



IBM Software Group

Rational software quality for enterprise business applications for System z

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Rational software



ON DEMAND BUSINESS™

Agenda

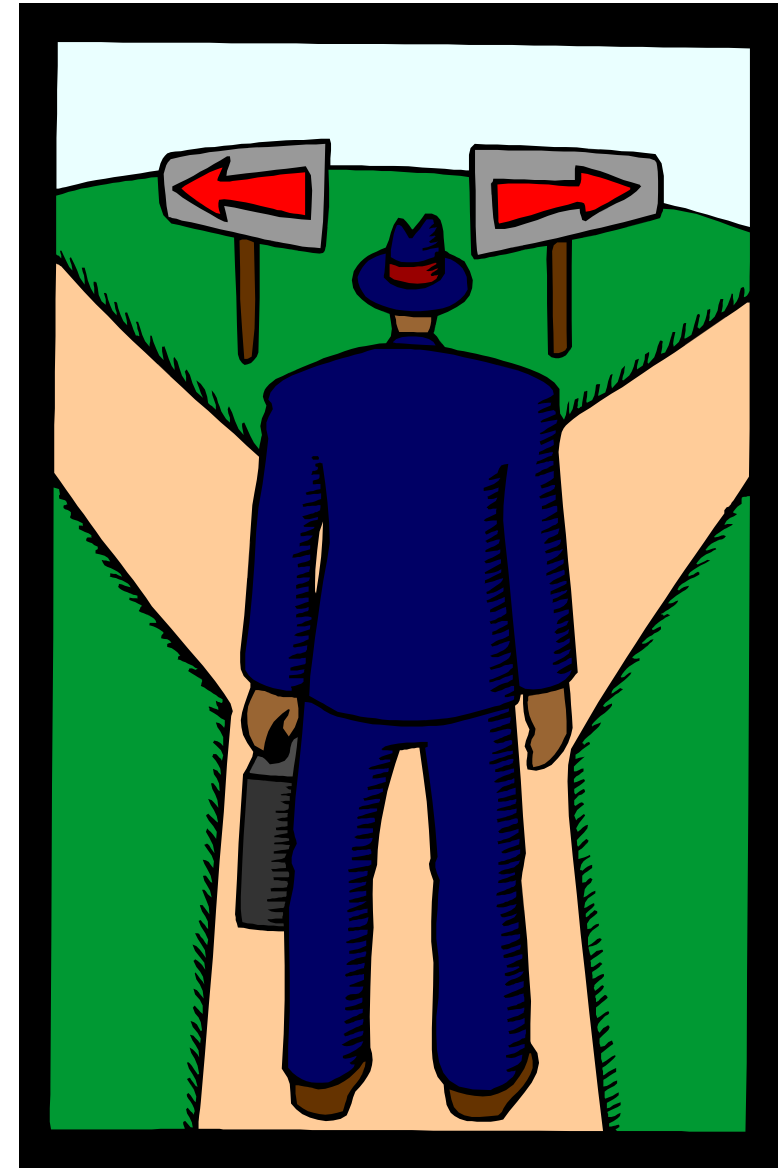
- Introduction
- Automated Functional Testing
- Manual Functional Testing
- Automated Performance Testing
- Summary



Introduction

- How can I test my enterprise applications?
 - ▶ ***Some will stay terminal-based***
 - I need to test after each modification
 - ▶ ***Some are migrating***
 - I need to test the new versus the old

I'd like to use only one set of tools to test both types of application.



The Tools

- IBM Rational Functional Tester (“RFT”)
 - ▶ Extension for Terminal-based Applications (“FTE”)
- IBM Rational Manual Tester (“RMT”)
- IBM Rational Performance Tester (“RPT”)
- IBM Workload Simulator (“WSim”)



Agenda

- **Introduction**

- **Automated Functional Testing**

- ▶ What is it?
- ▶ What does IBM offer?

- **Manual Functional Testing**

- **Automated Performance Testing**

- **Summary**



Functional Testing

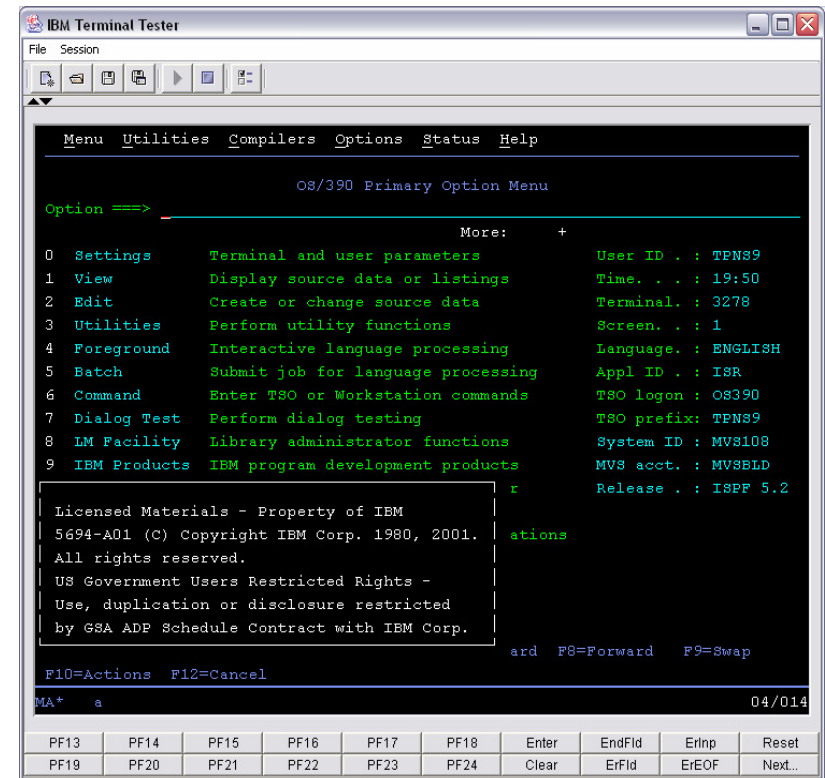
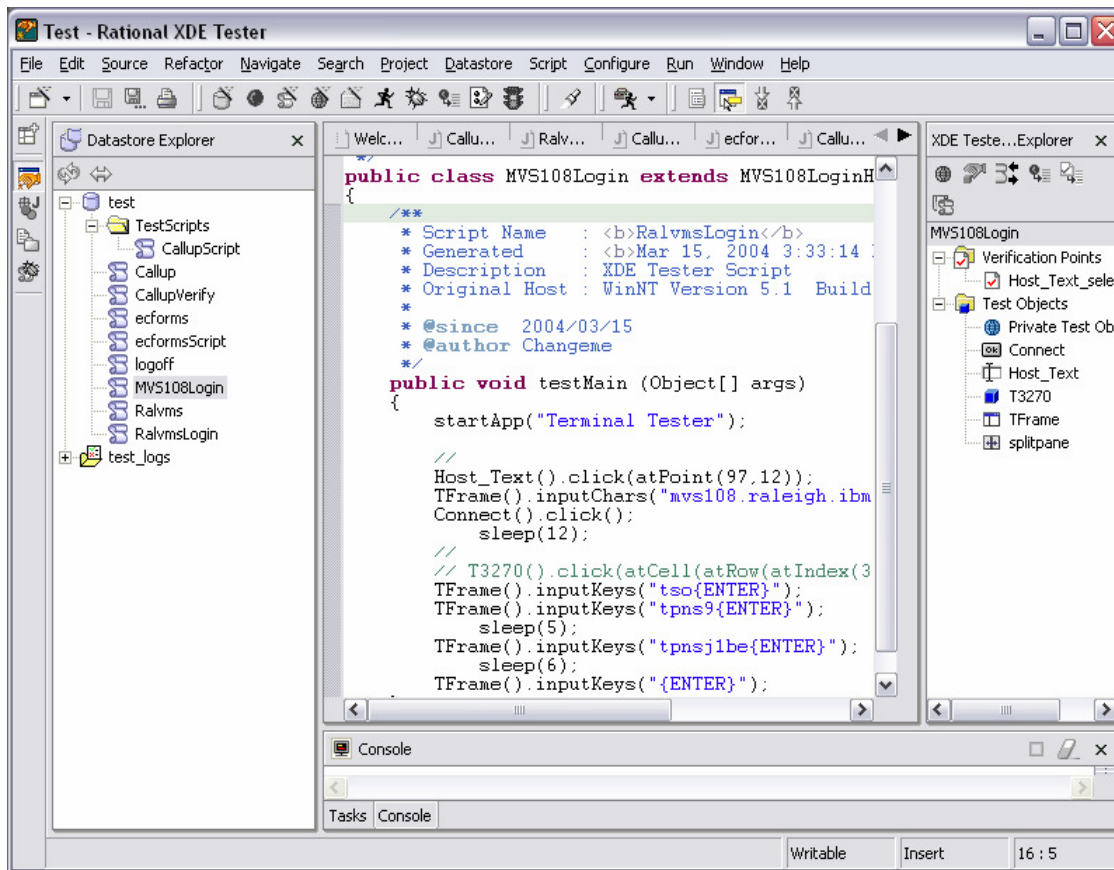
- **Functional testing**
 - ▶ Testing that ignores the internal mechanism of a system or component and focuses solely on the outputs generated in response to selected inputs and execution conditions. Synonym: black-box testing [[IEEE 90](#)].
 - ▶ Testing conducted from the users viewpoint
- In functional testing, we think of the program as a collection of functions
 - ▶ We test it in terms of its inputs and outputs.

➤ Rational Functional Tester



IBM Rational Functional Tester Extension for Terminal-based Applications

IBM Rational Functional Tester Extension for Terminal-based Applications lets you test your System z terminal-based applications with the same tool – IBM Rational Functional Tester – used to test your Java, .NET and Web-based client server applications.



Functional Tester Extension for Terminal-Based Applications

Extend your testing reach

- Optional extension to Rational Functional Tester supports the testing of terminal-based applications.

- ✓ 3270 (System z™)
- ✓ 5250 (System i™)
- ✓ VT100 (UNIX)

- Same tooling for automated testing solution for legacy ***and*** modernized apps

Browser UI

Java UI

.NET UI

Host UI

The image displays four overlapping screenshots illustrating the testing reach of Rational Functional Tester:

- Browser UI:** A Microsoft Internet Explorer window showing the Google homepage.
- Java UI:** A Rational XDE Tester IDE window showing Java code for a test script, including imports for `CallupVerifyHelper`, `Callup`, and `CallupVerify`.
- .NET UI:** A web application window titled "Account Management System" by "FITCH & mather", featuring sections for "Search Market", "Market Summary", and "Top Stories".
- Host UI:** A terminal window titled "Session A" showing a VTAM-style mainframe interface. The text includes "WELCOME TO IBM GLOBAL SERVICES", "RESEARCH TRIANGLE PARK", "INFORMATION", "SYSTEMS", and "VTAM Users: Enter VMEXIT to Exit". It also shows a login prompt for "USERID" and "PASSWORD".



Recording Scripts

Data Driven Testing

Data Driven Testing

- ▶ Separates test data from test script
- ▶ Enables a single script to run multiple tests by using multiple data sets

Wizard driven process

- ▶ No programming involved
- ▶ Import data from external sources

The image shows a terminal window titled "Session A - [24 x 80]" with a menu bar (File, Edit, View, Communication, Actions, Window, Help) and a toolbar. The terminal content displays a login screen for "z/VM ONLINE" with the following text:

```

WELCOME TO IBM GLOBAL SERVICES
RESEARCH TRIANGLE PARK
R R
R R III
R R I INFORMATION *
R R I *****
I SSS *****
III S SYSTEMS
S
SSS
VTAM Users:
Enter VMEXIT to Exit
Customer Service Center: 888-
USE OF THIS SYSTEM IS FOR IBM MANAGEMENT APP
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 ==>

```

Overlaid on the terminal is a dialog box titled "Insert Data Driven Actions". It contains the following sections:

- Data Drive Actions:** Choose test objects and actions to data drive.
- Populate then Select Test Objects:**
 - Press and drag hand to select test objects
 - Use selection wizard to select test objects
- Data Driven Commands:** A table with columns: Role, Test Object, Command, Variable, and Initial Value.

Role	Test Object	Command	Variable	Initial Value
	ItemText	setText	ItemText	Schubert
	_1899Text	setText	Album	String Quartets 14
	QuantityText	setText	QuantityText	1
	CardNumberIncludeTheSpa...	setText	CardNumber	1218 1014 0926 0607
	creditCombo	setText	creditCombo	Visa
	ExpirationDateText	setText	ExpirationDate	02/05
	NameText	setText	NameText	D. Bryson
	StreetText	setText	StreetText	307Calder St
	CityStateZipText	setText	CityStateZipText	Vancouver, BC
	PhoneText	setText	PhoneText	604-280-8326

At the bottom of the dialog box are buttons for "OK", "Cancel", and "Help".



Investigate Your Terminal-Based Application

Verification Points

Functional Tester Sees Data

Request Completed OK

```

Share Trading Demonstration                                     TRADER.T004

Share Trading Manager: Real-Time Quote

User Name:      JAN
Company Name:   Casey_Import_Export

Share Values:      Commission Cost:
NOW:              for Selling:      007
1 week ago:      00059.00           for Buying:      010
6 days ago:      00063.00
5 days ago:      00065.00
4 days ago:      00070.00
3 days ago:      00072.00
2 days ago:      00078.00           Number of Shares Held: 0100
1 day ago:      00077.00           Value of Shares Held: 000007900.00

Request Completed OK

-----
PF3=Return                                           PF12=Exit
MA*  a                                               01/001
    
```

Functional Tester Sees Properties

Property	Value
<input checked="" type="checkbox"/> background	BLANK
<input checked="" type="checkbox"/> blink	false
<input checked="" type="checkbox"/> foreground	GREEN
<input checked="" type="checkbox"/> hidden	false
<input checked="" type="checkbox"/> highIntensity	false
<input checked="" type="checkbox"/> modified	false
<input checked="" type="checkbox"/> numeric	true
<input checked="" type="checkbox"/> protected	true
<input checked="" type="checkbox"/> reverse	false
<input checked="" type="checkbox"/> text	000007900.00
<input checked="" type="checkbox"/> underline	false

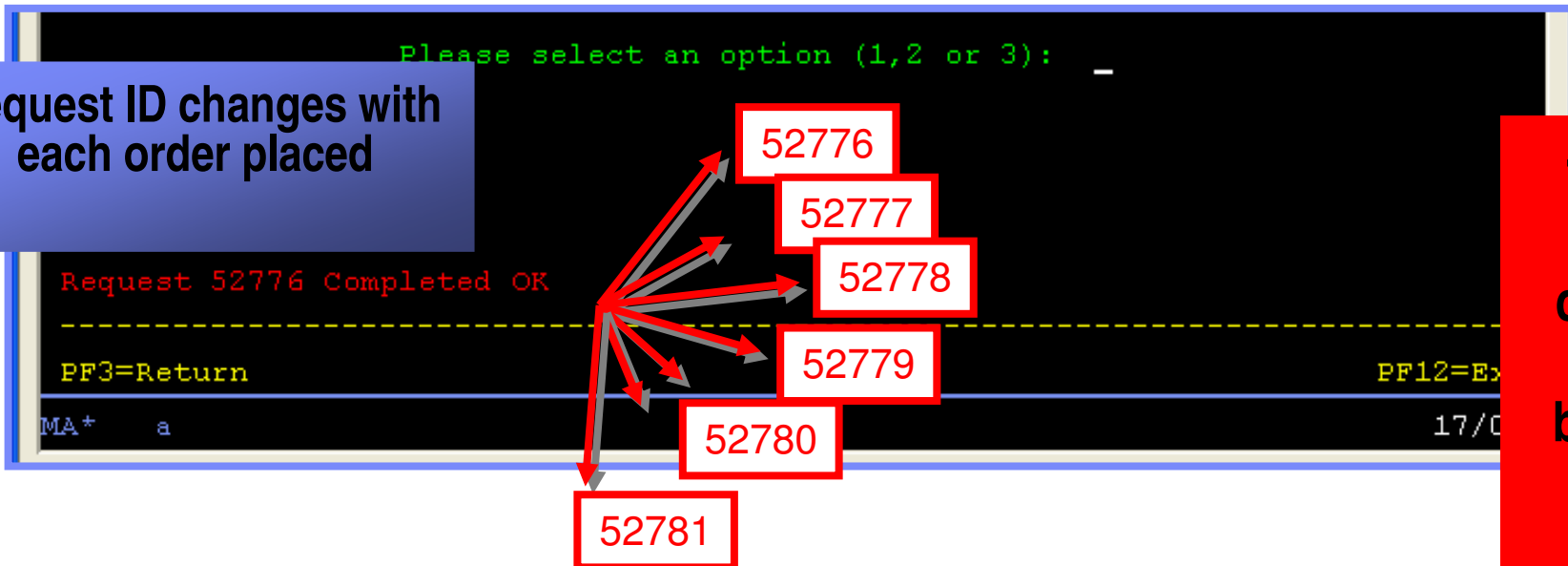
You See...

- **Automated Validation**
 - ▶ Verify any message or data on the screen
 - ▶ Verify any field attribute properties – including ones you can't see yourself



Validating Dynamic Data Without Coding

Request ID changes with each order placed



Test Fails when comparing static baseline to dynamic data

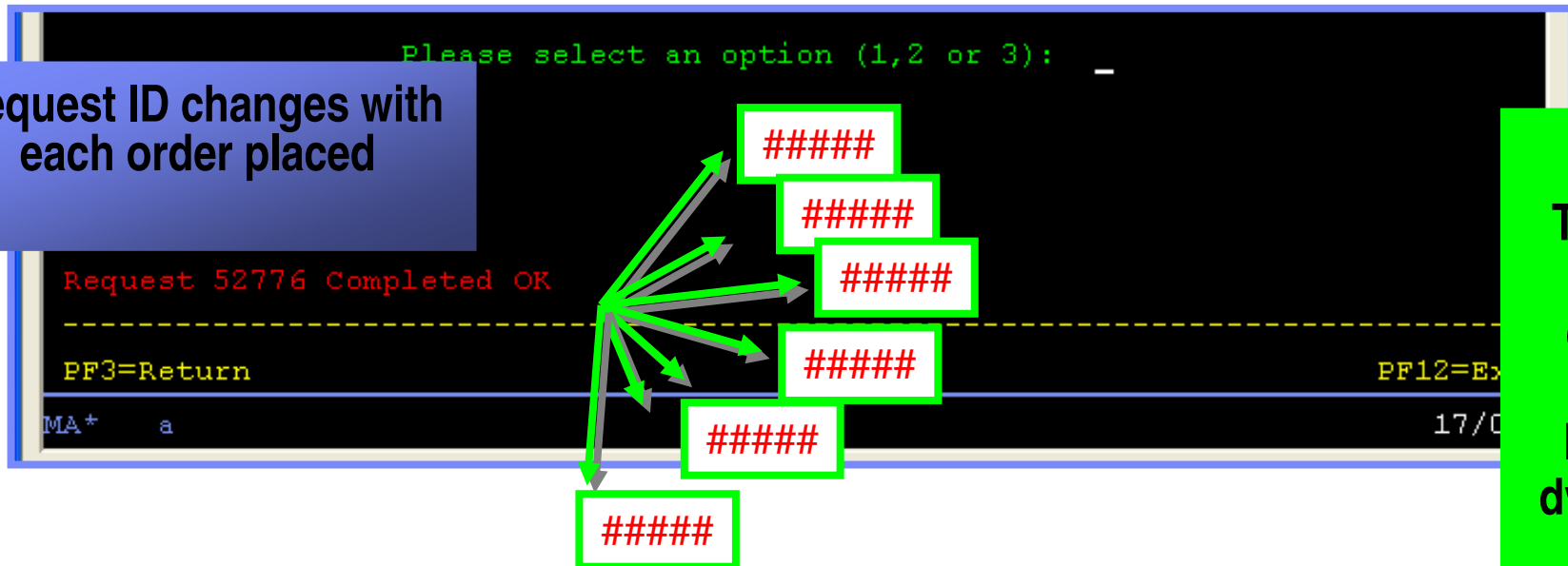
Dynamic Data/Content Matching

- ▶ Use pattern matching technique to verify dynamic data and create robust tests
- ▶ E.g. Instead of validating "Order ID 230", validate "Order ID ###" or Order ID 2##, etc.
- ▶ Build flexibility into your tests
- ▶ Accommodate a wide variety of acceptable responses as well as restrict acceptable responses to validate the application's behavior



Validating Dynamic Data Without Coding

Request ID changes with each order placed



Test Passes when comparing pattern baseline to dynamic data

- Dynamic Data/Content Matching
 - ▶ Use pattern matching technique to verify dynamic data and create robust tests
 - ▶ E.g. Instead of validating “Order ID 230”, validate “Order ID ###” or Order ID 2##, etc.
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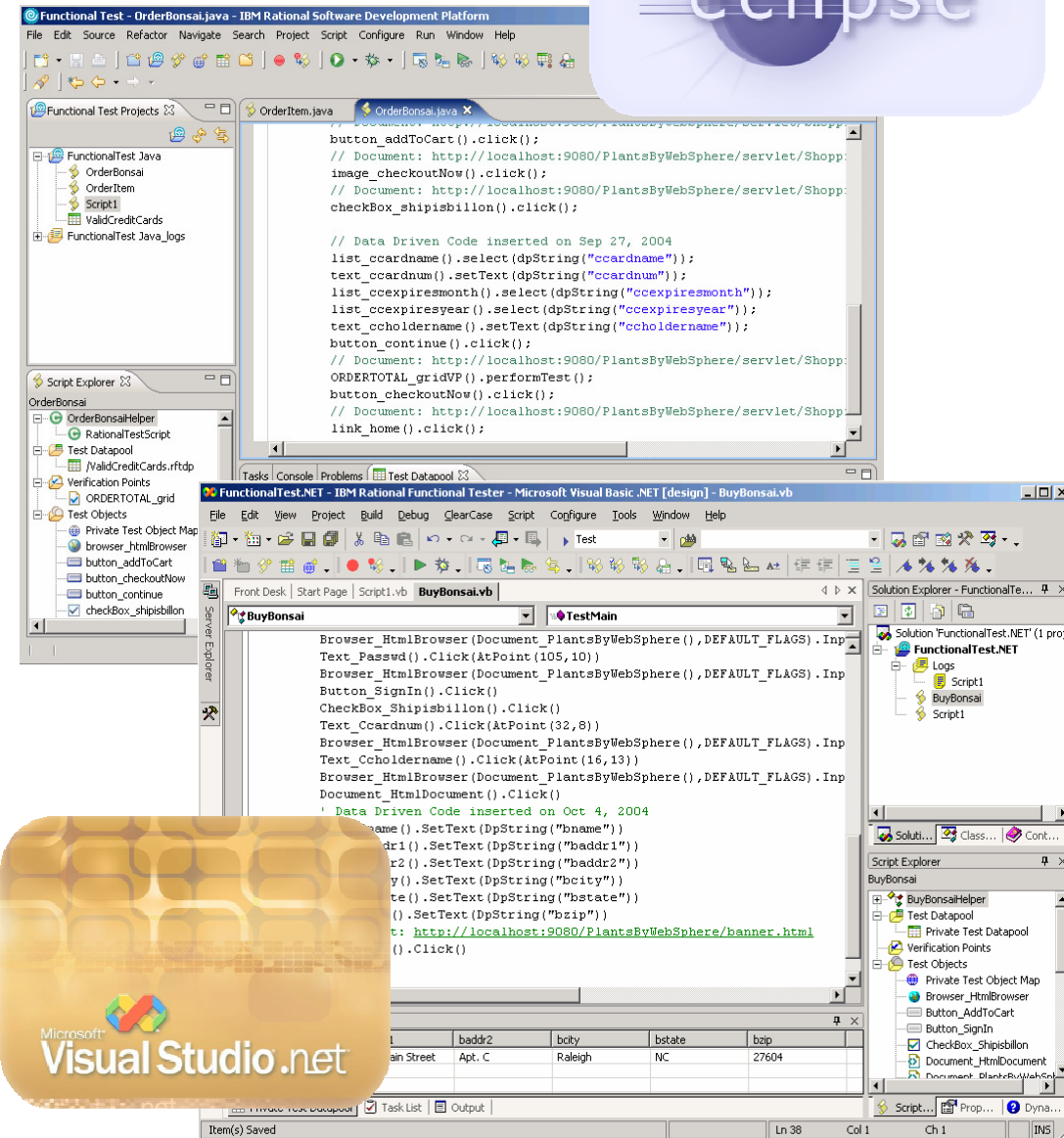


Enhancing Scripts

Powerful, Professional Debugger

- Functional Tester offers two development environments
 - ▶ Eclipse based IBM Software Development Platform
 - ▶ Visual Studio .NET

- Both environments offering powerful debugging features
 - ▶ Code assist editors
 - ▶ Step debugging
 - ▶ Variable watches
 - ▶ More...



Part of an Enterprise Quality Management System

"In the shell" integration

- ▶ Plan and manage all testing
- ▶ Execute functional tests
- ▶ Measure your progress
- ▶ Integrate to defect management

Test Log

Events

- start
- Bid on Flowers
 - Select Flowers
 - Select Springtime Flowers
 - Login
 - Place the cursor in the Credit C
 - (pass) Does the right customer name ap
 - Enter the current bid plus 1 in
 - Click on the Bid button to place
 - (Fail) Verify the Your Name field**
 - (pass) Verify the Current Bid field
 - (pass) Verify the Description
 - (pass) Verify Dale in header
- stop

Properties

(not associated to any element)

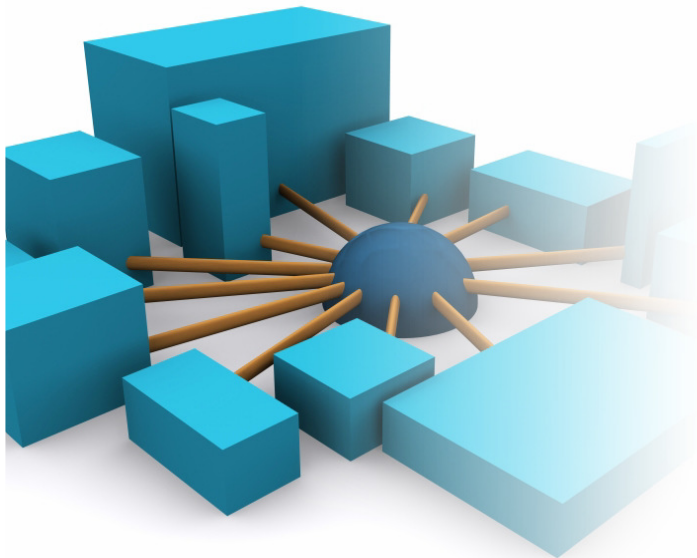
Verdict: fail

Time: Nov 13, 2006 2:00:47 PM PST

Text: Verify the Your Name field contains dale@yahoo.com

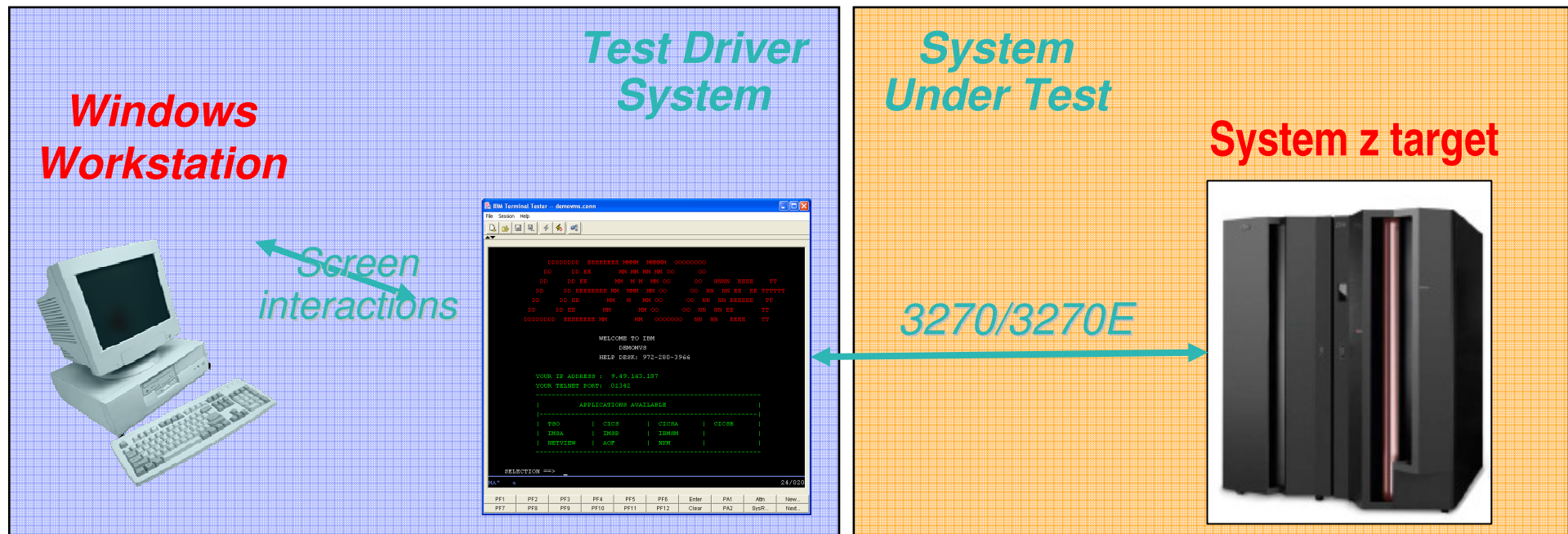
ClearQuest Records

New...
Select...
Open...
Remove



Rational Functional Tester Extension for Terminal-Based Applications

- Windows-based
- Java-based terminal emulator
- Nothing installs on the target



Agenda

- Introduction
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 - ▶ What is it?
 - ▶ What does IBM offer?
- Automated Performance Testing
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Transform Manual Testing with IBM Rational Manual Tester

From ad-hoc testing to controlled and efficient testing

Not everything can or should be automated

- Tests which will be run infrequently
- Environments too difficult to automate
 - ▶ Graphic intensive applications
 - ▶ Hardware integration or hardcopy testing
- A tool can automate parts of manual test execution
- Format all manual test script components



Transform Manual Testing with IBM Rational Manual Tester

From ad-hoc testing to controlled and efficient testing

- Support analysts, subject-matter experts and professional testers
- Develop detailed, easy to follow manual tests
- Minimize test maintenance and ensure test consistency
- Reduce human error during data entry and data verification
- Support diverse usage models and processes

Analysts



Technical & non-technical Testers



Create Robust, Reusable Manual Tests

Rich text editing
including images,
attachments, and
granular and high level
verifications

Import content from
Word or Excel

The screenshot displays the Rational software interface for creating manual tests. The main window shows a test script titled "OrderCD.rmt" with the following steps:

- Start the Classics application.
- Expand the **Composers** folder.
- Select **Symphonies 94 & 98**.
- Click on the **Place Order** button.
- Login
 - Select the user **Bob Smith**.
 - Enter the password 123456.
 - Select the Region **North America**.
 - Click the **OK** button.
- Enter the card number 5523 4567 7665 1234.
- Select **Visa** Card Type.
- Enter the Expiration Date 11/06.
- Does the right data appear?
 - Trent Culpito
 - 75 Wall St 22nd Fl
 - NY, NY 12212
 - 212-552-1867

The Properties window on the right shows the following data:

Property	Value
Attachme...	(Files)
Compare ...	5523 4567 7665 1234
Description	Enter the card num...
Execution...	
Execution...	
Name	Enter the card num...
Paste Data	5523 4567 7665 1234
Type	Step



Create Robust, Reusable Manual Tests

The screenshot shows the IBM Rational Manual Test interface. The main window displays a test script for 'OrderCD.rmt'. The script includes steps for starting the application, navigating through folders, logging in with user 'Bob Smith' and password '123456', and placing an order for 'Symphonies 94 & 98'. The order details include card number '5523 4567 7665 1234', card type 'Visa', and expiration date '11/06'. A verification step asks 'Does the right data appear?' with a checkmark. Below the script, there are input fields for 'Trent Culpito', '75 Wall St 22nd Fl', 'NY, NY 12212', and '212-552-1867'. A 'Properties' dialog box is open, showing a table of test data.

Property	Value
Attachme...	(Files)
Compare ...	5523 4567 7665 1234
Description	Enter the card num...
Execution...	
Execution...	
Name	Enter the card num...
Paste Data	5523 4567 7665 1234
Type	Step

Automated data entry
and verification
capabilities

Custom properties to
capture data and metrics
to fit any process



Create Robust, Reusable Manual Tests

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 - Click the **OK** button.
- Enter the card number 5523 4567 7665 1234.
- Select **Visa** Card Type.
- Enter the Expiration Date 11/06.
- Does the right data appear?
 - Trent Culpito
 - 75 Wall St 22nd Fl
 - NY, NY 12212
 - 212-552-1867

The 'Reuse' palette on the right contains a 'Login' folder with the following reusable steps:

- Select the user Bob Smith.
- Enter the password 123456.
- Select the Region North Ame
- Click OK

A blue callout box points to the 'Reuse' palette with the text: 'Drag and drop reusable test steps onto Reuse palette' and 'Single point updating of reused content'.



Create Robust, Reusable Manual Tests

The screenshot displays the IBM Rational Manual Test application window. The main area shows a test script for 'OrderCD.rmt'. The script includes steps for starting the application, navigating through folders, logging in, and placing an order. A blue callout box points to the 'Outline' view on the left, which provides a high-level summary of the test steps.

Outline view for test high level test summary

Test Script Content:

- Start the Classics application.
- Expand the **Composers** folder.
- Select **Symphonies 94 & 98**.
- Click on the **Place Order** button.
- Login
 - Select the user **Bob Smith**.
 - Enter the password 123456.
 - Select the Region **North America**.
 - Click the **OK** button.
- Enter the card number 5523 4567 7665 1234
- Select **Visa** Card Type.
- Enter the Expiration Date 11/06.
- Does the right data appear?
 - Trent Culpito
 - 75 Wall St 22nd Fl
 - NY, NY 12212
 - 212-552-1867

Properties Table:

Property	Value
Attachme...	(Files)
Compare ...	5523 4567 7665 1234
Description	Enter the card num...
Execution...	
Execution...	
Name	Enter the card num...
Paste Data	5523 4567 7665 1234
Type	Step

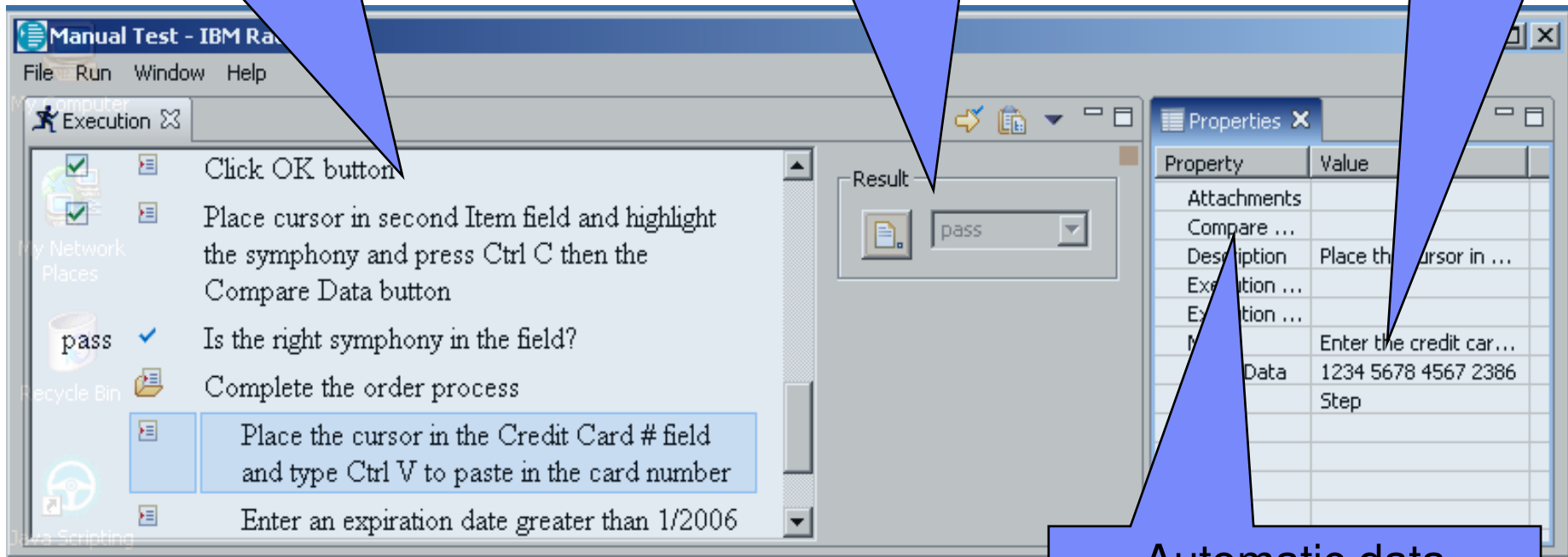


Reduce Human Errors in Test Execution

On-screen prompting of each test step. Translucent UI to maximize screen real-estate

Record result of each step from list of customizable result choices

Assisted data entry to reduce errors and improve test efficiency



Test Results are centralized; easy to create reports to show status

Automatic data comparisons to speed test execution and accuracy

Agenda

- Introduction
- Automated Functional Testing
- Manual Functional Testing
- Automated Performance Testing
 - ▶ What is it?
 - ▶ RPT for z/OS
 - WSWS
 - ▶ Workload Simulator
- Summary



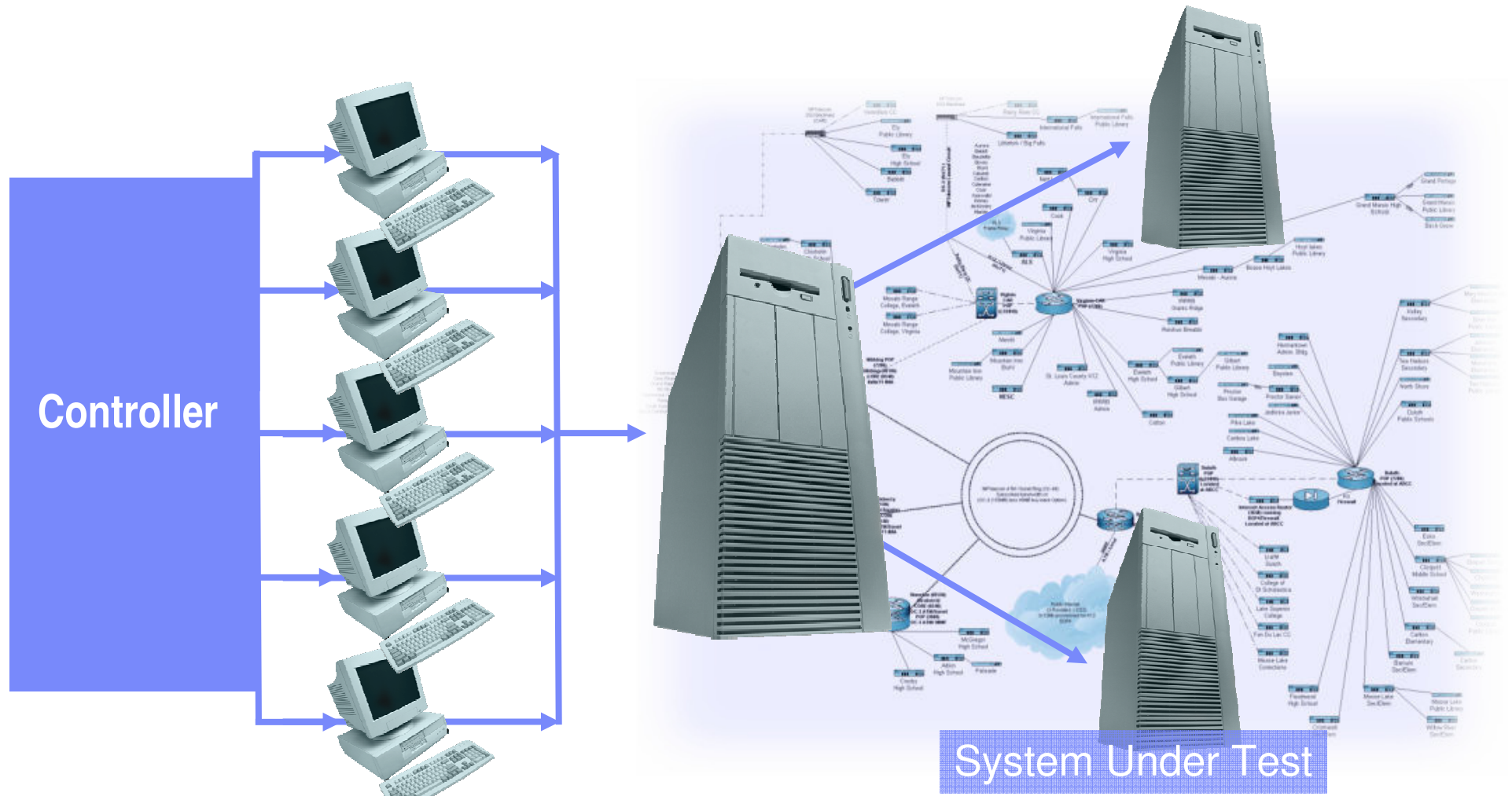
Performance Testing

- **Performance testing**
 - ▶ Testing conducted to evaluate the compliance of a system or component with specified performance requirements [[IEEE 90](#)].
- **Rational Performance Tester for z/OS**
 - ▶ WebSphere Studio Workload Simulator
- **IBM Workload Simulator**



What Is Performance Testing?

- The evaluation of a system's capability to provide acceptable response times and functionality while serving a large number of clients



Why do Performance Testing?

- Because a break at any point in your system means your customers are not getting the service you think they are

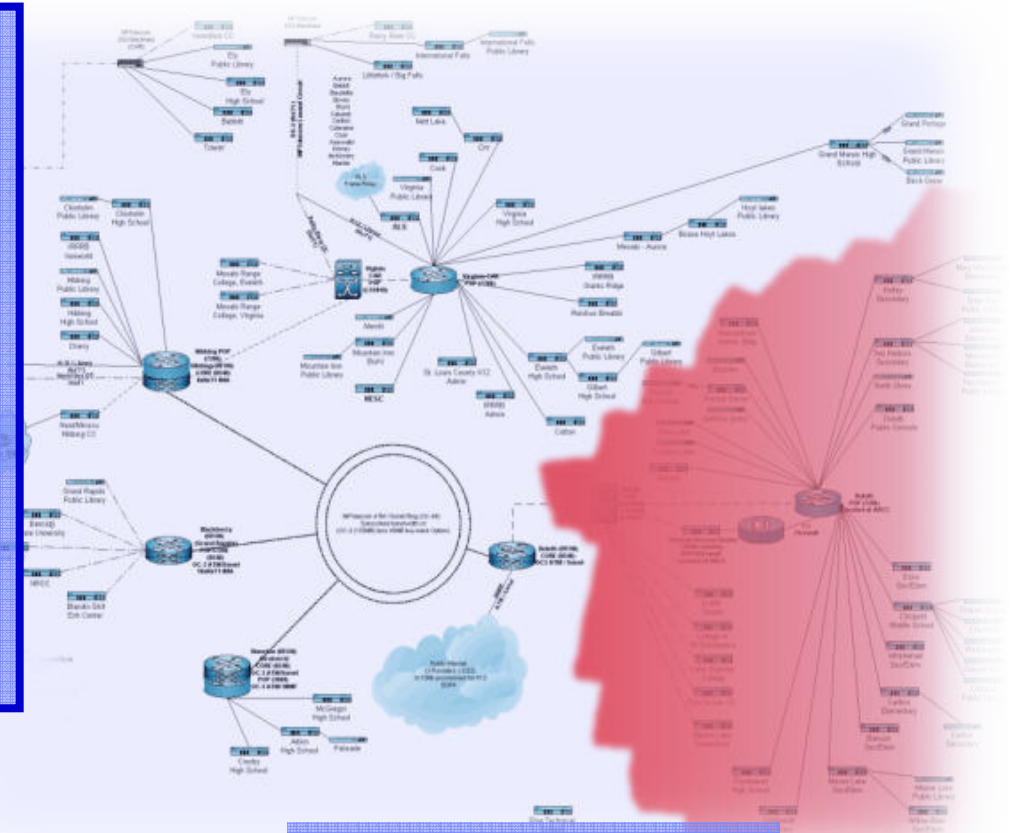
The page cannot be displayed

There is a problem with the page you are trying to reach and it cannot be displayed.

Please try the following:

- Click the **Refresh** button, or try again later.
- Open the home page, and then look for links to the information you want.

HTTP 500.13 - Server too busy.



System Under Test



Rational Performance Tester for z/OS

Leverage your System z hardware investment to test n-tier applications

- **Built for Day 1 Productivity**
 - ▶ Create code free tests
 - ▶ Mask complexity to get the job done
- **Advanced Data Access & Manipulation**
 - ▶ Create code free schedules
 - ▶ Automated data variation and synchronization
- **Lower Cost of Performance Testing**
 - ▶ Low resource requirements
 - ▶ Re-use existing Java code in tests



No-Code Tests



- ▶ Tests are represented in a tree view as a list of web pages and their elements, such as images.
- ▶ No programming necessary to create a test
- ▶ Underlying detail is accessible but hidden to simplify test creation and maintenance

Performance Test - RoomReservation

Test Contents

This section shows the test contents

- RoomReservation
 - Whistler Blackcomb - Ski Resort Website - Whistler, Canada
 - Guest Services
 - Room Reservations
 - Specify Room Details
 - Blackcomb Lodge - Room Details
 - My Reservations
 - Reservation Confirmation Details

Add

Insert

Remove

Up

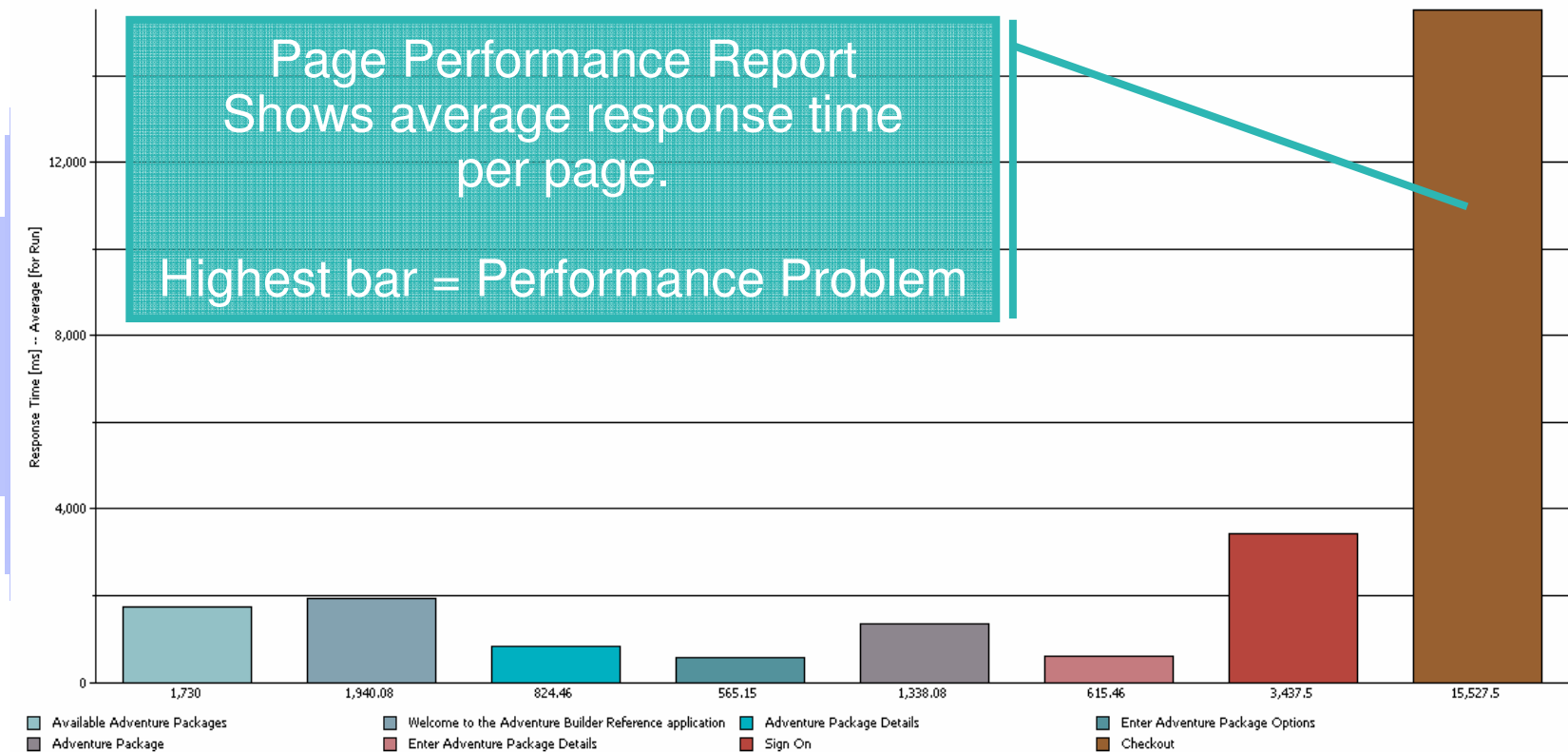
Down



Performance Problem Identification During Test

Page Performance

Average Page Response Time for Run (Filter applied: Count Filter: 10 highest)



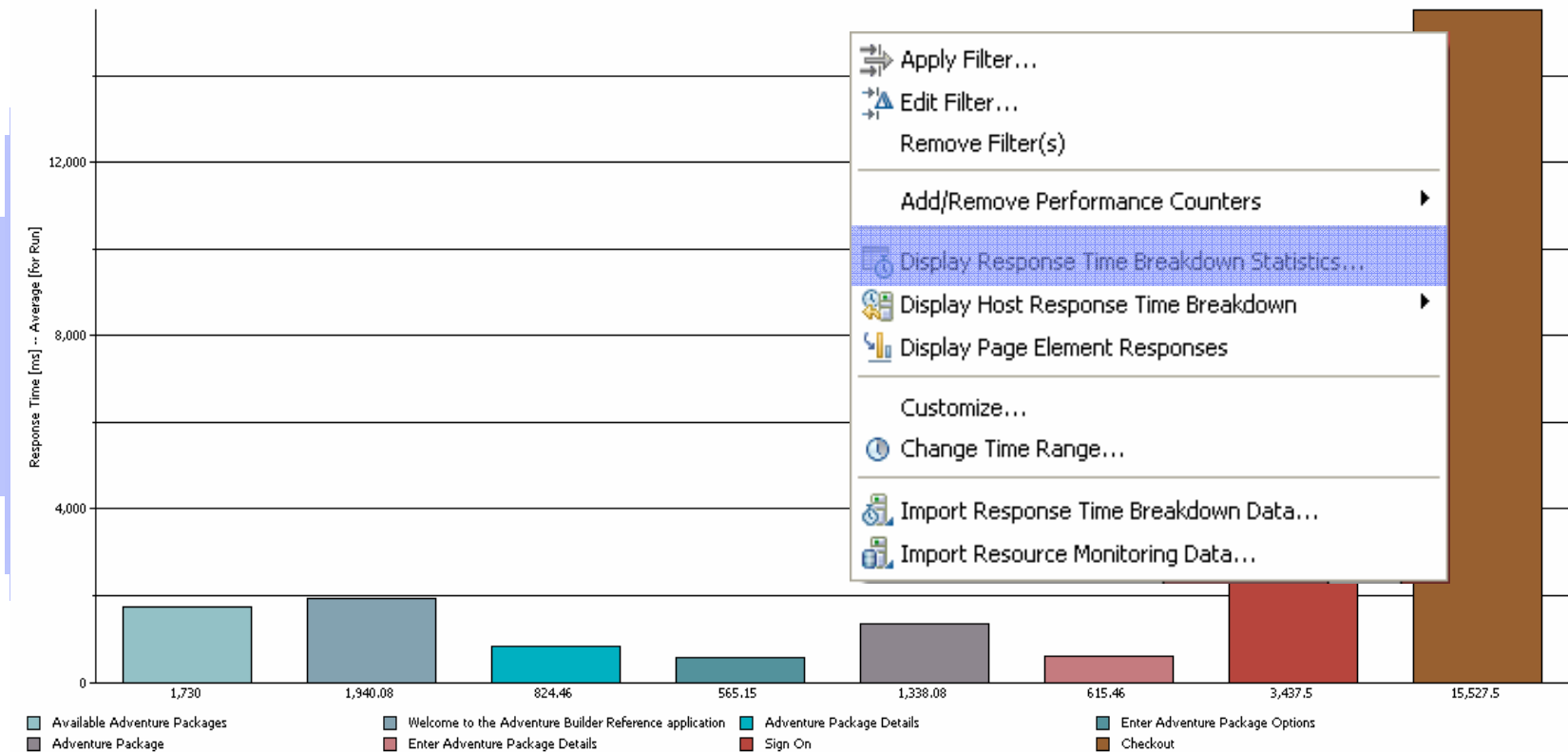
- Rational Performance Tester easily identifies bottlenecks
 - ▶ Next logical question is **Why?**
 - ▶ Root Cause Analysis provides tools to answer this question



Performance Problem Identification During Test

Page Performance

Average Page Response Time for Run (Filter applied: Count Filter: 10 highest)



- Rational Performance Tester easily identifies bottlenecks
 - ▶ Next logical question is **Why?**
 - ▶ Root Cause Analysis provides to tools to answer this question



Response Time Breakdown

Page Performance > Response Time Breakdown Statistics

demo:9080/ab/checkout.do

Component	Base Time (seconds)	Average Base Time...	Cumulative Time ...	Calls
CASPIAN	311.512	77.878	470.908	12
IBM Rational Performance Test	311.512	77.878	470.908	12
Delivery Time	26.500	6.625	26.500	4
Response time	208.748	52.187	208.748	4
text/html;charset=ISO-8859-1	76.264	19.066	235.660	4
demo	2,109.879	179.492	3,488.143	186
J2EE/WebSphere/6.0.0.1/demoNode01	2,109.879	179.492	3,488.143	186
Filter	39.632	9.908	570.228	4
JDBC	1,673.199	70.982	1,783.055	126
JSP	33.572	8.393	373.776	28
RMI-IIOP	5.280	0.660	5.280	8
Servlet	26.112	6.528	261.788	8
Session EJB	160.628	40.157	161.280	4
Web Services Provider	2.840	0.710	164.120	4
Web Services Requestor	168.616	42.154	168.616	4

- **Response Time Breakdown:**

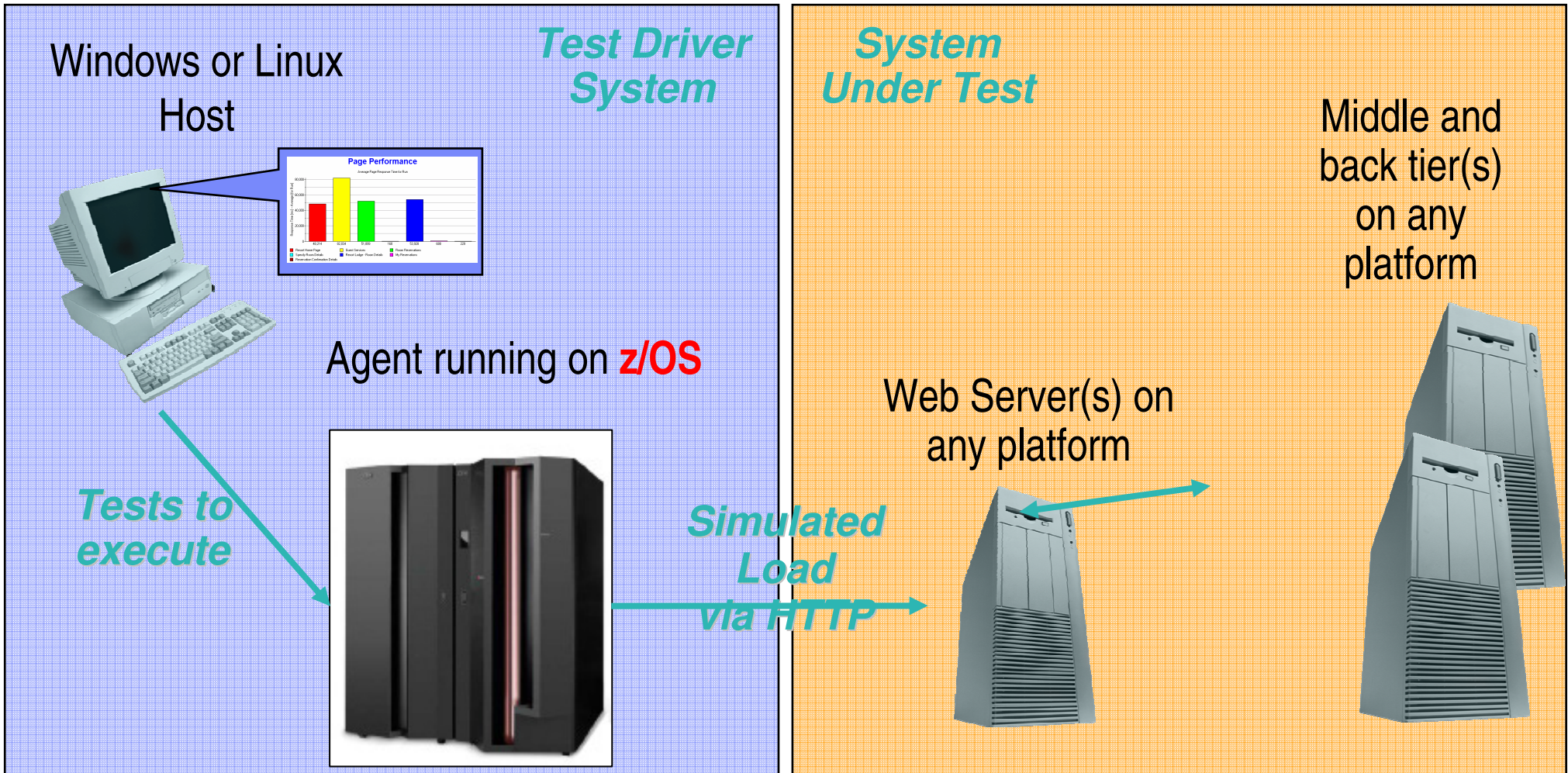
- ▶ Breakdown page response times into composite element response time

- **Provides:**

- ▶ Breakdown data drills down to highlight slowest components of a given page. Breakdown into tiers and components is a unique feature of Rational Performance Tester .



Deployment of Rational Performance Tester for z/OS



WebSphere Studio Workload Simulator

- IBM Rational Performance Tester for z/OS is a replacement for WebSphere Studio Workload Simulator (WSWS)
 - ▶ RPT for z/OS fulfills the HTTP load test use case provided by WSWS
- WSWS users should migrate to IBM Rational Performance Tester for z/OS
 - ▶ Contact your IBM Rational sales professional
 - ▶ No automated script migration is provided from WSWS to RPT for z/OS
 - You may use both products concurrently during the migration period
 - Use WSWS for old test scripts; use RPT on new projects
 - As old test scripts become outdated, record new scripts with RPT
- **Note: WebSphere Studio Workload Simulator is a different product from IBM Workload Simulator**



IBM Workload Simulator - *Conducts Reliable Stress, Performance, Regression, Function And Capacity Planning Tests*

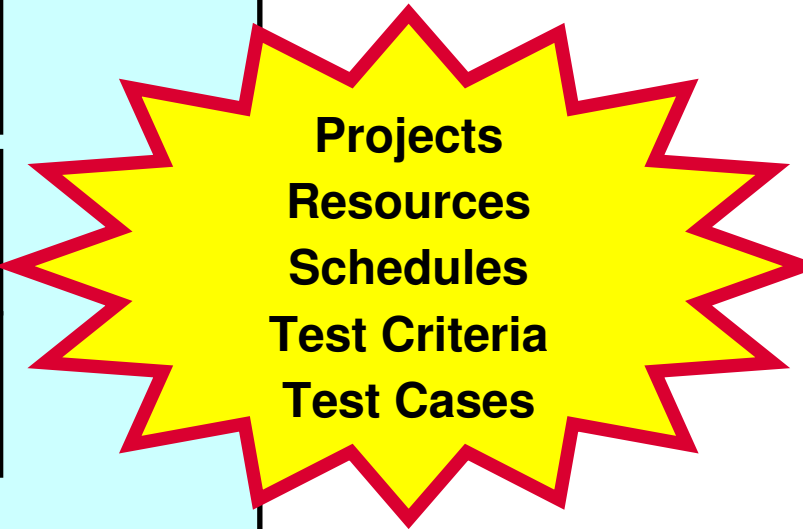


z/OS and OS/390

Applications
under test

VTAM

Workload
Simulator



All test execution and storage of test assets on System z



IBM Workload Simulator Features



- Auto Generation Of Scripts
- Auto Generation Of Networks
- Controls Resource During Runs
- Simulates Different Terminals, Terminal Features And Terminal Operator Actions
- Executes Independently Of The System Under Test
- Provides utilities for post-test analysis
- REXX-like scripting language
- Conducts Reliable Stress, Performance, Regression, Function And Capacity Planning Tests
- Consistent Across Protocols
 - ▶ SNA, CPI-C, TCP/IP
- Consistent Across Operating Systems
 - ▶ z/OS & OS/390, MVS/ESA, VM/ESA



IBM Workload Simulator Benefits

- Provides a systematic approach to performance testing
- Simulates real-world conditions to determine operational boundaries of the product
- Used for:
 - ▶ Load-testing
 - ▶ Stress-testing
 - ▶ Regression Testing
 - ▶ QA Testing



Agenda

- **Introduction**
- **Automated Functional Testing**
- **Manual Functional Testing**
- **Automated Performance Testing**
- **Summary**
 - ▶ The IBM Software Delivery Platform
 - ▶ Summary



Summary

- Rational Functional Tester Extension for Terminal-Based Applications
 - ▶ Extend the benefits of Rational Functional Tester to System z apps
- Rational Manual Tester
 - ▶ Manage and organize testing of any system – even hardware
- Rational Performance Tester for z/OS
 - ▶ Test performance of apps hosted on System z or System i
 - ▶ Leverage the power of System z hardware to scale performance testing
 - ▶ Replaces WebSphere Workload Simulator
- IBM Workload Simulator
 - ▶ Host all your testing artifacts on System z
 - ▶ Perform all your test activities on System z





QUESTIONS





THANK YOU

Learn more at:

- [IBM Rational software](#)
- [IBM Rational Software Delivery Platform](#)
- [Process and portfolio management](#)
- [Change and release management](#)
- [Quality management](#)
- [Architecture management](#)
- [Rational trial downloads](#)
- [Leading Innovation Web site](#)
- [developerWorks Rational](#)
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