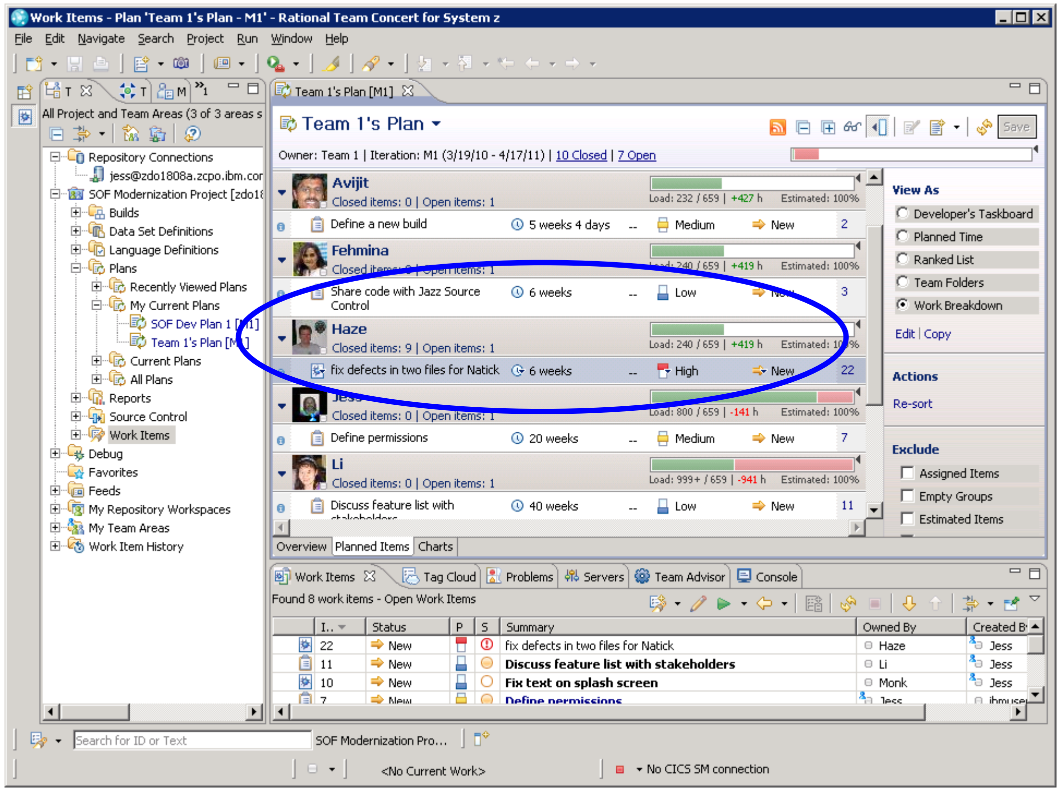
Manage Complete Application Lifecycle From A Single Unified Environment

- Once requirements are defined, project managers can create and assign work items across all teams
- Rational Team Concert provides common shared repository of application assets, and data schemas for all environments
- All team members work on the same integrated set of project assets, using a common UI
- From one platform, develop components for multiple environments



DEMO: Project Manager Assigns Work Items To Appropriate Team Member

- Easily view all developers on the project
- Visually assess work load for each
- Quickly determine the best person to fix the particular issue



Work Items - Plan 'Team 1's Plan - M1' - Rational Team Concert for System z

File Edit Navigate Search Project Run Window Help

All Project and Team Areas (3 of 3 areas s

- Repository Connections
  - jess@zdo1808a.zcpo.ibm.cor
- SOF Modernization Project [zdo18
  - Builds
  - Data Set Definitions
  - Language Definitions
  - Plans
    - Recently Viewed Plans
    - My Current Plans
      - SOF Dev Plan 1 [M1]
      - Team 1's Plan [M1]
    - Current Plans
    - All Plans
  - Reports
  - Source Control
  - Work Items
- Debug
- Favorites
- Feeds
- My Repository Workspaces
- My Team Areas
- Work Item History

Team 1's Plan

Owner: Team 1 | Iteration: M1 (3/19/10 - 4/17/11) | 10 Closed | 7 Open

Avijit Closed items: 0 | Open items: 1			Load: 232 / 659 | +427 h	Estimated: 100%	
Define a new build	5 weeks 4 days	--	Medium	New	2
Fehmina Closed items: 0 | Open items: 1			Load: 240 / 659 | +419 h	Estimated: 100%	
Share code with Jazz Source Control	6 weeks	--	Low	New	3
Haze Closed items: 9 | Open items: 1			Load: 240 / 659 | +419 h	Estimated: 100%	
fix defects in two files for Natick	6 weeks	--	High	New	22
Jess Closed items: 0 | Open items: 1			Load: 800 / 659 | -141 h	Estimated: 100%	
Define permissions	20 weeks	--	Medium	New	7
Li Closed items: 0 | Open items: 1			Load: 999+ / 659 | -941 h	Estimated: 100%	
Discuss feature list with stakeholders	40 weeks	--	Low	New	11

View As: Developer's Taskboard / Planned Time / Ranked List / Team Folders / [✓ Work Breakdown]

Edit | Copy

Actions: Re-sort

Exclude: ☐ Assigned Items ☐ Empty Groups ☐ Estimated Items

Overview | Planned Items | Charts

Work Items | Tag Cloud | Problems | Servers | Team Advisor | Console

Found 8 work items - Open Work Items

I..	Status	P	S	Summary	Owned By	Created B
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	ibmuse

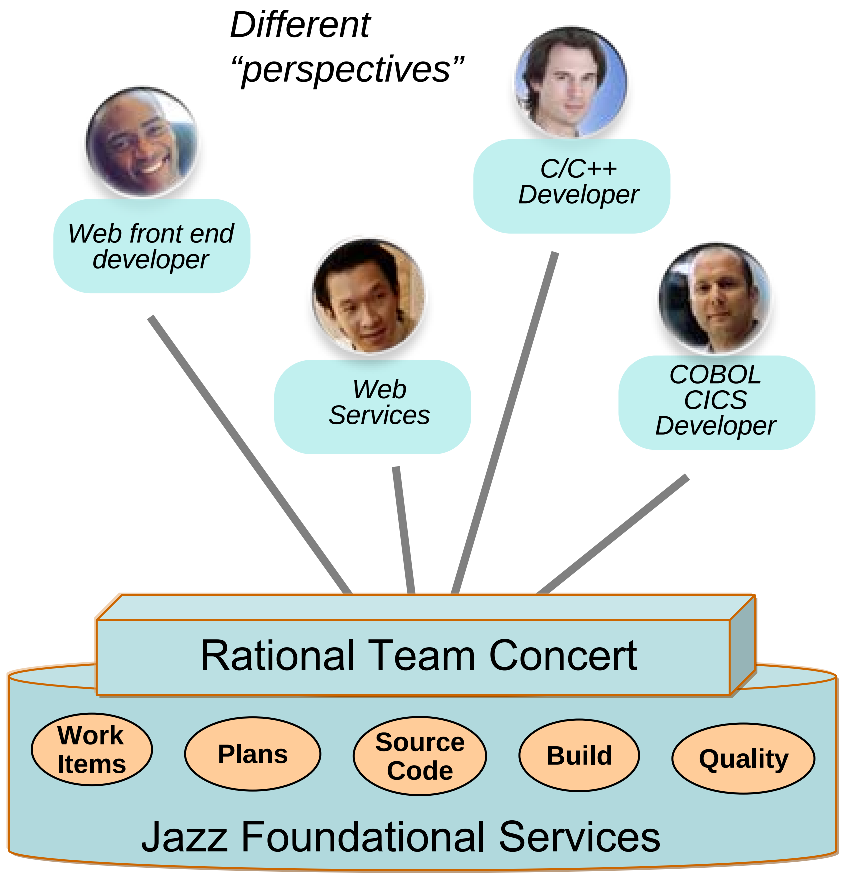
Search for ID or Text | SOF Modernization Pro...

<No Current Work> | No CICS SM connection

Rational Team Concert

Integrated Development Environment Means Common Tools For All Platforms

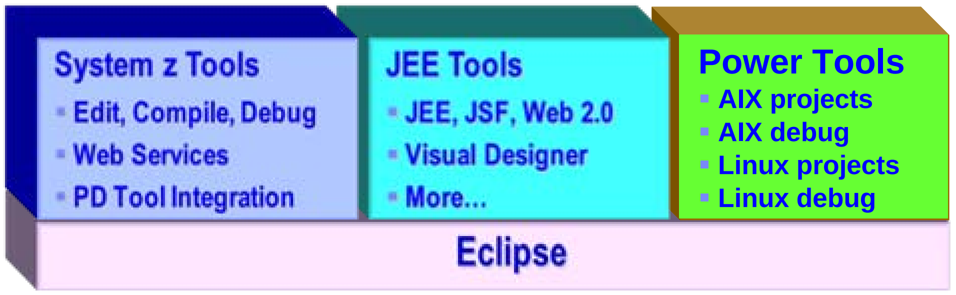
- Develop cross-platform hybrid applications using *integrated* tools that support z/OS, AIX, and Linux
- Applications, Web and script developers use Rational Application Developer (RAD)
- Traditional mainframe developers use Rational Developer for System z (RDz)
- Unix / AIX developers use Rational Developer for Power Systems (RDp)
- Collaborating with Rational Team Concert (RTC)

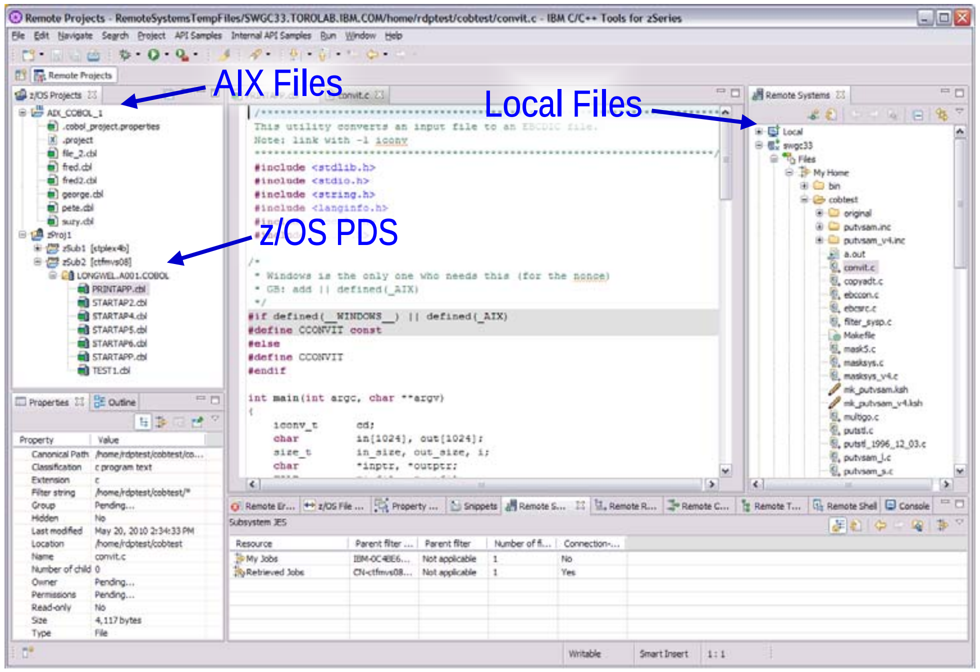


Integrated Eclipse plug-in framework supports all developers

Rational Delivers Integrated Development For zEnterprise Solutions

- Specifically designed for solutions development on zEnterprise
  - Rational Developer for zEnterprise
- Combines the functionality of z, Power Systems, x86 and applications development
- Addresses unique capabilities and requirements of zEnterprise
- Includes end-to-end debugging across all environments
- Lowers the cost of traditional mainframe application development
  - Uses selective workload offloading
  - Reduces MIPS used for common dev activities




Remote Projects - RemoteSystemsTempFiles/SWGC33.TOROLAB.IBM.COM/home/rdptest/cobtest/convit.c - IBM C/C++ Tools for zSeries
AIX Files
Local Files
z/OS PDS
z/OS Projects
AIX_COBOL_1
zProj1
LONGWEL.A001.COBOL
Remote Systems
convit.c

```
/****************************************************************************
 This utility converts an input file to an EBCDIC file.
 Note: link with -l iconv
 ****************************************************************************/
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <langinfo.h>

/*
 * Windows is the only one who needs this (for the nonce)
 * GB: add || defined(_AIX)
 */
#if defined(__WINDOWS__) || defined(_AIX)
#define CCONVIT const
#else
#define CCONVIT
#endif

int main(int argc, char **argv)
{
    iconv_t       cd;
    char          in[1024], out[1024];
    size_t        in_size, out_size, i;
    char          *inptr, *outptr;
```

Property	Value
Canonical Path	/home/rdptest/cobtest/co...
Classification	c program text
Extension	c
Filter string	/home/rdptest/cobtest/*
Group	Pending...
Hidden	No
Last modified	May 20, 2010 2:34:33 PM
Location	/home/rdptest/cobtest
Name	convit.c
Number of child	0
Owner	Pending...
Permissions	Pending...
Read-only	No
Size	4,117 bytes
Type	File

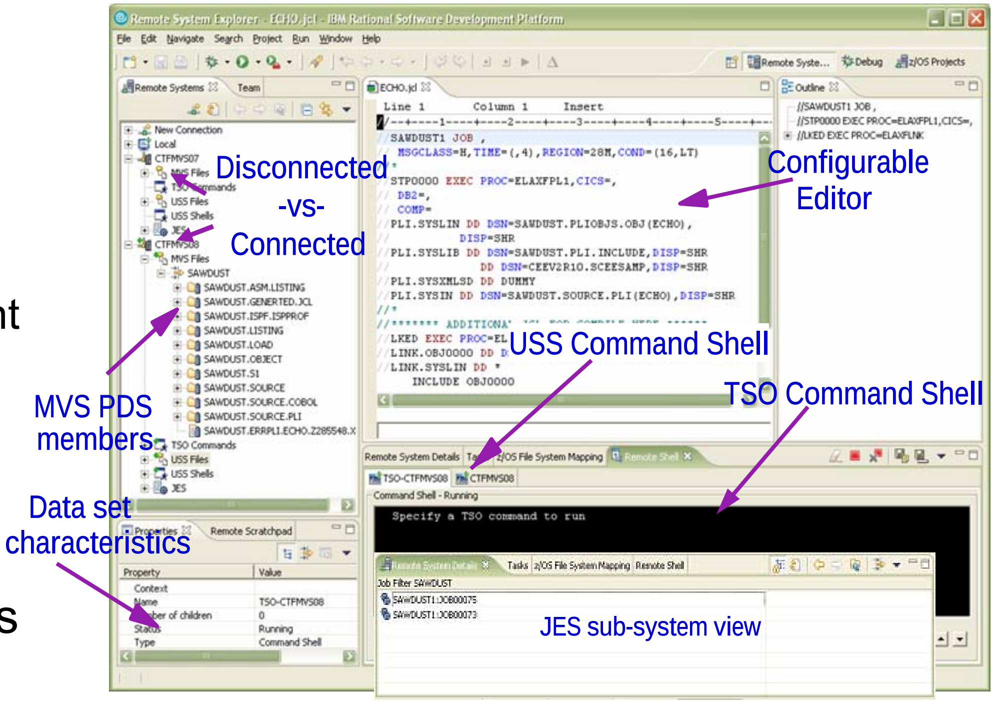
Subsystem JES

Resource	Parent filter ...	Parent filter	Number of fi...	Connection-...
My Jobs	IBM-0C4BE6...	Not applicable	1	No
Retrieved Jobs	CN-ctfmvs08...	Not applicable	1	Yes

Work with artifacts on multiple platforms in one GUI

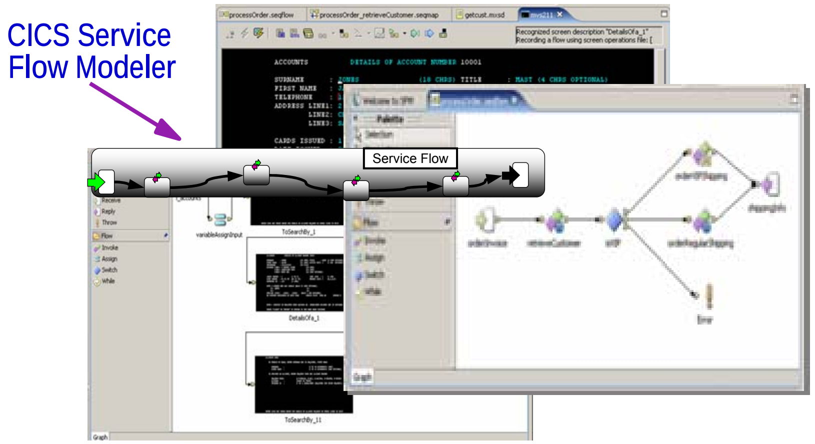
More Productive System z Software Development

- Mainframe developers move to a graphical integrated development environment
  - Rational Developer for System z provides full support for development and reuse of all mainframe 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 debug, job generation, submission, monitoring, command execution, etc.



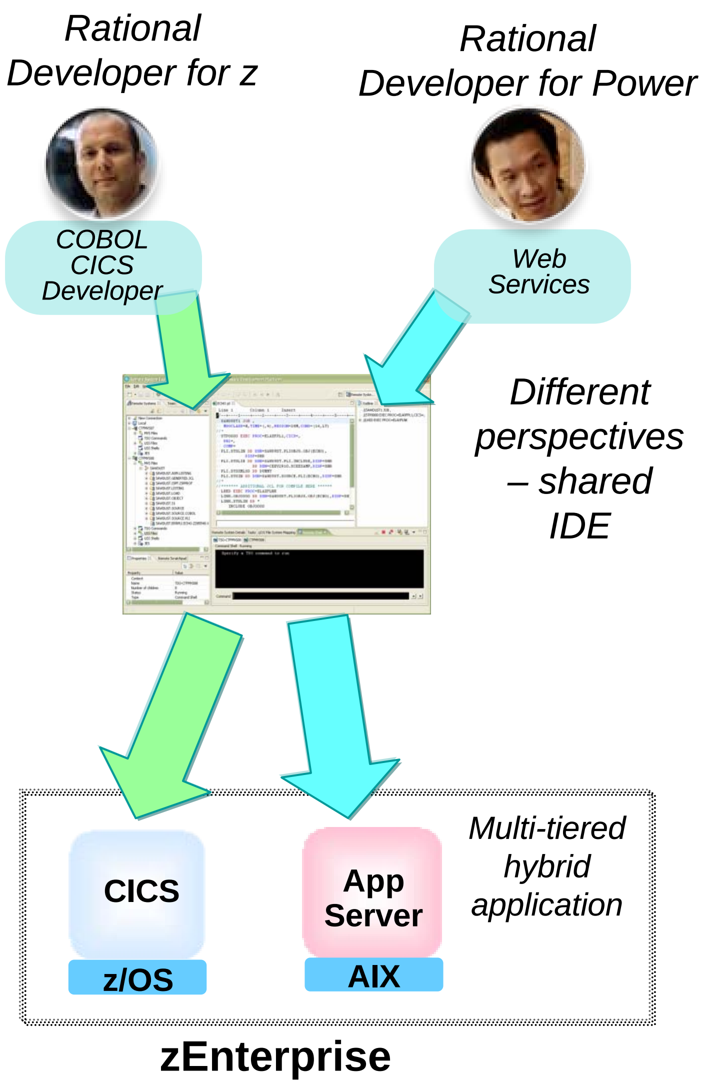
```
Line 1        Column 1      Insert
//--+----1----+----2----+----3----+----4----+----5----+--
//SAWDUST1 JOB ,
// MSGCLASS=H,TIME=(,4),REGION=28M,COND=(16,LT)
//*
//STP0000 EXEC PROC=ELAXFPL1,CICS=,
// DB2=,
// COMP=
//PLI.SYSLIN DD DSN=SAWDUST.PLIOBJS.OBJ(ECHO),
//              DISP=SHR
//PLI.SYSLIB DD DSN=SAWDUST.PLI.INCLUDE,DISP=SHR
//              DD DSN=CEEV2R10.SCEESAMP,DISP=SHR
//PLI.SYSXMLSD DD DUMMY
//PLI.SYSIN DD DSN=SAWDUST.SOURCE.PLI(ECHO),DISP=SHR
//*
//******* ADDITIONAL JCL FOR COMPILE HERE ******
//LKED EXEC PROC=EL
//LINK.OBJ0000 DD D
//LINK.SYSLIN DD *
   INCLUDE OBJ0000
```

```
//SAWDUST1 JOB ,
//STP0000 EXEC PROC=ELAXFPL1,CICS=,
//LKED EXEC PROC=ELAXFLNK
```



zEnterprise Power Developers Use The Same Integrated Development Environment

- Develop C/C++ and COBOL application components for AIX on Power
  - Rational Developer for Power
    - Also supports Linux and IBM I operating systems, plus RPG, Java, EGL, etc.
  - Same graphical IDE as System z developers, with same shared resources and collaborative team services
- Develop on workstation (remote), then upload to Power server to compile, execute and debug
- Includes compilers that exploit Power's parallel thread execution capability
  - Optimizations help to maximize performance
  - Data shows parallelization can reduce application execution times by 82%[1]



Rational Developer for z
Rational Developer for Power
COBOL CICS Developer
Web Services
Different perspectives – shared IDE
CICS
z/OS
App Server
AIX
Multi-tiered hybrid application
zEnterprise

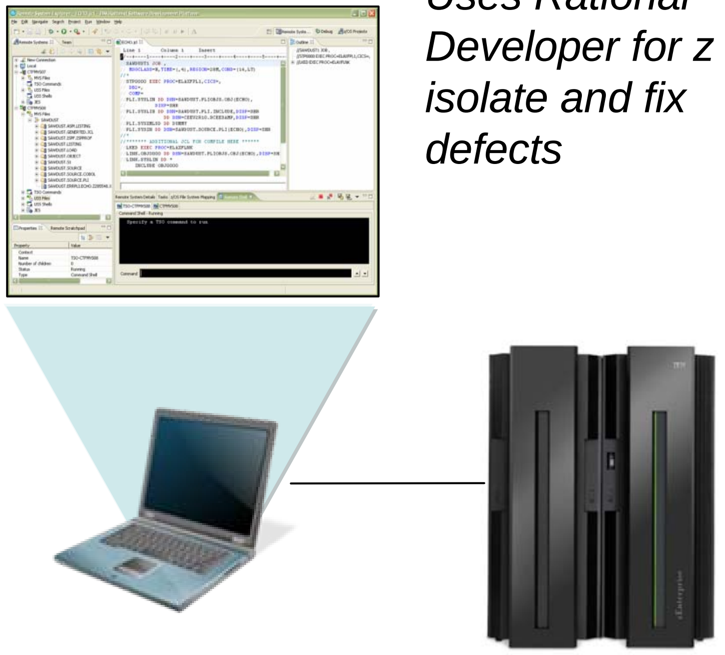
[1]Source: IBM internal study

DEMO: Work With COBOL And Java Using The Same IDE

- Both COBOL and Java developers use the same integrated development environment
- Share skills, share knowledge, cross-train
- Can lead to reduced development overhead

- One developer easily moves between Java and COBOL code to isolate and fix assigned defects

Uses Rational Developer for z to isolate and fix defects

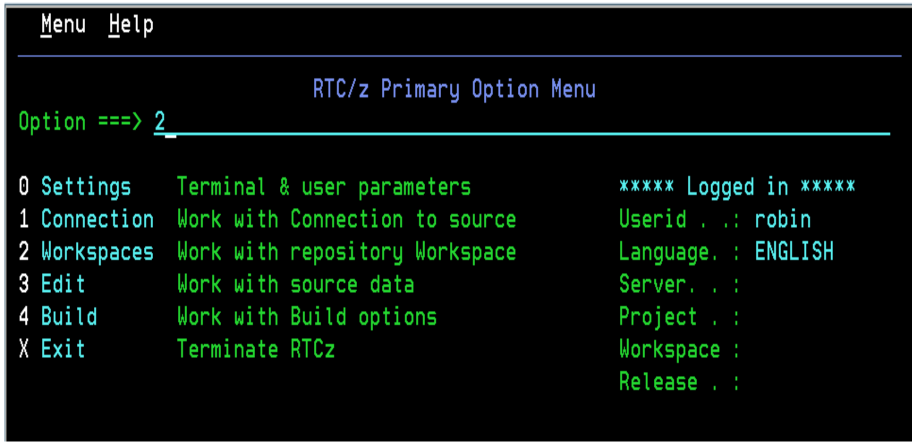


zEnterprise

Submit for compile and run

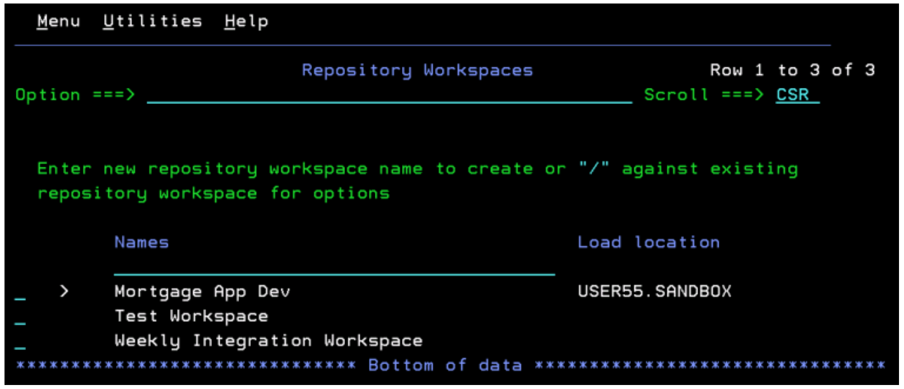
Mainframe Programmers Can Continue To Develop Using Traditional Tools If Desired

- Traditional ISPF programmers can continue to use familiar green-screen interface…
  - ISPF Client for Team Concert
- … but can integrate with Rational team services for software change management (SCM) functions
  - Use repository workspaces, change sets, link to work items, build requests, etc.
- Check out/check in code to native z/OS file system
- Facilitates phased implementation
- Reduces dependency on RDz deployment



```
 Menu  Help
------------------------------------------------------------------------------
                          RTC/z Primary Option Menu
Option ===> 2_

0 Settings    Terminal & user parameters          ***** Logged in *****
1 Connection  Work with Connection to source      Userid . .: robin
2 Workspaces  Work with repository Workspace      Language. : ENGLISH
3 Edit        Work with source data               Server. . :
4 Build       Work with Build options              Project . :
X Exit        Terminate RTCz                       Workspace :
                                                   Release . :
```

ISPF SCM Client

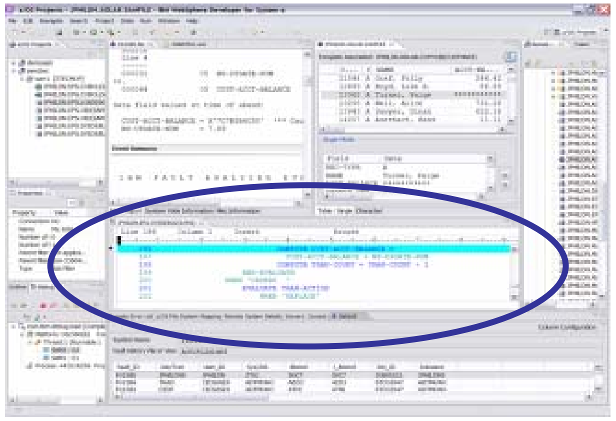


```
 Menu  Utilities  Help
------------------------------------------------------------------------------
                       Repository Workspaces                  Row 1 to 3 of 3
Option ===> ______________________________________  Scroll ===> CSR

  Enter new repository workspace name to create or "/" against existing
  repository workspace for options

         Names                                      Load location
         ______________________________________
_   >    Mortgage App Dev                           USER55.SANDBOX
_        Test Workspace
_        Weekly Integration Workspace
****************************** Bottom of data ******************************
```

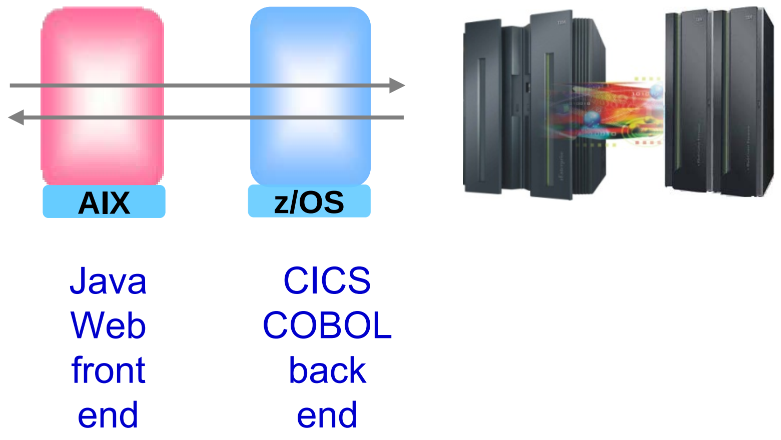
Hybrid Multi-tiered Applications Are Easily Debugged

- All Rational developer tools include integrated debuggers
  - Debug and step across languages
  - Debug and step across environments
- Team services add collaborative aspects to debug efforts

Work with code in debugger on workstation



Debug applications running on all zEnterprise platforms

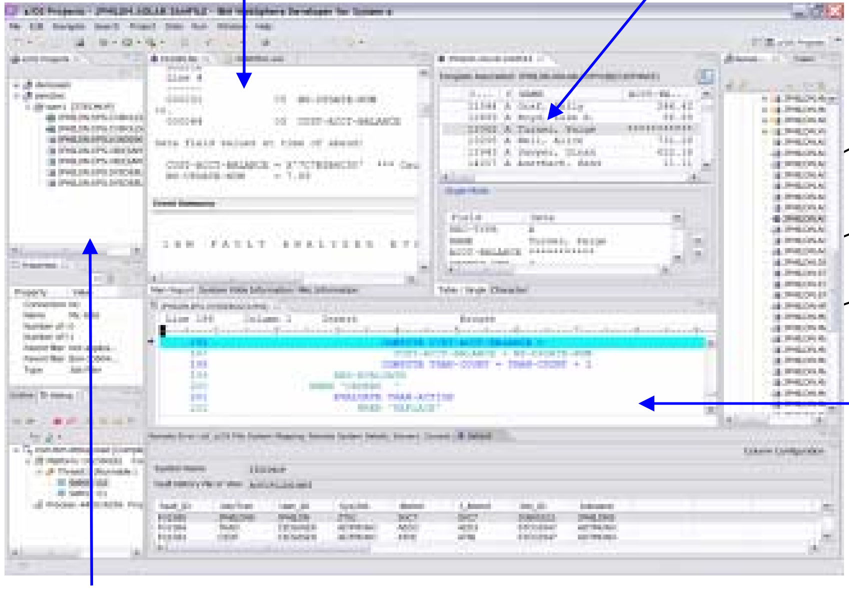


Debugging Includes Integration With Mainframe Problem Determination Tools

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

Displaying Fault Analyzer report

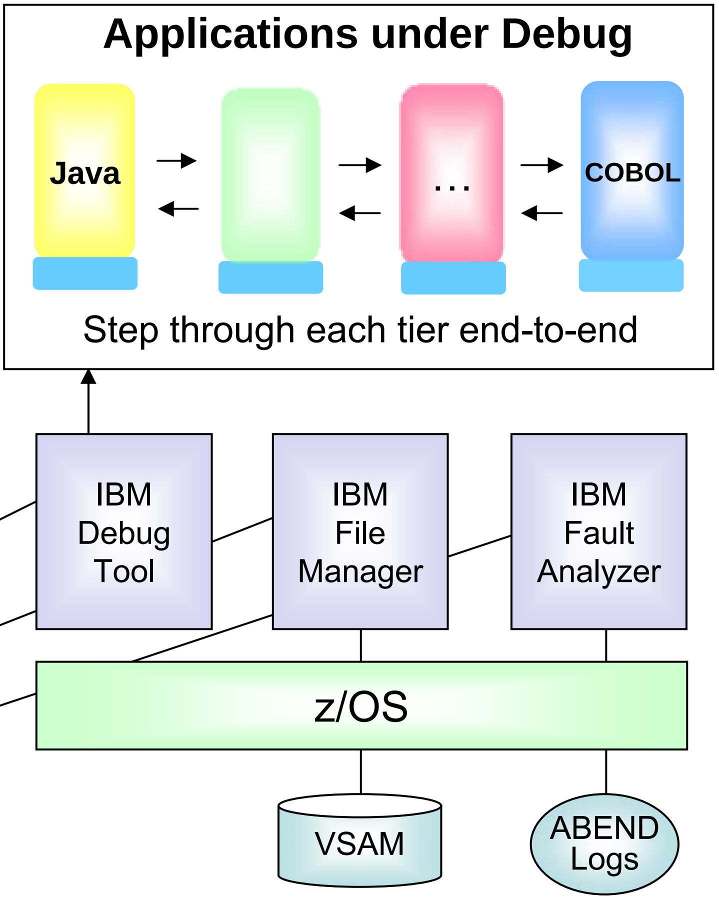
Editing data with File Manager



Debugging application with Debug Tool

Developing System z application with RDz

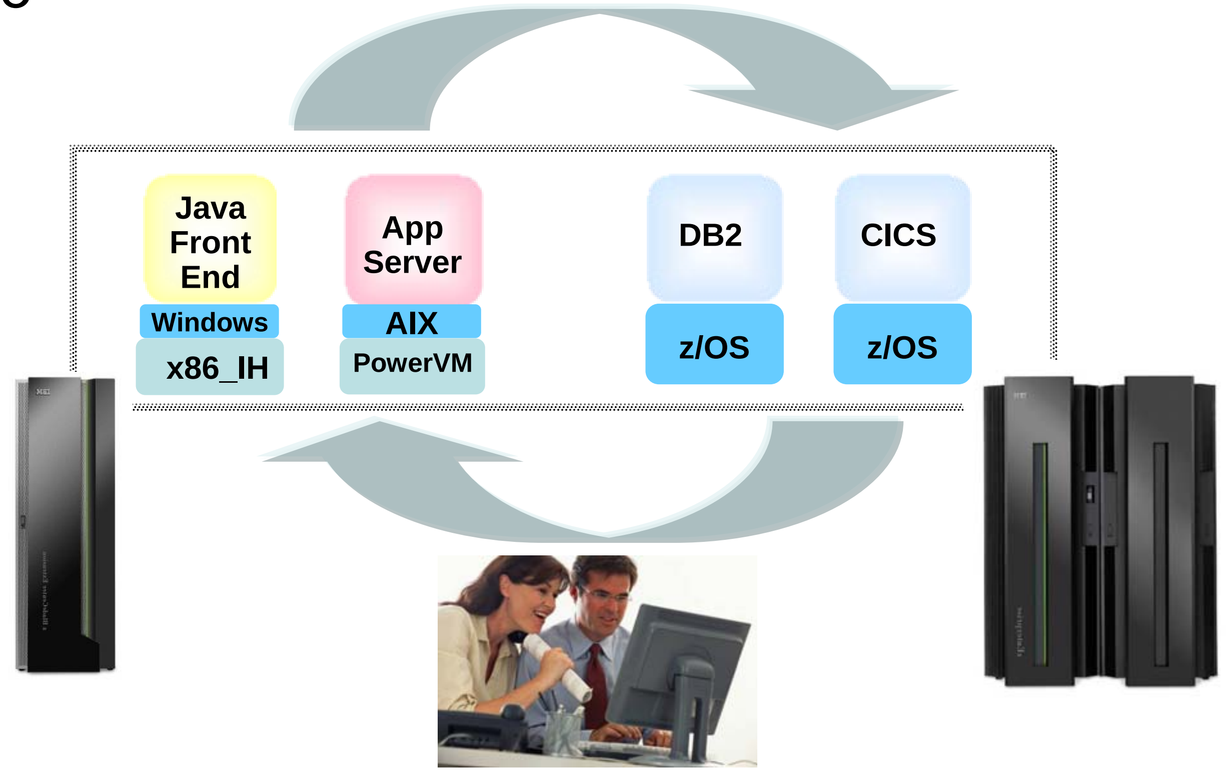
Workstation



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

DEMO: End-To-End Debugging Of A Typical Multi-tiered Application On zEnterprise

- Example of end-to-end debugging
  - Start in middleware tier (JSP)
  - Step through to COBOL tier
  - Step back to beginning tier



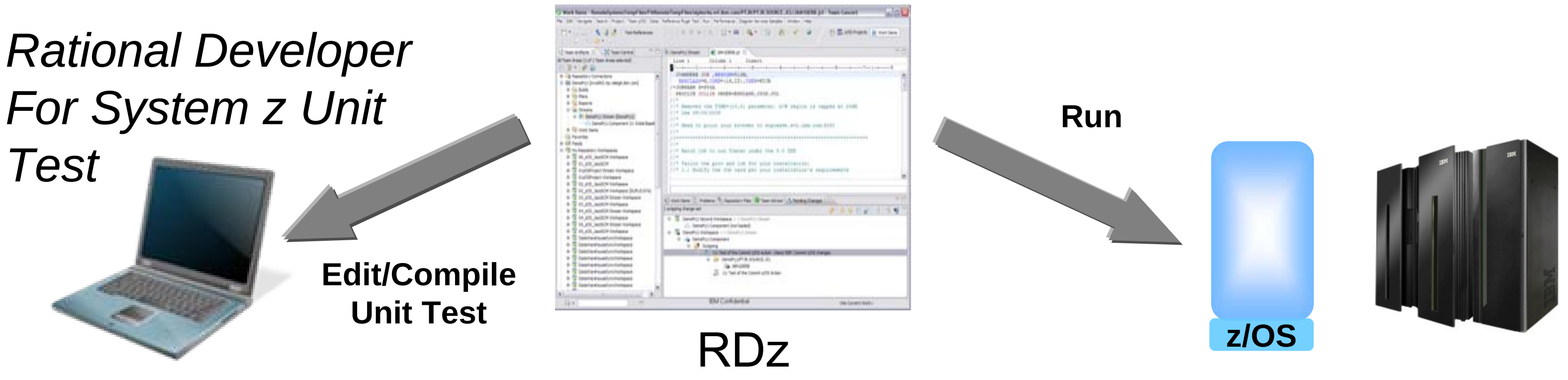
Testing The Full Extent Of A Multi-tiered Application Is Critical

- Application quality is measured at many levels
  - Unit test, functional test, system test, performance test, etc.
- Quality needs to extend to all platforms (Mainframe, Power, System x, etc.)
- Test procedures need to seamlessly step across platforms for complete end-to-end debug

- Need to continue to use existing System z problem determination and debug capability…
- … but it's critical that cost of testing be reduced if possible

Unit Test Option For z/OS Applications Can Reduce Testing Costs

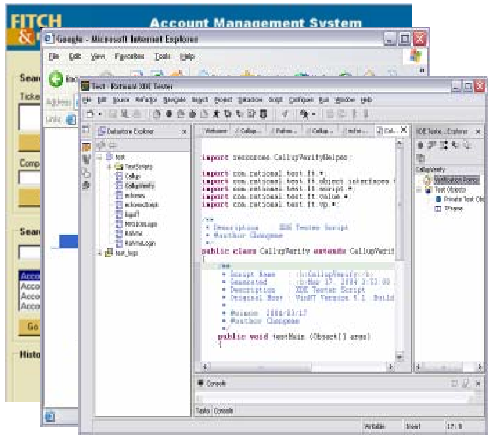
- z/OS runtime environment runs on x86 Linux workstation
  - **Compile and unit test** on the workstation
    - No zEnterprise hardware needed
  - Emulates System z general purpose processors, zIIPs, and zAAPs
- **Reduces development MIPS** for z/OS applications
  - Lower cost and better productivity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



Test All Aspects Of Application Using Integrated Quality Management Tools

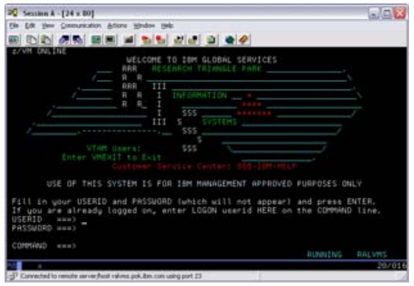
- Manage all integrated tests from one management tool
  - Rational Quality Manager
- Use script functions on Windows/Linux to functionally test any .NET, Web, or Java application (z or non-z)
  - Rational Functional Tester
  - Rational Functional Tester Extension for Terminal-based Applications
- Performance test any Web application (z or non-z)
  - Develop scripts on Windows/Linux and execute scripts on z/OS
  - Rational Performance Tester for z/OS
  - IBM Workload Simulator for z/OS and OS/390 to test terminal-based applications

Web and GUI Applications



FITCH
Account Management System
Google - Microsoft Internet Explorer
Test - Rational XDE Tester

z/OS | Linux | AIX | Windows

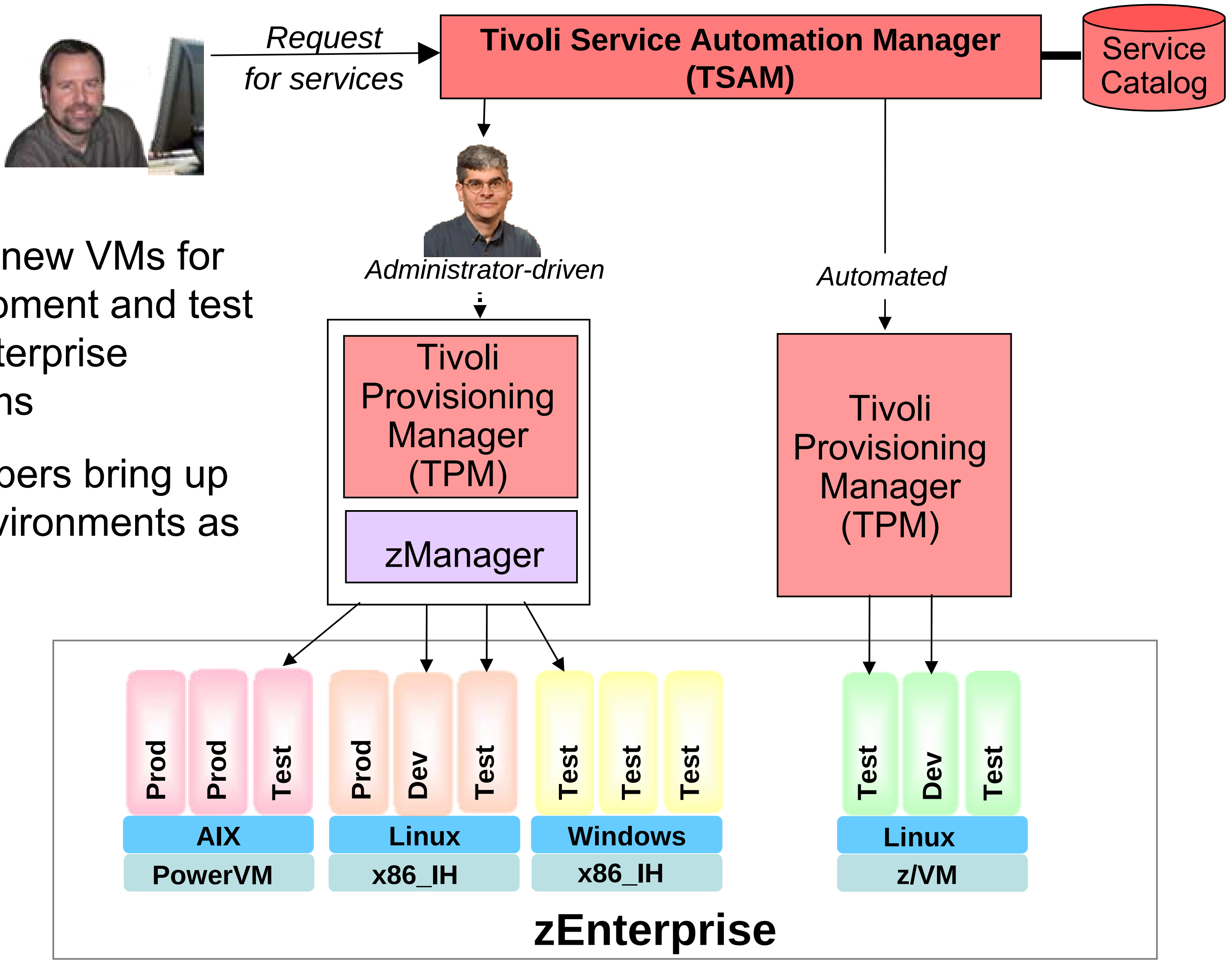


```
z/VM ONLINE
                    WELCOME TO IBM GLOBAL SERVICES
                    RRR   RESEARCH TRIANGLE PARK
                    R  R
                    RRR   III
                    R  R   I  INFORMATION
                    R  R   I
                           I   SSS
                          III  S    SYSTEMS
                               SSS
                                 S
         VTAM Users:           SSS
      Enter VMEXIT to Exit
                Customer Service Center: 888-IBM-HELP

      USE OF THIS SYSTEM IS FOR IBM MANAGEMENT APPROVED PURPOSES ONLY

Fill in your USERID and PASSWORD (which will not appear) and press ENTER.
If you are already logged on, enter LOGON userid HERE on the COMMAND line.
USERID   ===> _
PASSWORD ===>

COMMAND  ===>
                                                        RUNNING   RALVMS
                                                                  20/016
Connected to remote server/host ralvms.pok.ibm.com using port 23
```

System z Terminal UI

Use Tivoli And zManager To Create zEnterprise Runtimes For Compile And Test

- Create new VMs for development and test on zEnterprise platforms
- Developers bring up test environments as needed



IBM Has Low Cost Offerings For Application Development

- 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

Studies Show Rational Tools More Productive For Developing z/OS Applications

Comparison of **Rational Developer for System z** to **ISPF**:

Task	**Test Results**
Build a traditional CICS/COBOL/DB2 application	RDz was **1.2x** faster
Enable CICS applications for Web Services	ISPF could not complete the task
Compile, test and debug	RDz was **1.2x – 1.7x** faster

Conclusions:

✓ RDz was more productive for building robust real-world mainframe and Web based applications

✓ RDz was more productive at meeting applications requirements with minimum amount of tools

Source: The Branham Group, Inc.
http://www.branhamgroup.com/CustomContentRetrieve.aspx?ID=2002290&A=SearchResult&SearchID=2196098&ObjectID=2002290&ObjectType=35

Studies Show Rational Tools More Productive For Developing zBX Applications

Comparison of **Rational Application Developer** to **Microsoft Visual Studio**:

Task	**Test Results**
Build a Web application	Microsoft was **1.1x** faster
Build a Web Service from scratch	Rational was **2.1x** faster
Create a distributed transaction across two databases	Rational was **1.5x** faster
Model, simulate and test a workflow that consists of both an automated and human workflow	Microsoft could not complete the task
Model key components of the application	Rational was **2.4x** faster

Conclusions:

✓ RDz was more productive for building robust server-side distributed-based applications

✓ RDz was more productive with a minimum amount of tools

✓ Rational provided more visual interface tools and wizards, resulting in less manual hand coding, more consistent and higher quality code, and higher developer productivity

Source: The Branham Group, Inc.
http://www.branhamgroup.com/LiteratureRetrieve.aspx?ID=36699&A=SearchResult&SearchID=2196098&ObjectID=36699&ObjectType=6

Customer Data Shows Integrated Rational Tools Yield Significant Return On Investment

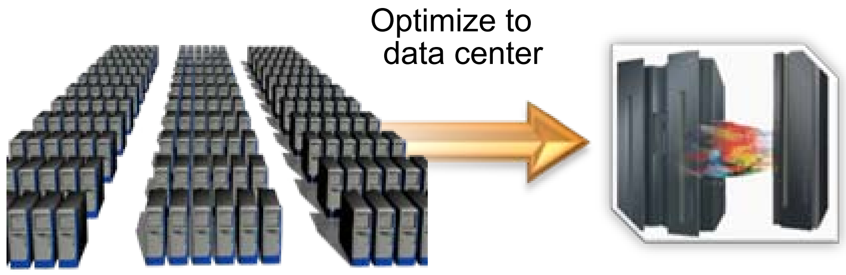
Team Productivity	↑ 50%	✓ Improved project management ✓ Leveraged remote staff ✓ Improved team utilization
Team Collaboration	↑ 50%	✓ Transparent knowledge sharing ✓ Improved task coordination across team ✓ Seamless transfer of work
Quality of releases	↑ 12%	✓ Reduced customer issues ✓ Reduced build issues ✓ Reduced risk of project failures
Project governance	↑ 12%	✓ Automated process management ✓ Enforcement of best practices ✓ Alignment of risk with lifecycle stages

Based on IBM customer surveys

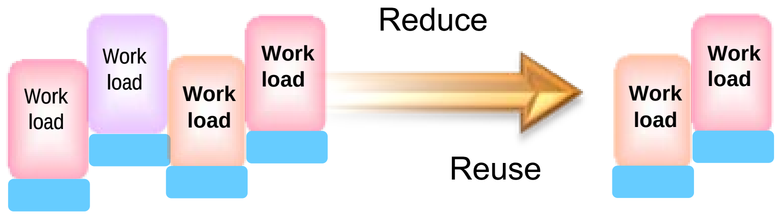
Summary of Today …

Smarter Computing Strategies To Reduce Costs And Improve Value

Consolidate Infrastructure



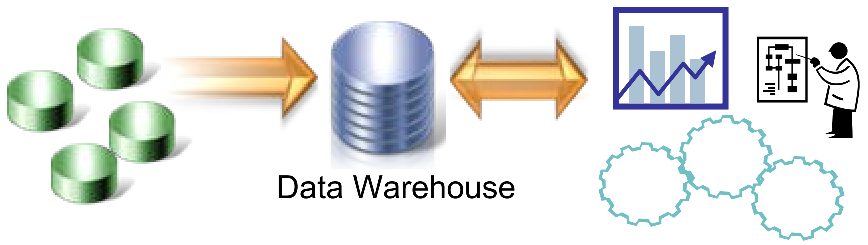
Eliminate Redundant Software



Improve Service Delivery

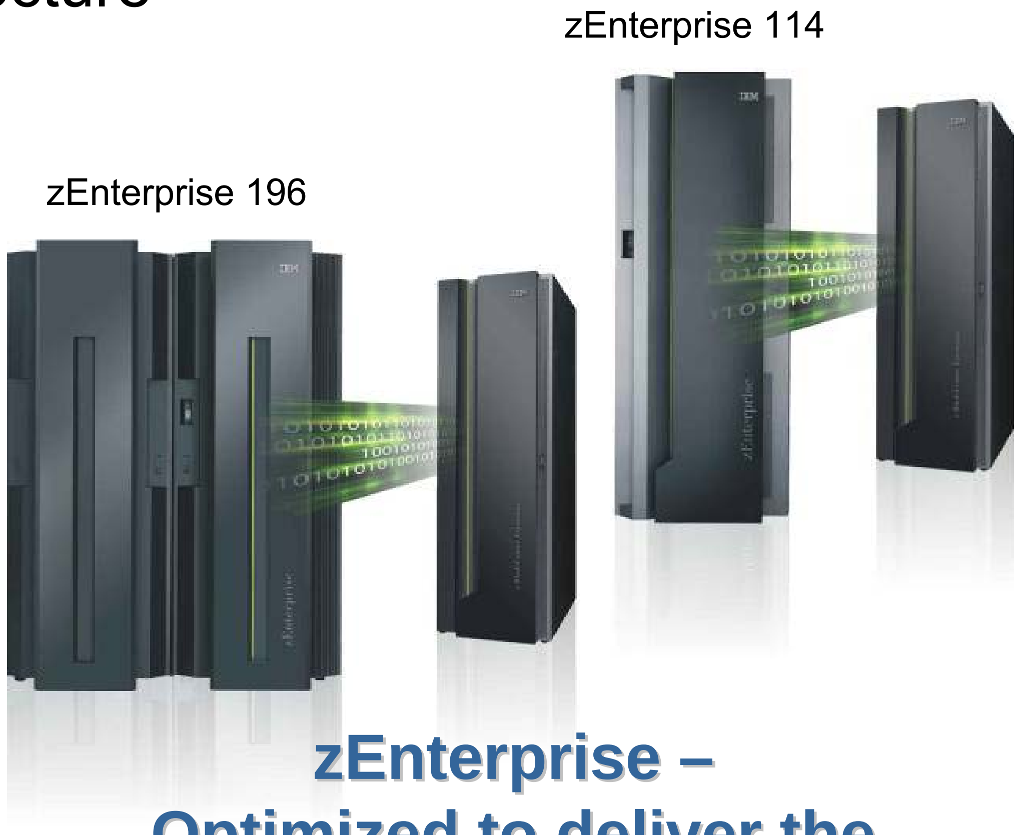
Integrated Service Management
Visibility
Control
Automation
Cloud Computing

Leverage Data to Optimize Business



The IBM zEnterprise System Is The Ideal Platform For Smarter Computing

- World's first multi-architecture virtualization platform
- Workloads deployed on optimal platforms
- Unified system management
- Broad support for private clouds
- Superior platform for business analytics



zEnterprise – Optimized to deliver the lowest cost per workload

Thank You

… for coming today

Please remember to fill out
the feedback forms