



## IBM DevOps solution: Sept 11, 2013

### *Continuous testing to save costs and improve application quality*



**Rosalind Radcliffe (@rosalindradd)**

IBM Distinguished Engineer  
Rational Enterprise Modernization Solution Architect  
rradclif@us.ibm.com





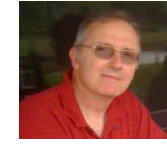








**Marty Shelton**

Product Line Manager  
Problem Determination Tools, IBM Software Group  
mmshelto@us.ibm.com

**IBM DevOps Solution Series**  
*5-part webcast series with IBM DevOps experts*



Presenters	Topics	Live On
  	<p><b>IBM DevOps solution: Accelerating the Delivery of Multiplatform Applications</b></p> <p><i>Presenters: Carmen DeArdo, Hayden Lindsey, and Mike Perera</i></p>	<p>August 7, 2013</p>
 	<p><b>IBM DevOps solution : Continuous Business Planning to get cost out and agility in</b></p> <p><i>Presenters: Rick Slade and Richard Szulewski</i></p>	<p>August 14, 2013</p>
 	<p><b>IBM DevOps solution : Collaborative Development to Spark Innovation and Integration among Teams</b></p> <p><i>Presenters: Tim Hahn and Danny Mace</i></p>	<p>Sept 4, 2013</p>
 	<p><b>IBM DevOps solution : Continuous Testing to save costs and improve application quality</b></p> <p><i>Presenters: Rosalind Radcliffe and Marty Shelton</i></p>	<p>Sept 11, 2013</p>
 	<p><b>IBM DevOps solution : Continuous Release and Deployment to compress delivery cycles</b></p> <p><i>Presenters: David Myers and Mike Baskey</i></p>	<p>Sept 18, 2013</p>

**Register here now: [ibmsystemsmag.com/devops](http://ibmsystemsmag.com/devops)**

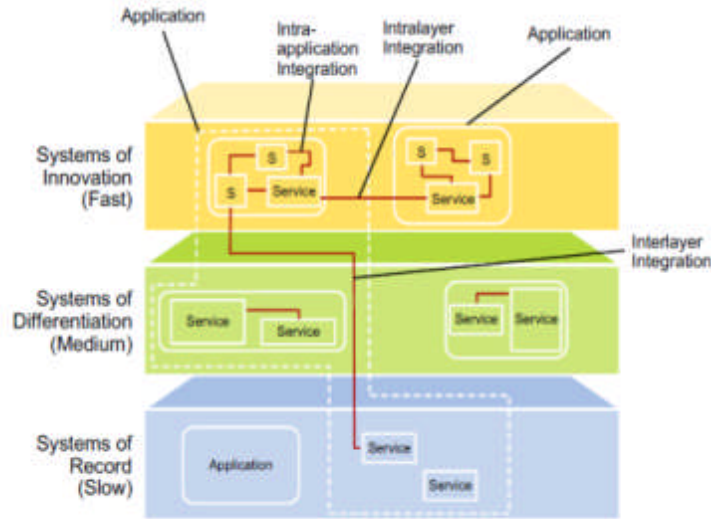
## Agenda

- Industry Background
- Definition of DevOps
- IBM DevOps Solution
- DevOps Challenges for System z
- Specifics of IBM DevOps Solution
- How Problem Determination Tools Fit into a DevOps Environment
- Summary

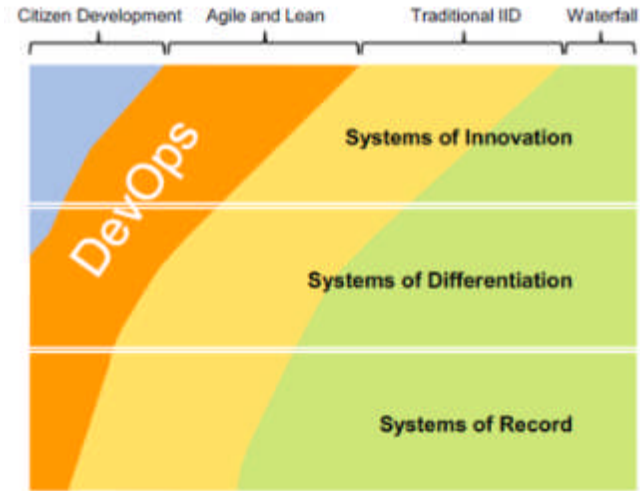
# New era systems integrate existing operational systems with rapid delivery of new client-facing apps



# Evolving customer and market expectations



Source: Gartner (October 2012)

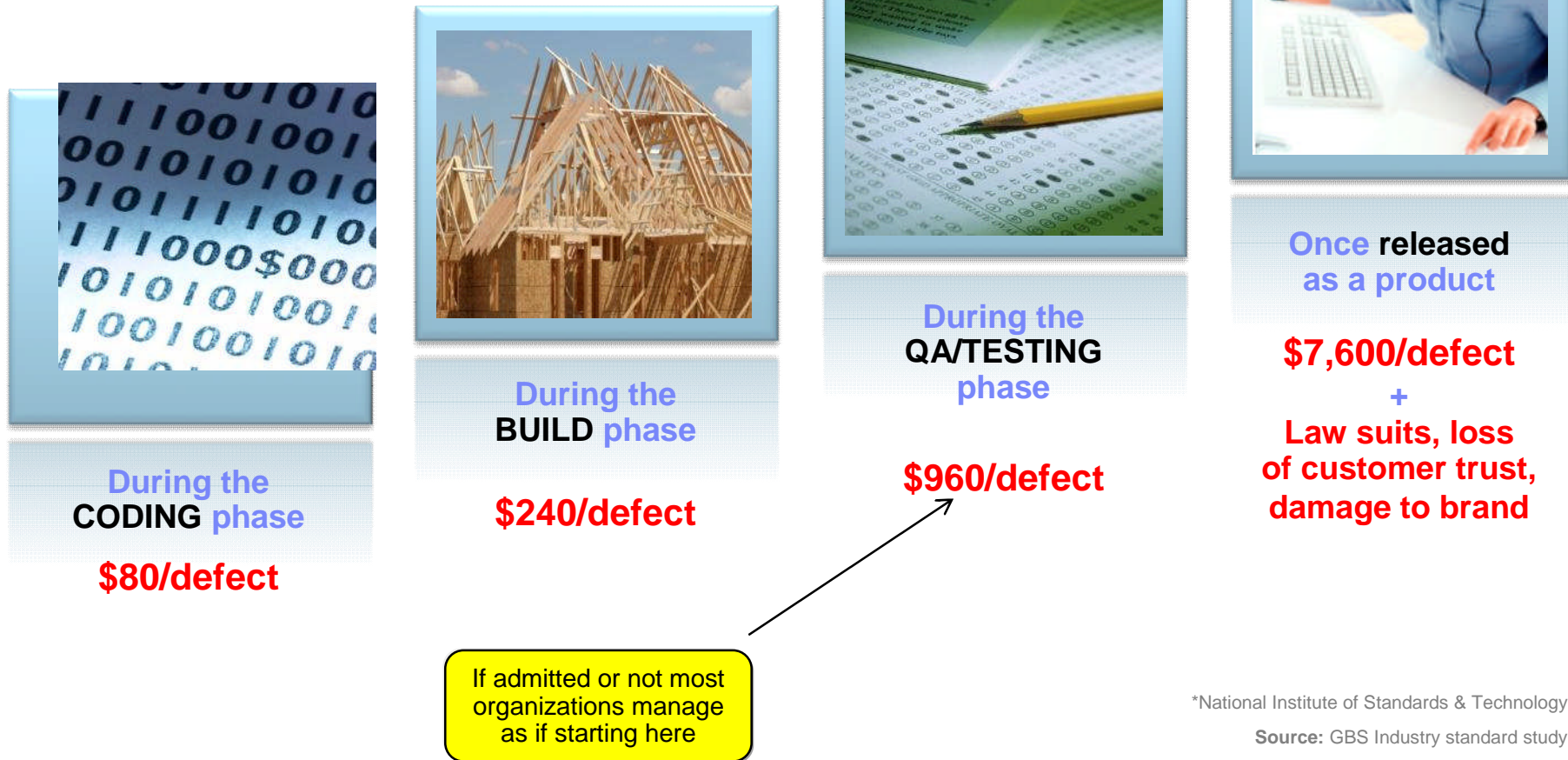


Source: Gartner (October 2012)

Capabilities and User Experience	Today	Emerging
Primary Workload Types	<b>Systems of Record</b> <i>Transactional</i>	<b>Systems of Engagement (+ Record)</b> <i>Big Data, Analytics, Mobile/Social Channels</i>
Time to Value	Planned	Opportunistic
Delivery Model	Planned	Incremental (DevOps)
Development and Operations Team Sizes	100s and Costly	10s with built-in DevOps automation
<b>Release Frequency</b>	<b>Months to Years</b>	<b>Hours to Days, based on business opportunity</b>
Integration Frequency	Weeks	Continuous
Service Sourcing	Develop	Consume and Assemble (Public and Private)
Operational Model	Systems Management	Built in to application, Recovery Oriented Computing, Continuous Availability
Infrastructure Deployment	Days	Minutes
Risk Profile	Big-Bang (High Risk)	Incremental

# Cost is a significant driver

80% of development costs are spent identifying and correcting defects!\*



Defect cost derived in assuming it takes 8 hrs to find, fix and repair a defect when found in code and unit test.  
Defect FFR cost for other phases calculated by using the multiplier on a blended rate of \$80/hr.

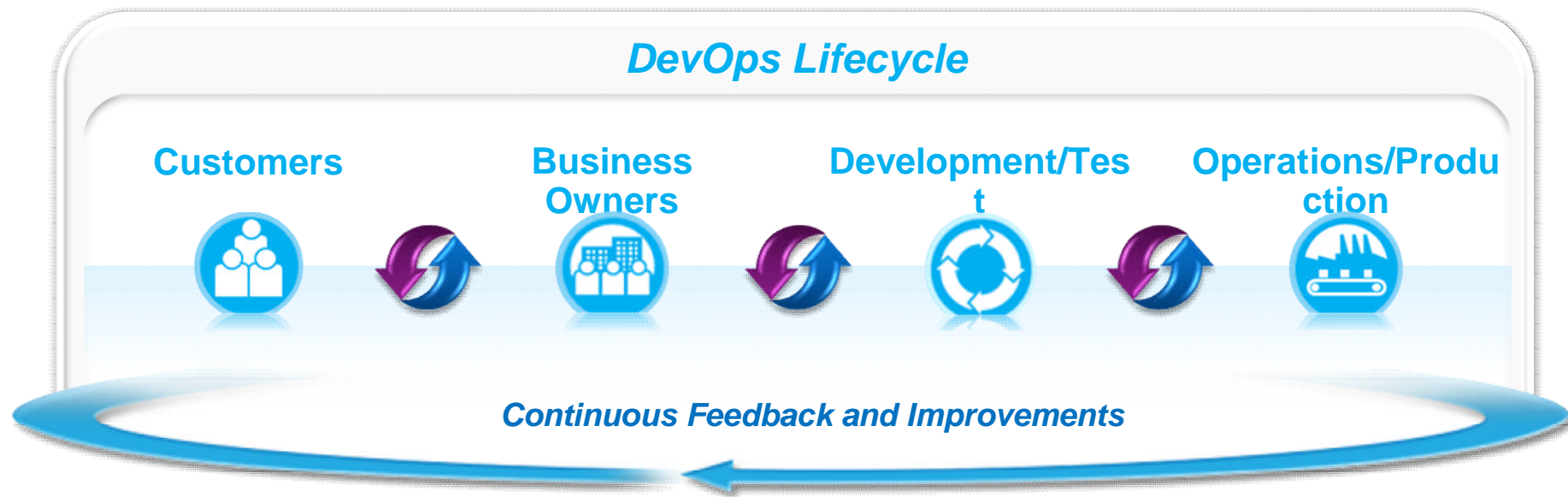
\*National Institute of Standards & Technology

Source: GBS Industry standard study

# DevOps: A blueprint for continuous delivery of software-driven innovation

**dev-ops** *noun* \ˈdev-äps\

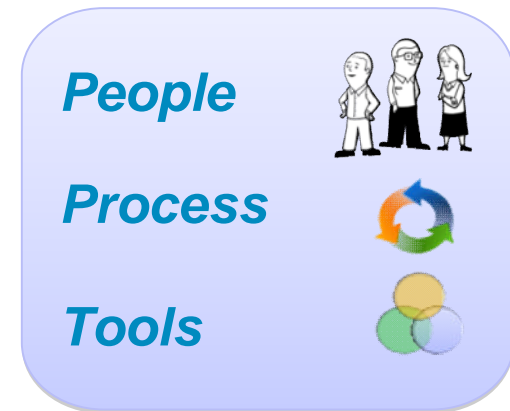
Enterprise capability for continuous software delivery that enables clients to seize market opportunities and reduce time to customer feedback.



- Accelerated software delivery
- Improved governance across the lifecycle
  - Balanced quality, cost and speed
- Reduced time to obtain and respond to customer feedback

# DevOps Principles and Values

- Develop and test against a production-like system
- Iterative and frequent deployments using repeatable and reliable processes
- **Continuously monitor and validate operational quality characteristics**
- Amplify feedback loops

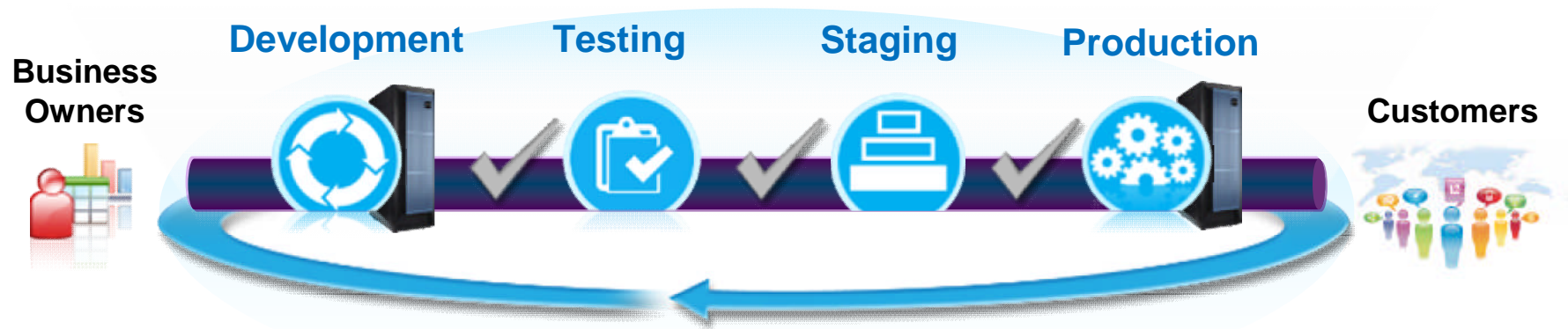




# IBM DevOps Reference Architecture



# Solution: A Continuous Delivery Pipeline



Ensure applications are production-ready throughout the lifecycle and can be released at any time while minimizing rollback due to quality issues

- Validate on more production-like conditions earlier
- Automate hand-offs/promotions to increase velocity through the different stages
- Standardization on processes and assets between Dev and Ops
- Automated monitoring and dashboarding of quality and performance against service level agreements at multiple stages



## Mainframe Delivery Pains...

- Multiple teams working across restricted dev and test capacity lead to conflict, delays, or bad test results in shared environments
- Complex and manual management and configuration tasks result in errors and delays
- Too much bad code going into test and production causes crit sits and emergency fixes
- Bottlenecks due to inefficient communications between disparate platforms and teams (Dev/Test - System Programmers; mobile – distributed-mainframe)

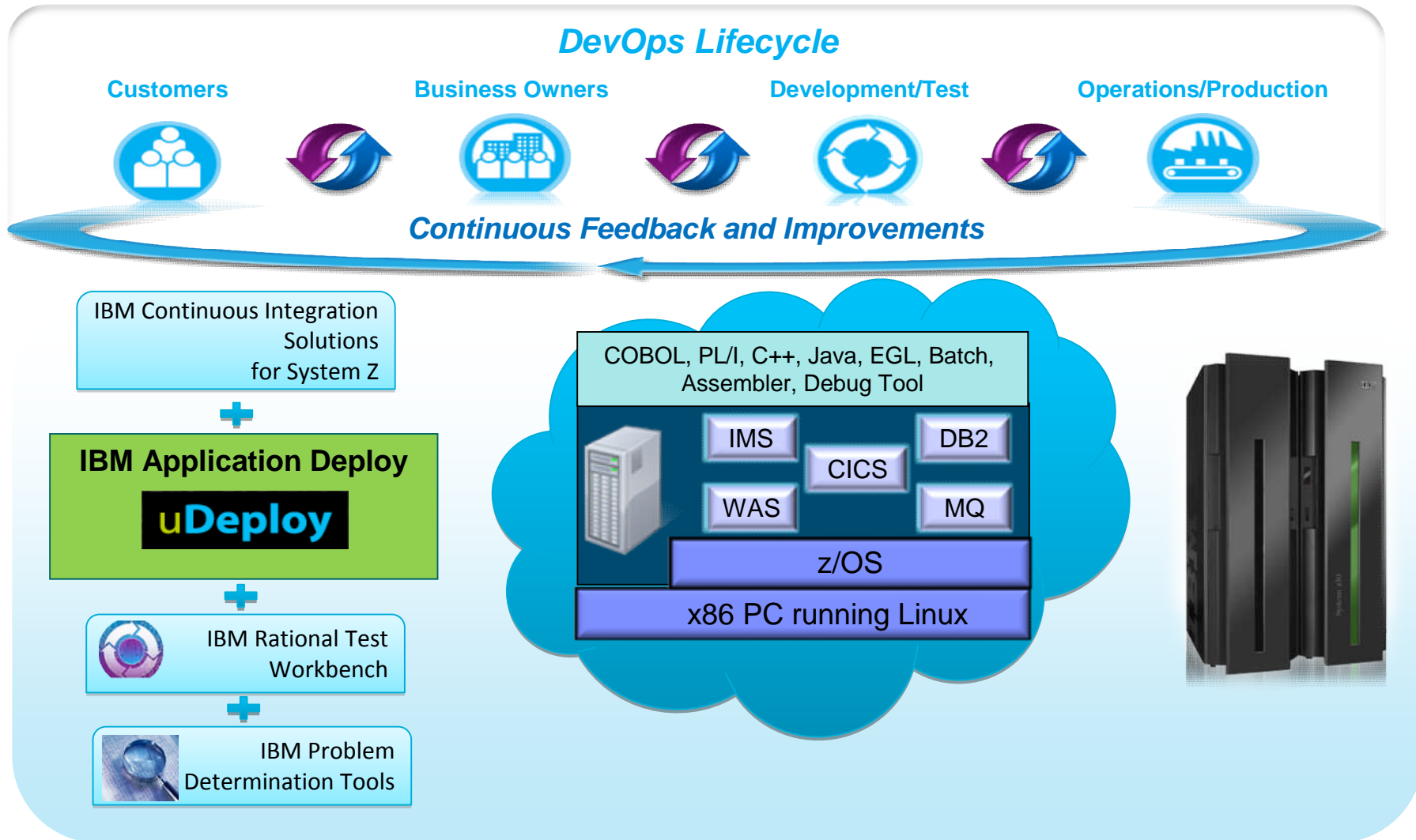


## ...solutions from IBM

- Provide cheap, isolated, development and test environments for project teams
  - Rational Development and Test Environment
  - Rational Test Virtualization Server
  - SmartCloud Provisioning
  - Cloud Ready for Linux on System z
  - IBM Problem Determination Tools
- Enforce base quality standards automatically prior to promotion
  - Rational Test Workbench
  - Rational Quality Manager
  - SmartCloud Application Monitoring
  - Omegamon
- Automate consistent build, configure, and deploy processes across all stages
  - Rational Team Concert
  - uDeploy
  - SmartCloud Orchestrator
- Improve communication and collaboration with cross-platform release planning
  - IBM Collaborative Lifecycle Management
  - Smart Cloud Control Desk

# Solutions for DevOps Lifecycle

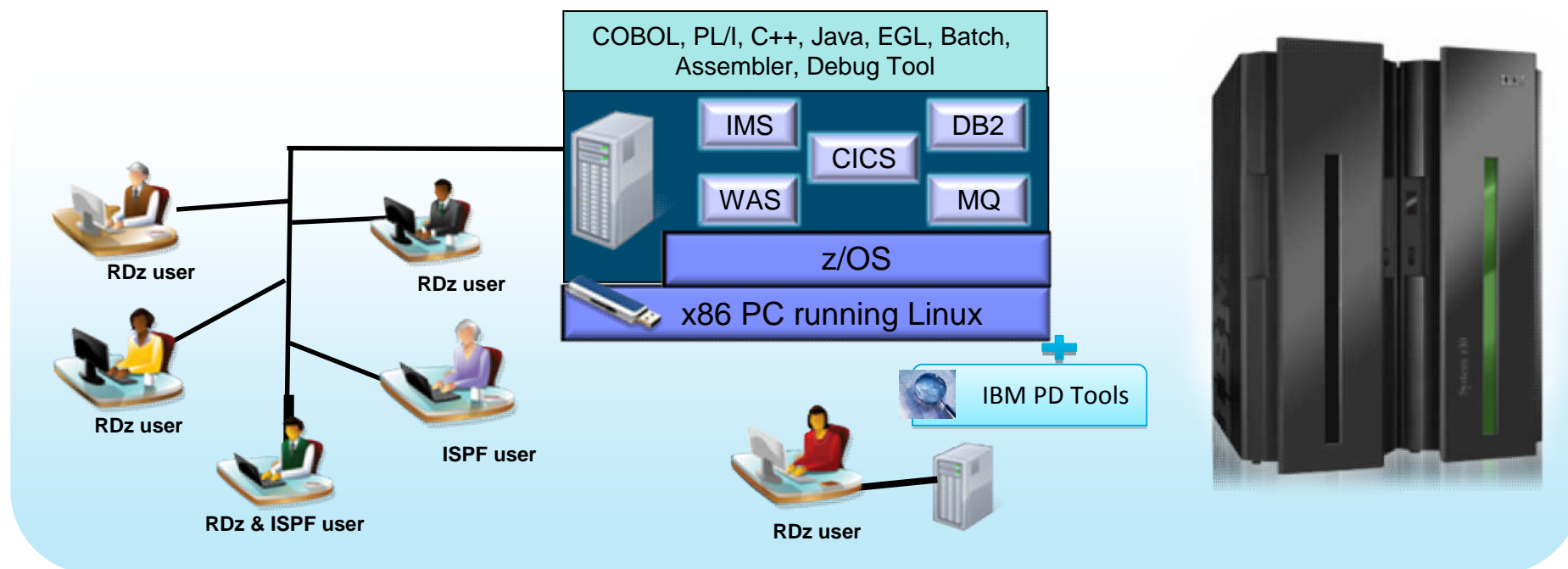
*Continuous build and test of cross-platform systems*



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

# Rational Development and Test Environment for System z

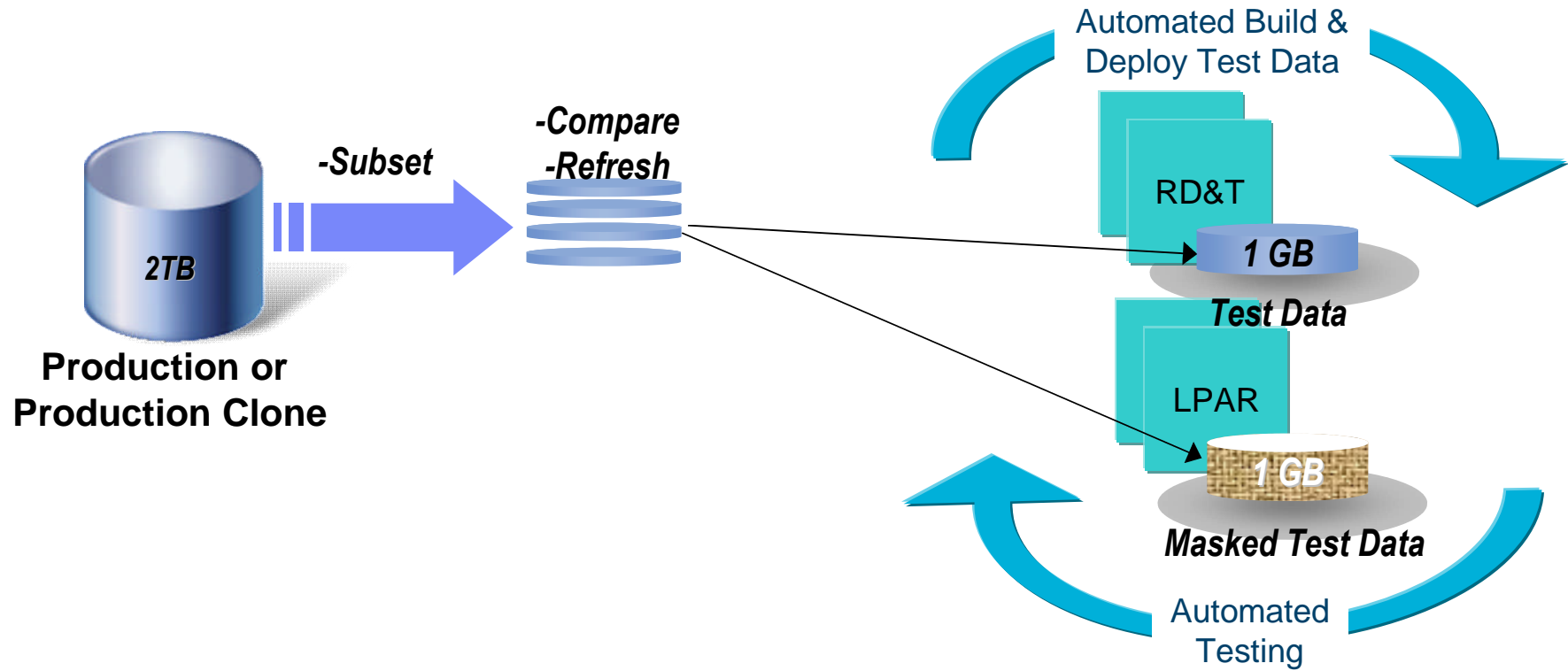
*The ultimate in modern application development for System z*



- Liberate developers to rapidly prototype new applications
- Develop and test System z applications anywhere, anytime!
- Free up mainframe development MIPS for production capacity
- Eliminate costly delays by reducing dependencies on operations staff

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# Create, secure, and deploy test data



Create "right-size" production-like environments for application testing

De-identify sensitive information with realistic *but fictional* data for testing & development purposes

Automated test data deployment for each build and test

Optim

RTC

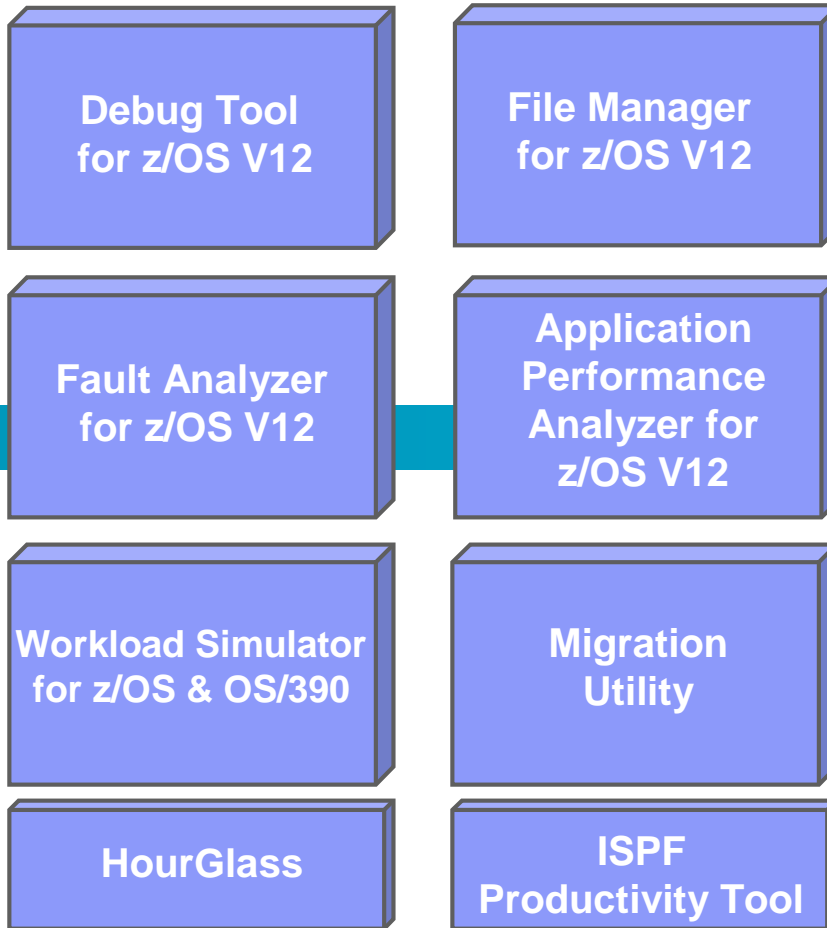
# IBM Problem Determination Tools Suite for z/OS

Best of breed application development tooling

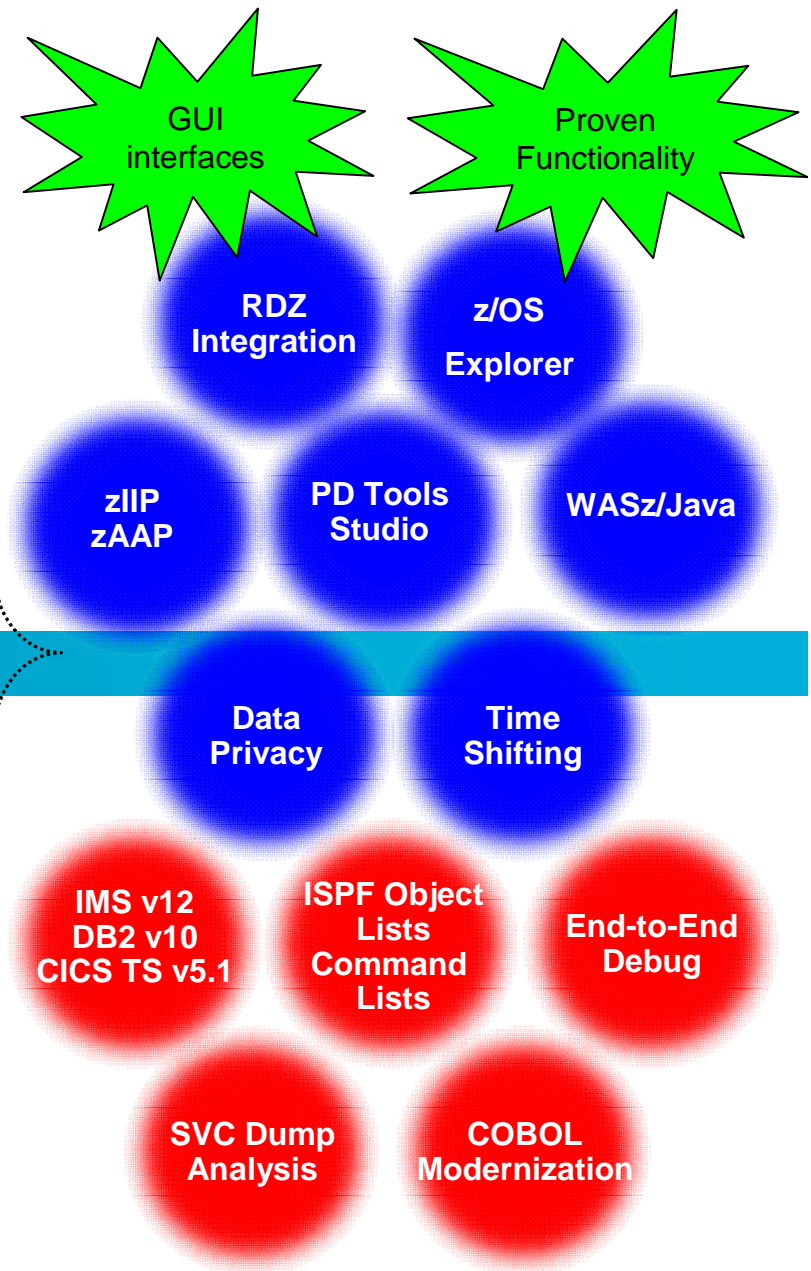
IBM 2013 Current Offerings

(watch this space)

IBM Problem Determination Tools



[www.ibm.com/software/awdtools/deployment](http://www.ibm.com/software/awdtools/deployment)



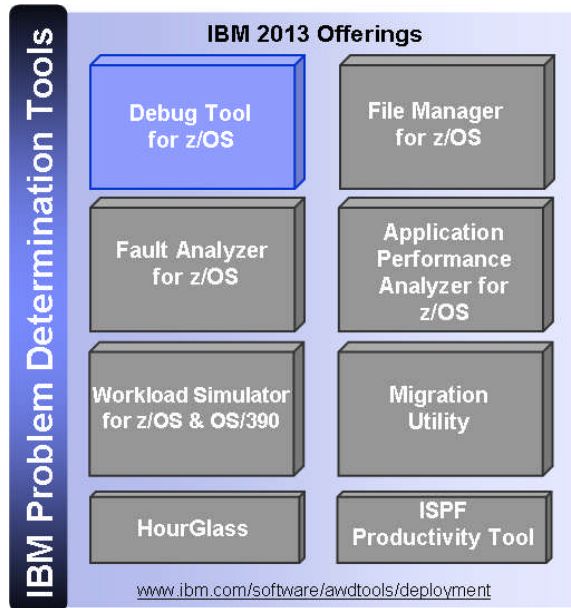


# *z/OS Problem Determination Tools*

## *Core Product descriptions*

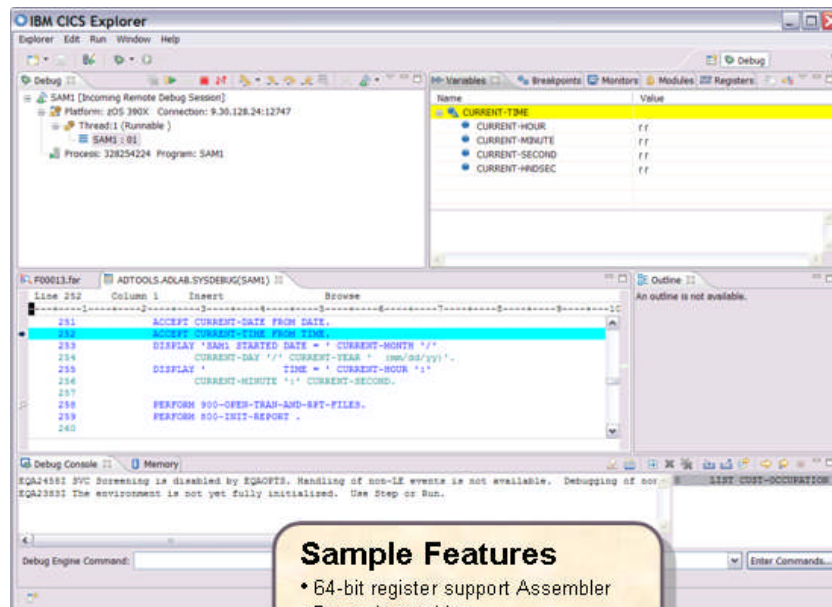
- **Debug Tool z/OS**
  - Interactive source level debugging for multiple languages
- **Fault Analyzer for z/OS**
  - Captures and analyzes exceptions to provide information about application and environment
- **File Manager for z/OS**
  - Manages production, test, and development data across multiple file formats and storage media
- **Application Performance Analyzer for z/OS**
  - Helps maximize application performance and resource consumption
- **Workload Simulator for z/OS and OS/390**
  - Regression, performance, stress, function, and capacity testing
- **HourGlass for z/OS**
  - Date and Time manipulation without resetting the system date
- **Migration Utility for z/OS**
  - Converts CA-Easytrieve applications to standard IBM Enterprise COBOL, allowing continued use of the Easytrieve syntax

# The IBM Problem Determination Tools Suite for z/OS



## Debug Tool for z/OS Highlights

- Interactive program debugging
- Easy setup – debug your program quickly
- Multiple languages:
  - COBOL, PL/I, C/C++, Assembler
- Multiple z/OS environments
  - Batch, TSO, CICS, IMS/TM and DB, DB2 SP's, WAS/z, USS
- Code Coverage reporting
- COBOL Modernization



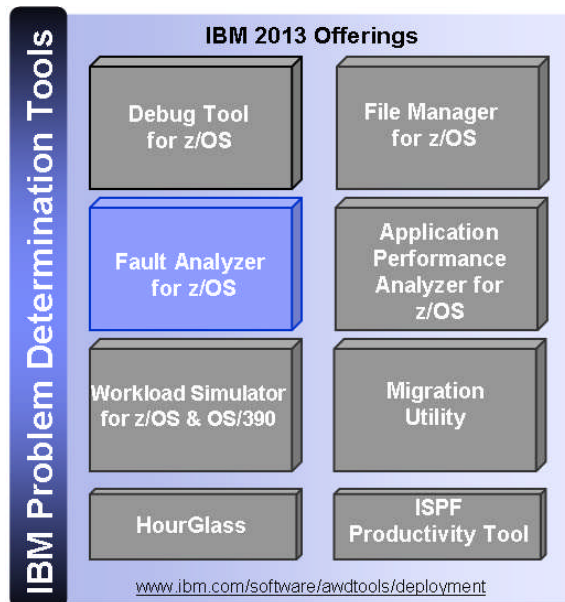
### Sample Features

- 64-bit register support Assembler
- Dynamic patching
- Save and restore sessions settings
- Object level disassembly debugging

## Key Value:

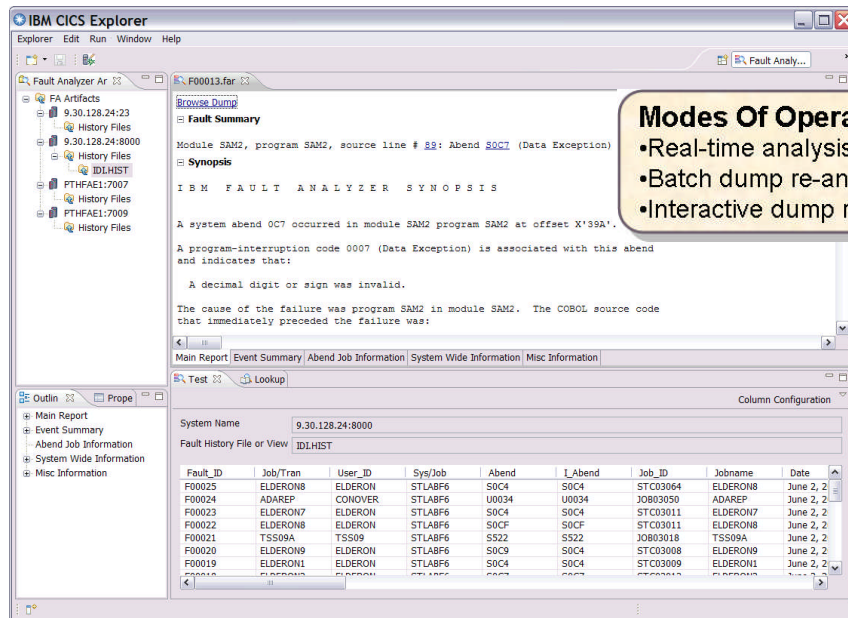
- *One Debugger for ALL Environments*
  - Same look and feel across – Batch, CICS, IMS, DB2, MQ – learn/use one product
  - Same Command Set provides a reduced learning curve

# The IBM Problem Determination Tools Suite for z/OS



## Fault Analyzer for zOS Highlights

- Automatic program abend/exception capture
- Program source-level reporting
- Provides a detailed report about program failures to help resolve them quickly
- Offers a view of storage contents, trace tables and terminal screen images at the time of failure to help speed corrective action
- Multiple languages:
  - COBOL, PL/I, C/C++, ASM, JAVA
- Multiple z/OS environments
  - Batch, TSO, CICS, IMS/TM and DB, DB2 SP's, USS



## **Key Value:**

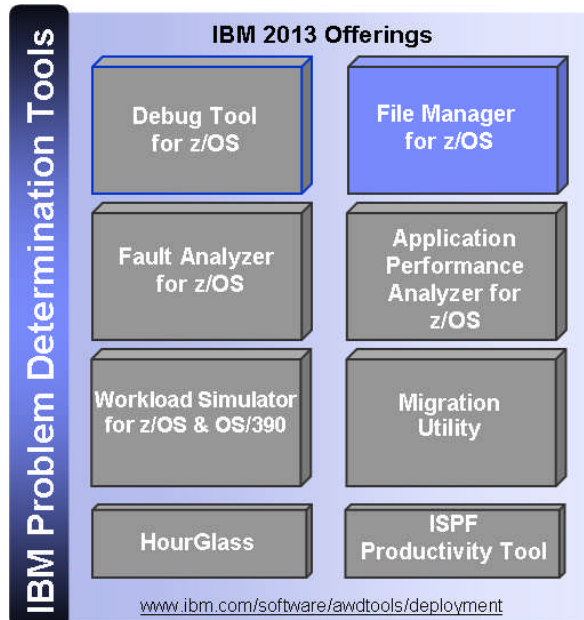
Analysis at the application level

Tells the developer:

What happened, and why? What program?

Line of code? What variables?

# The IBM Problem Determination Tools Suite for z/OS



## File Manager for zOS Highlights

- Data manipulation using COBOL, Assembler and PL/I record layouts interactively or in batch
- Comprehensive, user-friendly, batch and interactive utilities
- Supports data from multiple environments
  - VSAM, QSAM, IMS, DB2, Websphere MQ, IAM, OAM, HFS or z/Files

**Files, Queues, and Database**

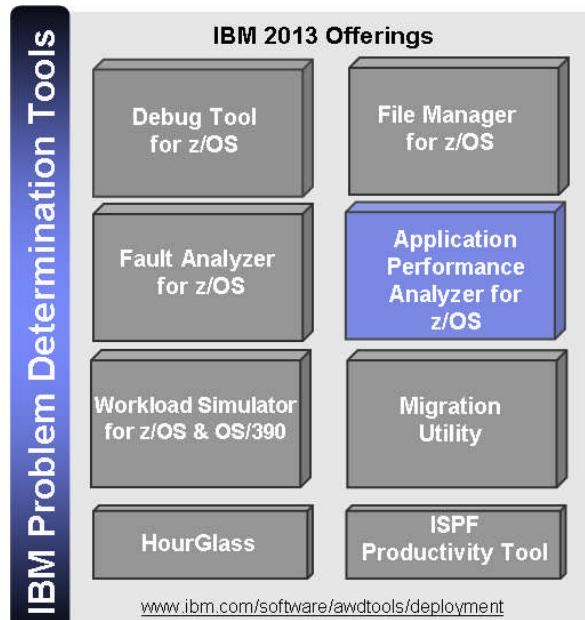
**View Data in a Table Format and Single Record Format at the same time.**

CUST-ID	NAME	ACCT-BALANCE	ORDERS-YTD	ADDR	CITY	STATE	COUNTRY	MONTH(1)	MONTH(2)	MONTH(3)	MONTH(4)	MONTH(5)	MONTH(6)
01001	Lynn, Amanda	47.48	9	119 North Lake Road	Spirit Lake	IA	USA	1.21	1.21	1.21	1.21	1.21	1.21
02220	Graham, Anna	410.00	0	89 Clay Springs Rd	Alton	NY	USA	4.94	1.00	3.00	10.89	8.00	10.89
02222	Majoy, Art	1299.14	3	1512 Rose Bluff	Hamden	MO	USA	3.43	15.00	10.89	4.84	7.00	4.84
03003	Freestone, Azza	0.00	7	33 Bonshaw	Larose	WY	USA	4.89	10.89	4.84	3.43	4.89	3.43
03390	Dendr, Darsah	74.00	3	449 Brown Street	Sandstone	IN	USA	6.00	0.00	0.00	2.42	6.00	2.42
03970	Palmer, Ford	293.27	12	3039 Manning St.	Dewsbury	MI	USA	12.00	0.00	2.42	7.24	12.00	7.24
04021	Berly, Bridgton	311.00	10	9465 James Road	Madison	NE	USA	2.42	2.42	7.24	9.00	2.42	10.00
04104	Lender, Annette	489.84	7	4127 Ruse Street	Taladega	AL	USA	3.94	7.24	13.00	15.00	7.24	15.00
04711	Dubree, Duatia	192.98	11	9229 Delegate's Row	Indianapolis	IN	USA	4.84	0.00	7.24	1.21	0.00	4.84
04800	Benn, Chris F.	1001.01	3	1118 Russetta	Litch	IL	USA	2.00	4.00	6.00	8.00	10.00	12.00
07008	Roussac, Roger	296.97	10	4411 Northside Pkwy	Stoner Elk	NC	USA	0.00	14.82	32.47	0.00	10.89	0.00
07044	Shauer, April	89.83	7	7331 Gulf Shore Dr.	Naples	FL	USA	2.00	4.00	6.00	8.00	10.00	12.00
07077	Mann, Mr. E.	421.00	1	24 Valentine Rd	Denville	TX	USA	0.00	0.00	0.00	0.00	0.00	0.00
07078	Claw, Mike	232.25	9	1445 Crystal Springs	Dowagiac	MI	USA	11.89	10.01	14.89	0.00	1.00	10.89
07970	Furner, April	122.15	1	1 955 Dundee	London	ON	Canada	9.48	9.48	9.48	9.48	9.48	9.48
07880	Haka, Audrey	450.51	2	90 South Cascade	Bozler	CO	USA	2.42	49.41	9.41	2.42	1.21	2.42
08085	Moore, Amline	490.95	3	4700 S. Syracuse	Denver	CO	USA	7.24	0.00	0.00	7.24	0.00	9.36
10027	Bertrachs, Rose	11.11	0	Waldensgraben 46	Frankfurt	Germany	Germany	10.89	0.00	1.21	1.21	1.21	1.21
10290	Wells, Allison	731.24	4	124 Nicholson Rd	North Perth	Australia	Australia	10.89	0.00	0.00	0.00	14.52	10.89
10304	Geat, Polly	244.42	1	1341 Oaks Road	Dowagiac	MI	USA	4.84	9.48	9.48	9.48	9.48	9.48
11004	Shaw, Lane	*****	3	1146 Regisville Road	Portage	MI	USA	7.24	0.00	0.00	0.00	0.00	0.00
13002	Turner, Paige	234.00	4	2039 East Creek Rd	Bozler	CO	USA	0.00	0.00	0.00	0.00	0.00	0.00
13003	Avayter, Dinah	622.14	4	439 Oak Grove Rd	Spirit Lake	IA	USA	2.42	0.00	0.00	0.00	0.00	0.00

## High Value Capabilities:

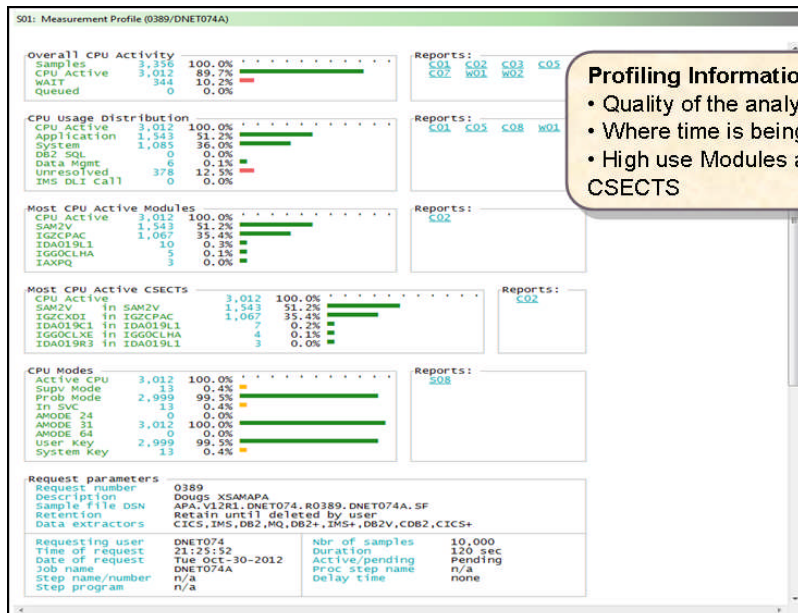
- Edit entire files regardless of size
- Scramble sensitive data to insure data privacy
- Format data w/ COBOL, PL/I, or ASM
- Quickly locate fields with invalid values
- Generate test data based on record layouts
- Compare data/load modules between datasets using field level mapping

# The IBM Problem Determination Tools Suite for z/OS



## Application Performance Analyzer for z/OS

- Identify performance and response time problems
- Reduce batch application turnaround time
- Multiple languages:
  - COBOL, PL/I, C/C++, ASM, Java, Natural
- Multiple z/OS environments
  - Batch, CICS, IMS, DB2 (SP, DDF/DRDA), Websphere MQ, WAS, Adabas



**Profiling Information Includes**

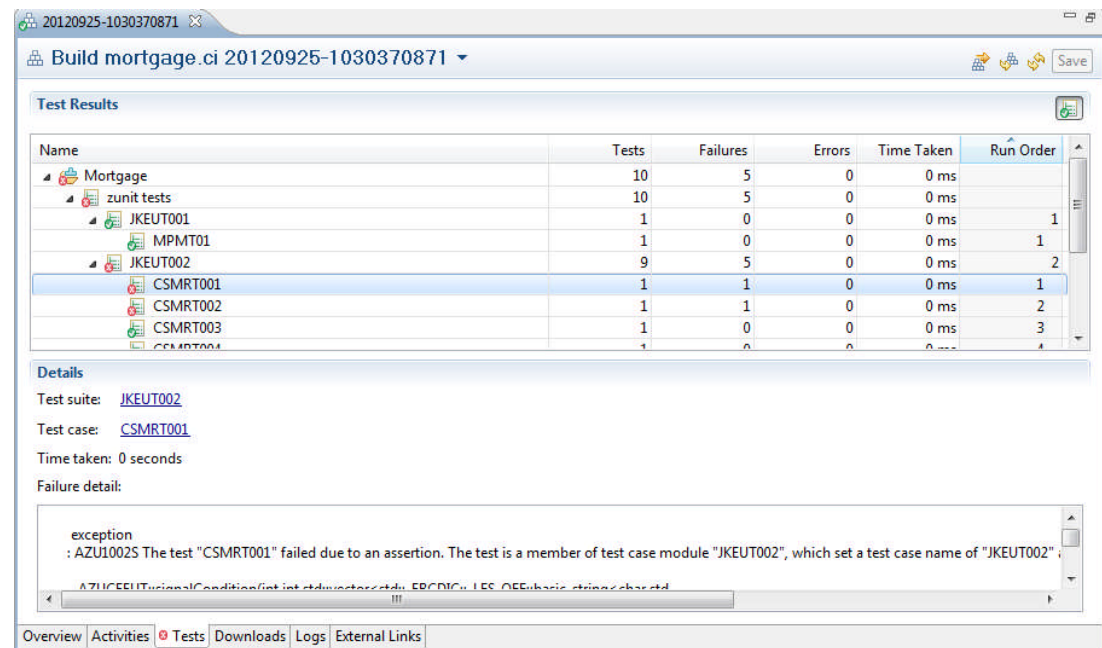
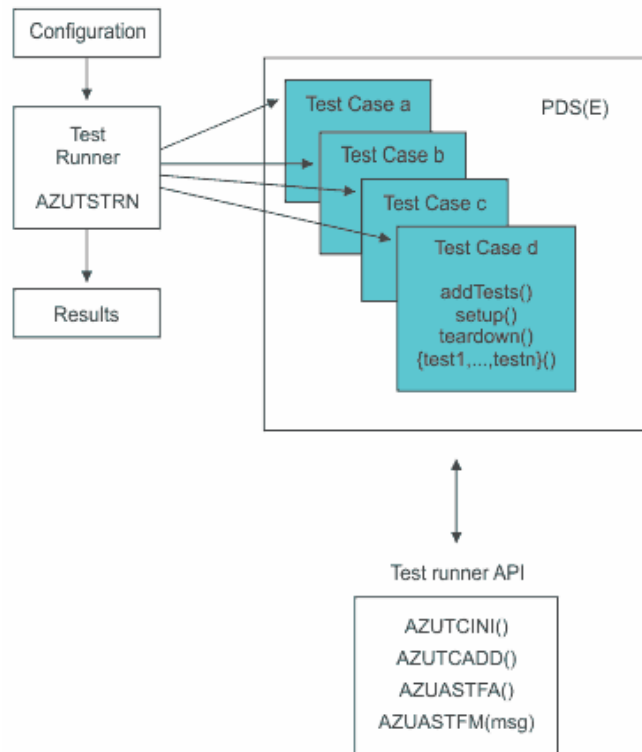
- Quality of the analysis
- Where time is being spent
- High use Modules and CSECTS

## **Value APA:**

- Measures system resources application problems
- Minimizes time to identify and resolve
- Helps to maximize performance of HW and SW
- Aids in app design, development and maintenance cycles

# Run Unit Testing (zUnit) as part of the build

zUnit is an adaptation of the xUnit framework for writing code to run repeatable, self-checking unit tests. The ideas and framework developed in xUnit for unit testing object-oriented code are adapted by zUnit for testing Enterprise COBOL and PL/I code.



Running zUnit as part of the build

# Decouple subsystem teams using Green Hat

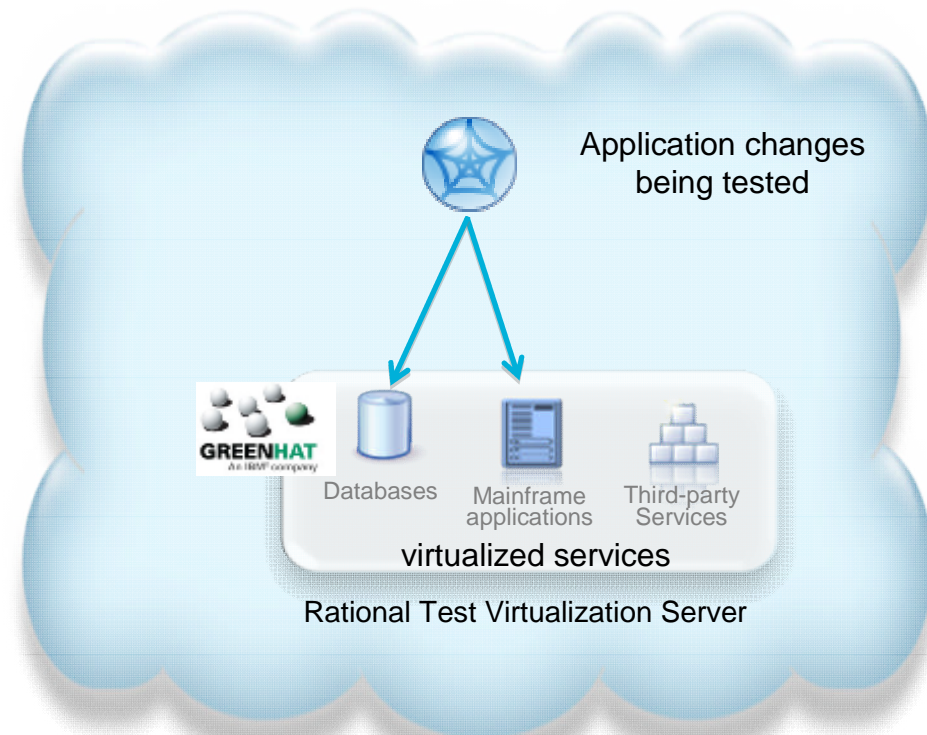
*Improve testing with Green Hat service simulation*

Simulate subsystem dependencies

- Test impact of latency
- Test application response to unresponsive services

Create a stable test environment

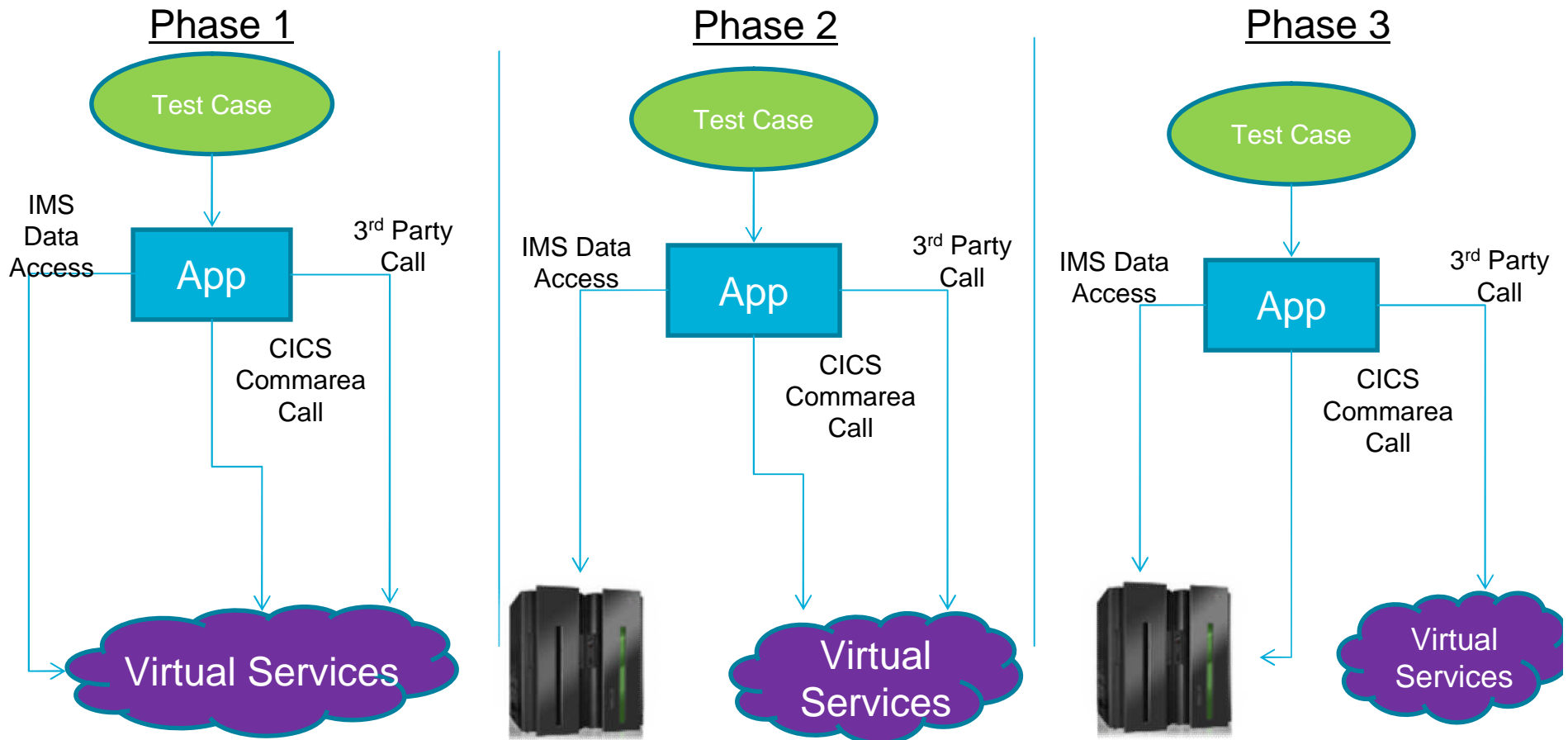
- Simulate “public” services
- Reduce capacity requirements on infrastructure
- Improve security by reducing access from external services



# Testing with dependency virtualization

Controlled large system testing by isolating components under test

- Easier problem determination
- Lower test environment capacity requirements
- Improved component quality





# SIBRA GmbH cuts developer effort by at least 50 percent

## IBM Rational software keeps a vital project within budget and on time

### The need:

SIBRA needed a source code analyzer tool to identify in mainframe applications all instances of a serial number and its relationship to other data fields caused by moves and redefinitions.

### The solution:

SIBRA used IBM® Rational® software to create an inventory of the affected applications and perform impact analyses to get work item lists, gaining an overview of the changes' quantity and complexity.

### The benefit:

- Helped SIBRA update the serial number in a prototype scenario 50 percent faster than it could using other tools
- Boosted productivity, as performing tasks manually would have taken 10 to 20 times longer than it did using Rational software
- Enabled SIBRA to complete projects on time and within budget

*“With Rational Asset Analyzer, you can see all the statements that are affected and the complexity of the required changes. You can minimize project risk, and the project planning is nearly perfect.... So the project will be within budget and on time.”*

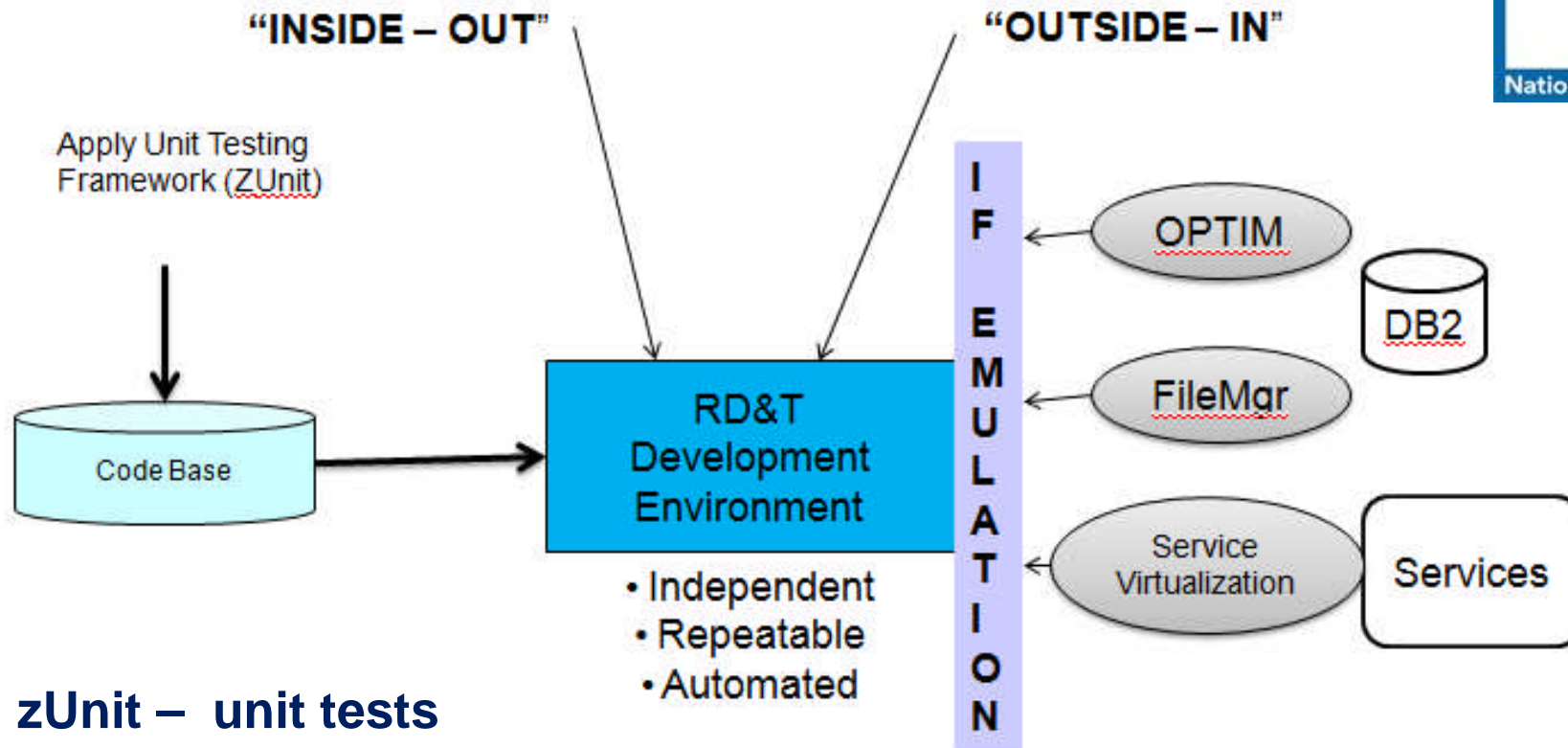
— Eberhard Ramm, owner and chief executive officer, SIBRA

### Solution components

- IBM® Rational® Asset Analyzer for System z®
- IBM® Rational® Developer for System z®

**SIBRA**  
Ingenieurgesellschaft  
für Datentechnik mbH  
Germany

# Nationwide's Mainframe tooling approach



**zUnit – unit tests**

**RAA – identify test code base & dependencies**

**OPTIM & File Manager – manage test data**

**Service Virtualization – emulate services**

## ***HSBC Bank Argentina S.A. - An International Bank in Argentina***

### *Business Challenge*

- Needed to reduce mainframe application development costs and quickly identify and fix root-cause issues impacting application performance and reliability

### *Solution*

Using IBM Problem Determination Tools, the bank's development team modernized its processes for developing back-end IBM CICS applications with Rational Developer for z.

-IBM Debug Tool for z/OS

-IBM Fault Analyzer for z/OS

-IBM File Manager for z/OS

### *Benefits*

- Decreased abend-resolution time by approximately significantly!
- Increased programmer productivity by **10%**
- Decreased application development costs
- Improved application performance

### *Client Quote*

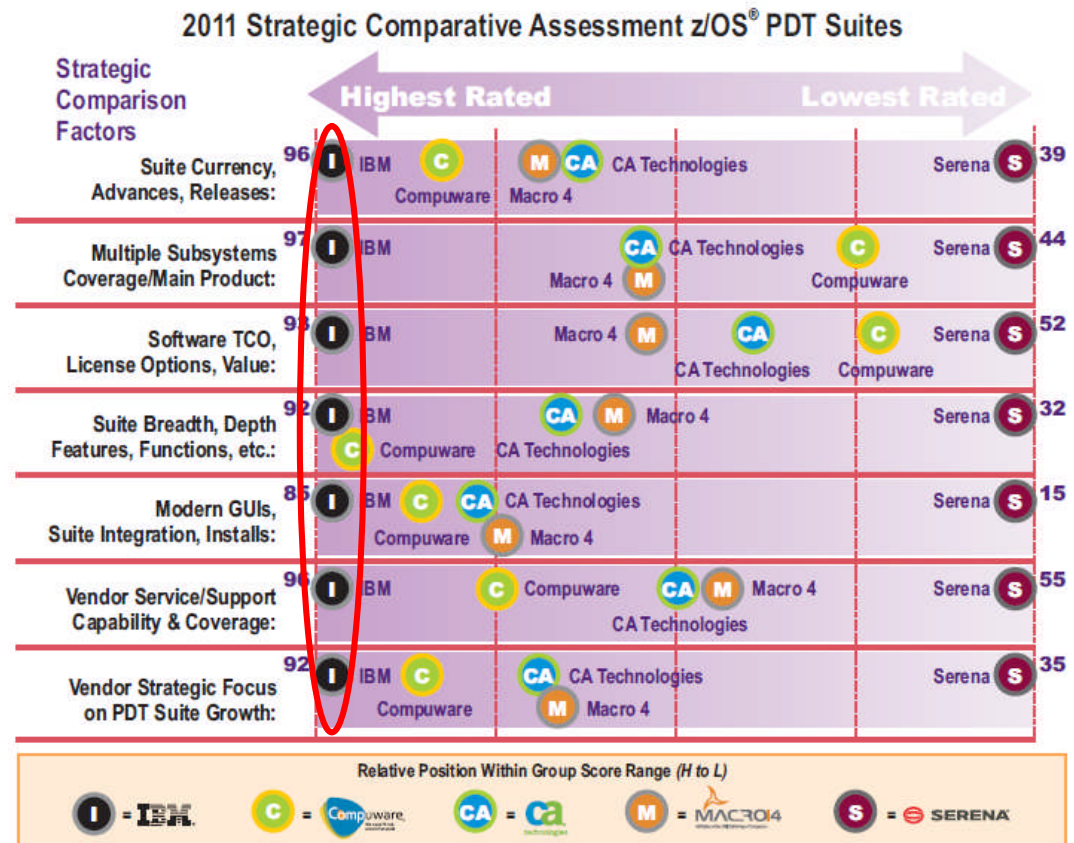
***"We've increased programmer productivity by 10 percent and cut development costs. Not only that, but we've experienced significant decreases in the number of transaction failures within our applications."***

# IBM Problem Determination Tools Wins Top Spot

Software Strategies Analyst Report, April 2011

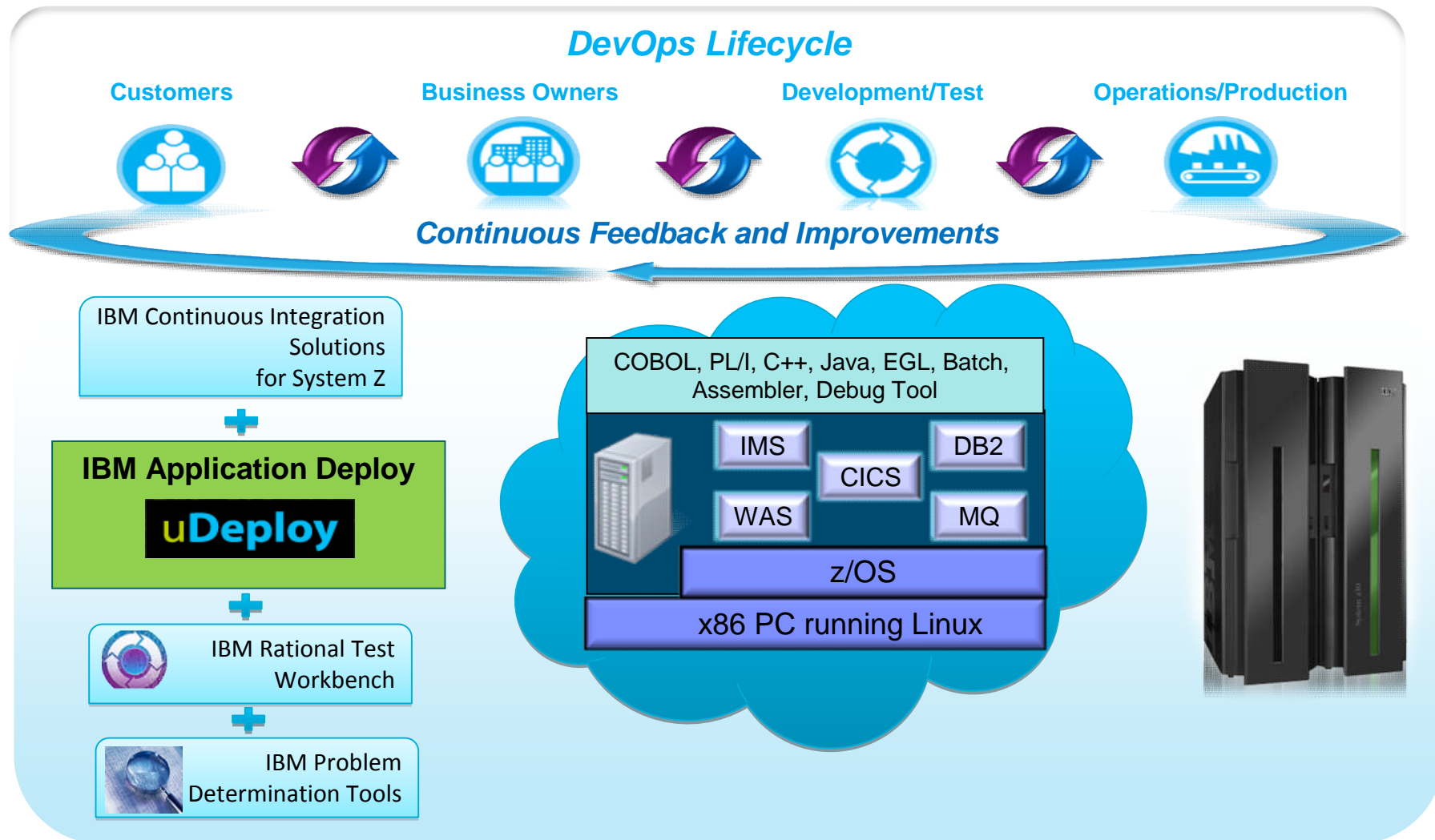
## IBM's PD Tools Suite Extends Technology Lead:

- IBM successfully challenged existing vendors in this segment since 2000
- Modern, well-featured, fully integrated, inclusive, and good-value
- The latest suite (V12) has now extended clear technology, feature and functional leadership over and above this reports findings



©2011 Software Strategies

# Summary



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# Resources





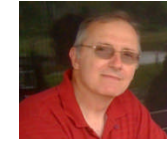

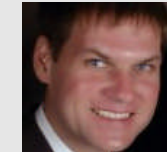



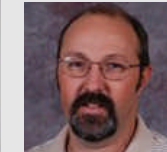
- Websites:
  - [Continuous Integration Solution for System z](#)
  - [Service Virtualization](#)
  - [IBM PD Tools for z/OS](#)
  - [IBM Rational Development and Test Environment for System z](#)
- White papers & tech docs
  - [Analyst Report: IBM z/OS Problem Determination Tool Suite Leads Again](#)
  - [Introduction to System z Problem Determination Tools within Rational Developer for System z](#)
  - [IBM z/OS application continuous integration:Part 2. Continuous testing at all levels](#)
- Books
  - [Service Virtualization for Dummies](#)
  - Redbook [zPDT Volume 1](#)
- Education:
  - [RTC Distance learning class](#) (No charge)

# Questions



**IBM DevOps Solution Series**  
*5-part webcast series with IBM DevOps experts*



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 	<p><b>IBM DevOps solution : Continuous Testing to save costs and improve application quality</b></p> <p><i>Presenters: Rosalind Radcliffe and Marty Shelton</i></p>	<p>Sept 11, 2013</p>
 	<p><b>IBM DevOps solution : Continuous Release and Deployment to compress delivery cycles</b></p> <p><i>Presenters: David Myers and Mike Baskey</i></p>	<p>Sept 18, 2013</p>

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