



IBM Software Group

IBM Rational Performance Tester - What's New in Version 8.1

Rational software



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Performance Tester Version 8.1 in Action

- Performance Testing in an Agile Environment – Test early and often!
- Rational Performance Tester for the Performance Test Specialist
- Rational Performance Tester for the Performance Analyst





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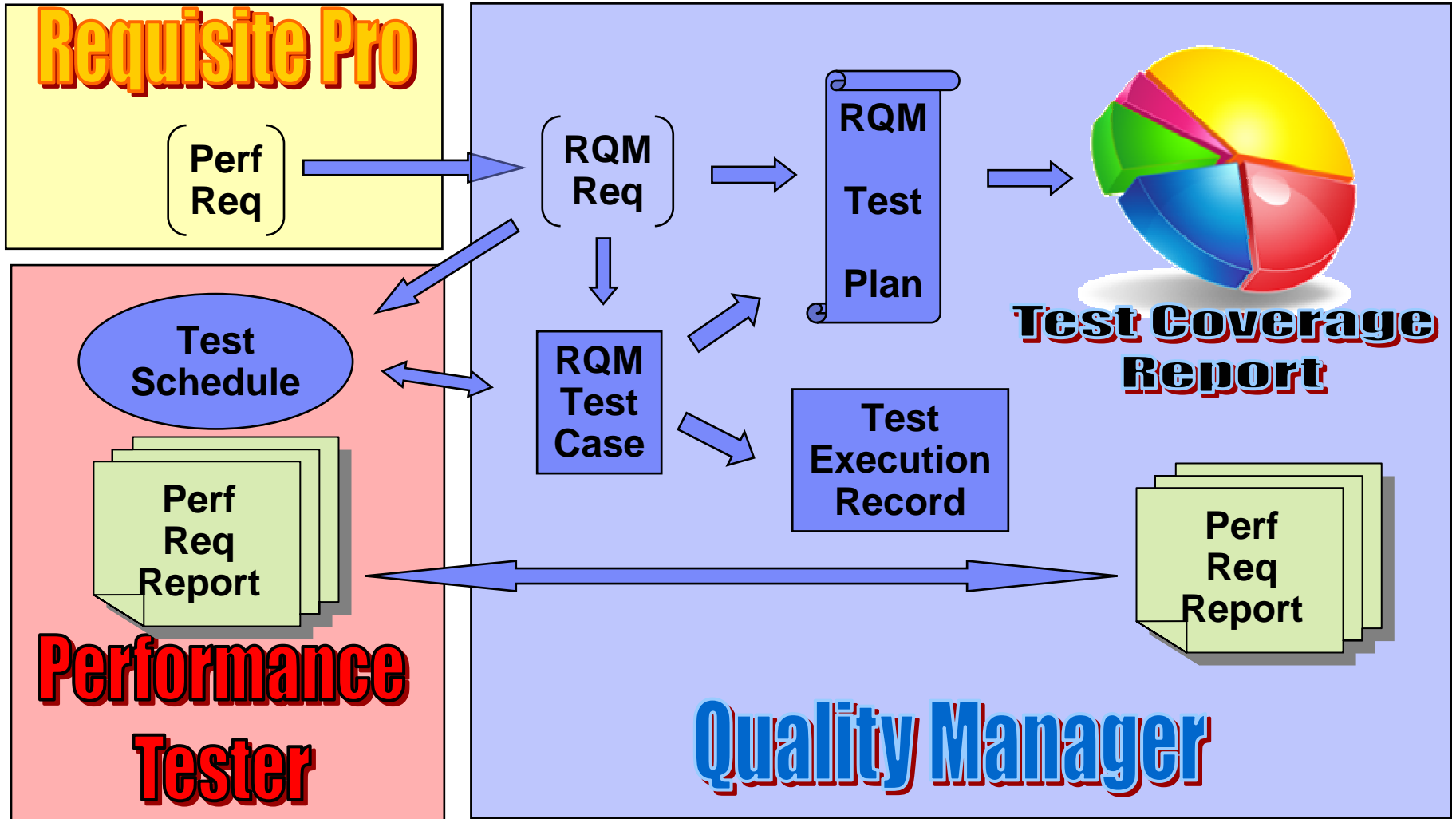
Performance Testing in an Agile Environment

Test early – Test often!!

Rational software



Performance Requirements Workflow



Agile Performance Testing with RQM/RPT

1. Define a Performance Requirement
2. Write the Test Case
3. Capture the Test
4. Set the Performance Metric
5. Run the Test
6. Analyze the Results



Define a Performance Requirement

- The user story says: “The website user shall be able to access and update the user’s profile information.”
- The performance requirement –
 - ▶ For user profile update operations,
 - ▶ 90 percent of the responses must return
 - ▶ in less than 2 seconds
- The expected peak workload –
 - ▶ During the busy hour along with other operations,
 - ▶ User profile updates may occur at 2,000 / min



Rational Quality Manager

- Enter the performance requirement in RQM

Requirement 23



Save

Summary: Performance - Update User Profile

New

- Overview
- Links
- Approvals
- History

Saved: Jul 12, 2009 2:46 PM

Details

Type:	<input type="text" value="Requirement"/>	Severity:	<input type="text" value="Normal"/>
Creation Date:	Jul 5, 2009 12:23 PM	Owned By:	Pete Planner
Created By:	ADMIN	Tags:	performance, shopping_cart

Description Edit

The performance of the update user profile operation must be able to handle 2000 transactions per minute during the busy hour workload and maintain a 2 second response time at 90th percentile.



Performance Test Case in RQM

The screenshot displays the RQM web interface for a Performance Test Case. The breadcrumb navigation shows 'Home' > 'View Test Cases' > 'Performance - Update...'. The main title is 'Performance - Update User Profile' with a help icon. Below the title are links for 'Test Case Overview' and 'View Snapshots'. On the right, there are buttons for 'Discard Changes' and 'Save', along with a status message: 'Saved successfully at: 21:08:39'. The 'Originator' is 'ADMIN' and the 'Action' is 'Select Action'. The state is 'Draft'.

The left sidebar contains a 'Manage Sections' menu with the following items: Summary, Test Case Design (highlighted), Formal Review, Requirements, Pre-Condition, Post-Condition, Test Scripts, Test Execution Records, and Attachments. There is also a checkbox for 'Show All Sections'.

The main content area is titled 'Test Case Design' and contains the following text:

Define the overall design for the current test case. This can include any background setup information or topologies.

Work Item: [Create](#)

[Edit](#)

- The user profile information is saved on the mainframe database
- The SAVE button for the profile update web page causes a POST of the profile information
- The user scenario is as follows:
 - Login as a random registered user
 - Click on the update user profile link
 - Enter some new information in the form
 - Click the SAVE button

Capture the Test and Set the Metric

- Capture the user scenario
- Add the 90th percentile < 2 seconds requirement for update response time

Test - UserProfileUpdate2

Test Contents

This section shows the test contents

- [-] UserProfileUpdate2
 - [+] Test Variables
 - [+] LoginForm
 - [+] LoggedInHomePage
 - [+] UpdateForm
 - [+] UserProfileUpdated

Test Element Details

UserProfileUpdated

Performance Requirements

Enable Performance Requirements

Name:

Performance Requirement	Op...	Value
Page Response Time Standard Deviation [m...		
25th Percentile Response [ms][for Run]		
50th Percentile Response [ms][for Run]		
75th Percentile Response [ms][for Run]		
85th Percentile Response [ms][for Run]		
90th Percentile Response [ms][for Run]	<=	2000
95th Percentile Response [ms][for Run]		
Percent Verification Points Passed for Page ...		
Average Response Time for Page [ms] [for ...		
Page Verification Point Pass Count [for Run]		
Hit Rate for Page [per second] [for Run]		
Minimum Response Time for Page [ms] [fo...		
Maximum Response Time for Page [ms] [fo...		

Hide undefined requirements



Performance Testing in an Agile Environment

- **Write** performance requirements in RQM
- **Attach** a test case defining the workload and performance test
- **Capture** an automated performance test for the feature to be tested
- **Add** the performance requirements to the test
- **Run** the test case which links to the automated performance test
- **Results** of the performance test are automatically recorded in RQM
- **Repeat** the performance test in every iteration's regression suite



Performance Requirements Reporting

Summary of Pass/Fail and Performance Margin

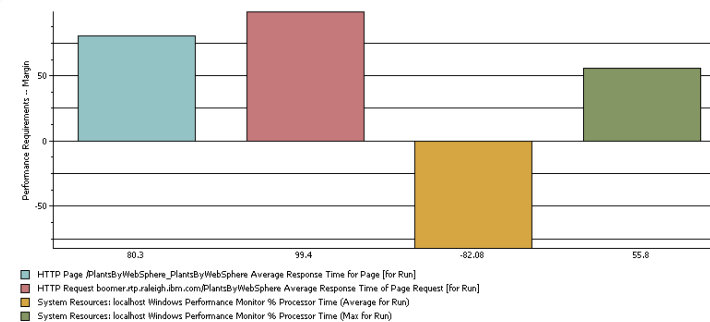
Status Summary

Performance Requirement Status for Run	Failed
Performance Requirements Percent Passed	75

Summary

			Performance Requirements -- Specification	Performance Requirements -- Status
HTTP Page	/PlantsByWebSphere_PlantsByWebSphere	Average Response Time for Page [for Run]	<= 3000	Passed
HTTP Request	boomer.rtp.raleigh.ibm.com/PlantsByWebSphere	Average Response Time of Page Request [for Run]	< 1000	Passed
System Resources: localhost	Windows Performance Monitor	% Processor Time (Average for Run)	< 10	Failed
System Resources: localhost	Windows Performance Monitor	% Processor Time (Max for Run)	< 70	Passed

Performance Requirement Margins

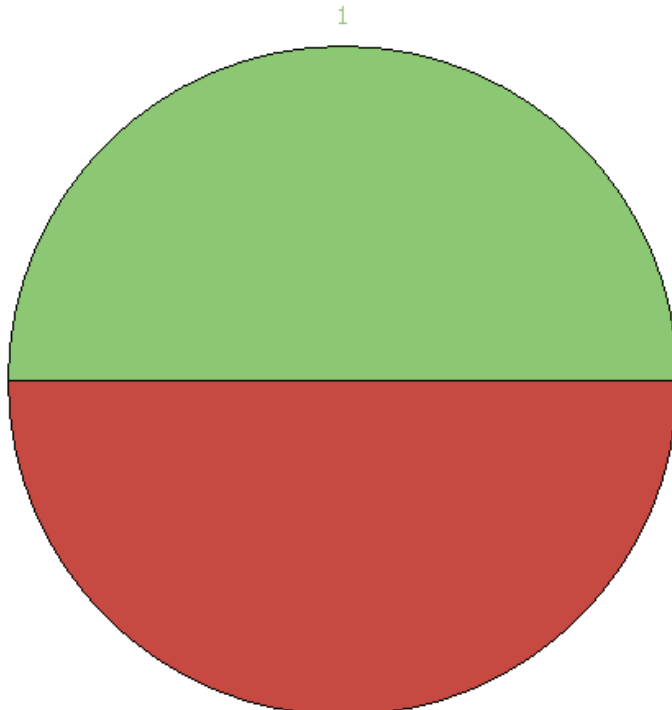


Performance Requirements Summary

Overall Summary

Performance Requirement Status for Run	Failed
Performance Requirements Percent Passed	50
Total Performance Requirements Percent Passed	50

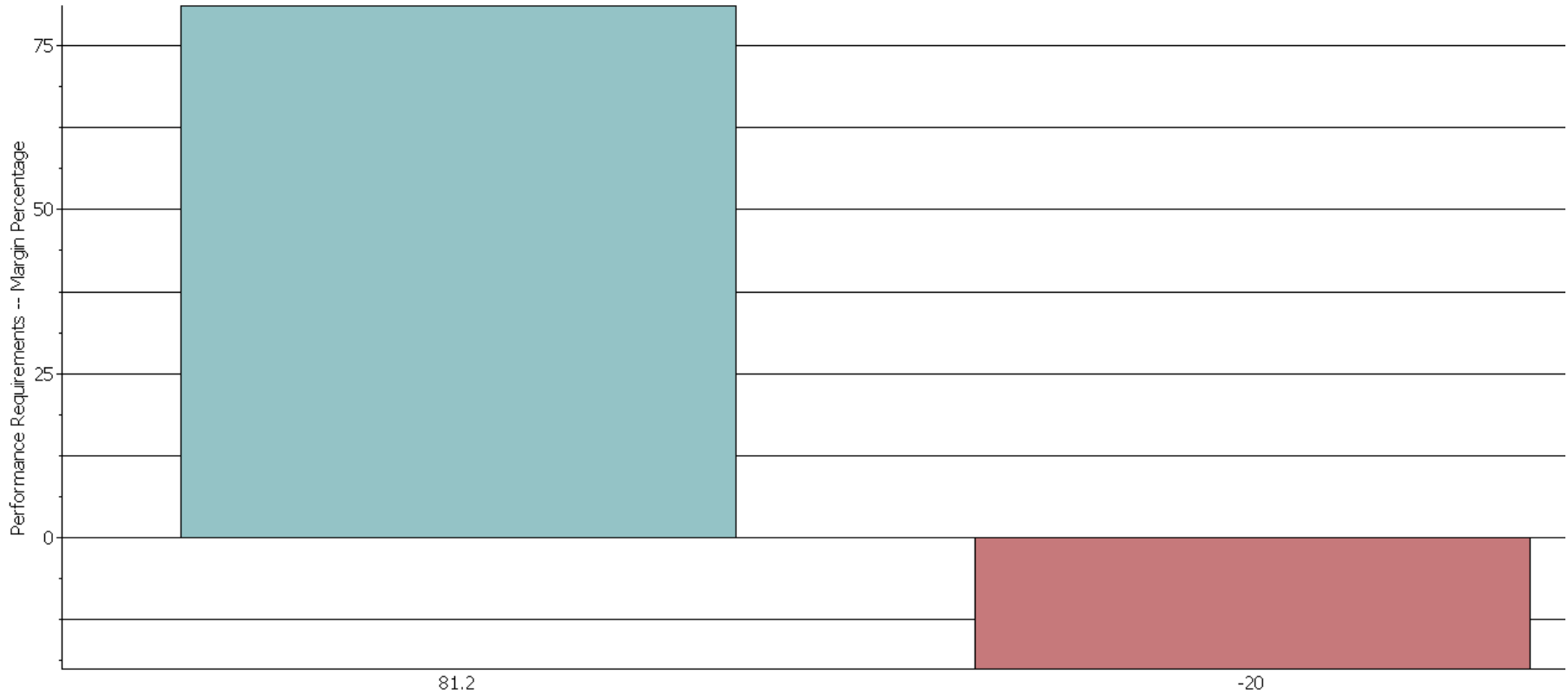
Performance Requirements



Performance Requirement Margins

Details

Performance Requirement Margins



- HTTP Protocol Performance Schedule - "perf_requirements" 90th Percentile Response Time for all Page Elements [ms] [for Run]
- Core Feature Performance Schedule - "perf_requirements" 75th Percentile Execution Time for all Transactions [ms] [for Run]



Performance Requirement Details

Performance Requirement Details

			Performance Requirements -- Margin Percentage	Performance Requirements -- Observed Results	Performance Requirements -- Specification	Performance Requirements -- Status
Core Feature	Performance Schedule - "perf_requirements"	75th Percentile Execution Time for all Transactions [ms] [for Run]	-20	6,000	<= 5000	Failed
HTTP Protocol	Performance Schedule - "perf_requirements"	90th Percentile Response Time for all Page Elements [ms] [for Run]	81.2	94	<= 500	Passed



Performance Requirements in RPT

- Define specific request, page, or transaction requirements in test
- Define aggregate request, page, or transaction requirements in schedule
- Define resource measurement requirements in schedule
- Requirements can be on minimum, maximum, average, percentile or std deviation

- Quality of the performance test results can also be checked
 - ▶ Verify quantity of good transactions or page hits is large enough
 - ▶ Verify tight enough set of samples – test against standard deviation
 - ▶ Verify small number of errors – test percentage of VPs passed



RPT Schedule – Performance Requirement List

⊖ HTTP Protocol

Average Response Time For All Page Elements [ms] [for Run]		
Response Time Standard Deviation For All Pages [for Run]		
Percent Page VPs Passed [for Run]		
Page Hit Rate [per second] [for Run]		
Minimum Response Time For All Pages [ms] [for Run]		
25th Percentile Response Time for all Page Elements [ms] [for Run]		
50th Percentile Response Time for all Page Elements [ms] [for Run]		
75th Percentile Response Time for all Page Elements [ms] [for Run]		
85th Percentile Response Time for all Page Elements [ms] [for Run]		
90th Percentile Response Time for all Page Elements [ms] [for Run]	<=	500
95th Percentile Response Time for all Page Elements [ms] [for Run]		
Average Response Time For All Pages [ms] [for Run]		
Maximum Response Time For All Pages [ms] [for Run]		
Response Time Standard Deviation For All Page Elements [for Run]		
Percent Page Element VPs Passed [for Run]		
25th Percentile Response Time for all Pages [ms] [for Run]		
50th Percentile Response Time for all Pages [ms] [for Run]		
75th Percentile Response Time for all Pages [ms] [for Run]		
85th Percentile Response Time for all Pages [ms] [for Run]		
90th Percentile Response Time for all Pages [ms] [for Run]		
95th Percentile Response Time for all Pages [ms] [for Run]		





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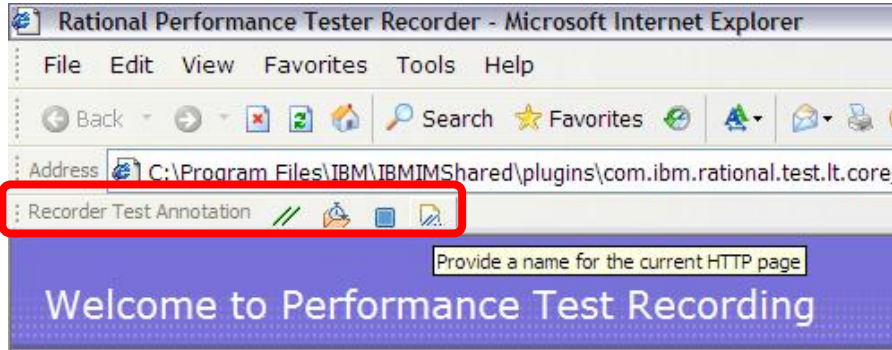
RPT for the Performance Test Specialist

New Content in RPT 8.1 for test development

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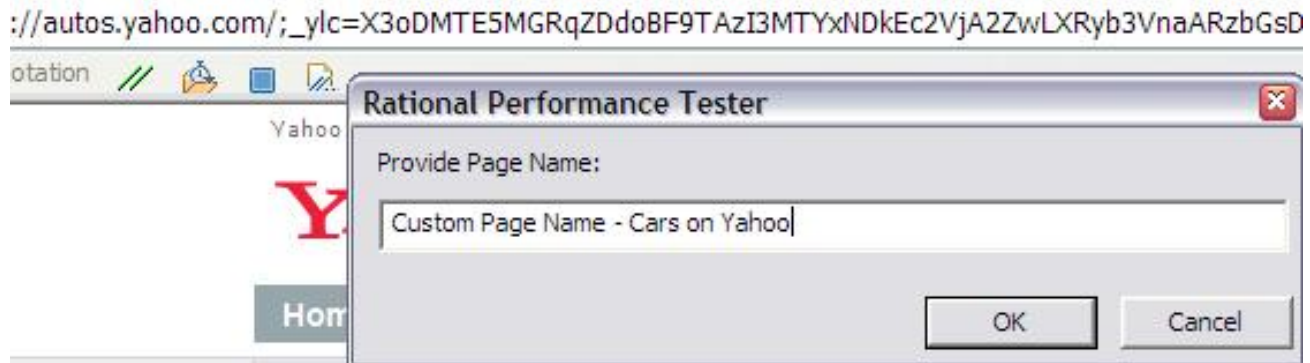


HTTP record-time annotations from the browser



Test Contents

This section shows the test contents



HTTP test split action in editor

- Make multiple tests from one
- Separate login from work to repeat

Test - test1backup1

Test Contents

This section shows the test contents

test1backup1

- Test Variables
- 1RAM-LoginPage
- 2RAM-UserHomepage
- 3RAM-
- 4RAM-
- 5RAM-
- 6RAM-
- 7RAM-
- 8RAM-

Context menu for 2RAM-UserHomepage:

- Add
- Insert
- Verification Points
- Split Test...**
- Merge Pages... Ctrl+P, M
- View
- Filter
- Disable
- Enable
- Enable All
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V

HTTP test split dialog

Split Test

New Test Names
Provide names and descriptions for new tests to be created

Split test "test1" before:
 Comment : Starting transaction

First file: <input type="text" value="test1_a.testsuite"/>	Second file: <input type="text" value="test1_b.testsuite"/>
Location: <input type="text" value="/testproj"/>	Location: <input type="text" value="/testproj"/>
Description/comment: <input type="text" value='Created by splitting test "test1" (/testproj/test1.testsuite), Part 1'/>	Description/comment: <input type="text" value='Created by splitting test "test1" (/testproj/test1.testsuite), Part 2'/>
Original description: <input type="text"/>	Original description: <input type="text"/>

Also use description text for comment at the beginning of each test

Split Test

Required Changes
Review changes to be performed.

Changes to be performed

- Split test test1.testsuite into test1_a.testsuite and test1_b.testsuite
 - Create new test: /testproj/test1_a.testsuite
 - Create new test: /testproj/test1_b.testsuite
- Link tests through variables
- HTTP Specific Changes
 - HTTP Protocol: No changes required

No preview available



HTTP test after split

test1_a First test

Test - test1_a

Test Contents

This section shows the test contents

- test1_a
 - Test Variables
 - Server Connections
 - Variables Created by Split Test
 - t = "1247059128"
 - _ylp = "A0WTTaq4nFRKWLCaEBv1"
 - hp = "0"
 - cp = "0"
 - cres = ""
 - sss = "1247059128"

Created by splitting test "test1" (/testp

Yahoo!

- Set t = ["t" ("1247059128" - Content)]
- Set _ylp = ["_ylp" ("A0WTTaq4nFRKWLCaEBv1" - Content)]
- Set hp = [""]
- Set cp = [""]
- Set cres = ["cres" ("" - Content)]
- Set sss = ["sss" ("1247059128" - Cont

test1_b Second test

Test - test1_b

Test Contents

This section shows the test contents

- test1_b
 - Test Variables
 - Server Connections
 - Variables Created by Split Test
 - t
 - _ylp
 - hp
 - cp
 - cres
 - sss

Created by splitting test "test1" (/testp

Starting transaction

- Transaction: Transaction 1
- Find or Sell Used Cars on Yahoo! Autos



Test Variables


- Different from previous version
 - ▶ Different initialization methods
 - ▶ “Not initialized error” handling at runtime
 - Do Nothing
 - Issue a Warning
 - Issue an Error
 - Exit Test
 - ▶ Visibility
 - All tests for this user
 - This test only
- See variable usage through the test;
- See all assignments to the variable;

Test Element Details

Variable: _y/p = "A0WTTaq4nFRKWLCaEBv1cSkA"

Variable Data

Name:

Visible in:  All tests for this user

If not initialized, set to

Text:

Datapool value:

Run-time error if variable not initialized:

Assignments:

 test1_a
  Set _y/p = ["_y/p" ("A0WTTaq4nFRKWLCaEBv1cSkA" - Content)]

Variable Usage:



Test Variables (cont.)

- Set/assignment operator
 - ▶ Set existing variable to
 - Literal, text value
 - A value from an Data Source
 - Nothing – un-initialize

Test Element Details

Variable Assignment: Set _y1p = ["_y1p" ("A0WTTaq4nFRKWLCaEBv1cSkA" - Content)]

Variable Data

Name:  _y1p

Change...

Visible in: All tests for this user

Set to

Text:

Datasource value:  "_y1p" ("A0WTTaq4...1cSkA" - Content) Data Source...

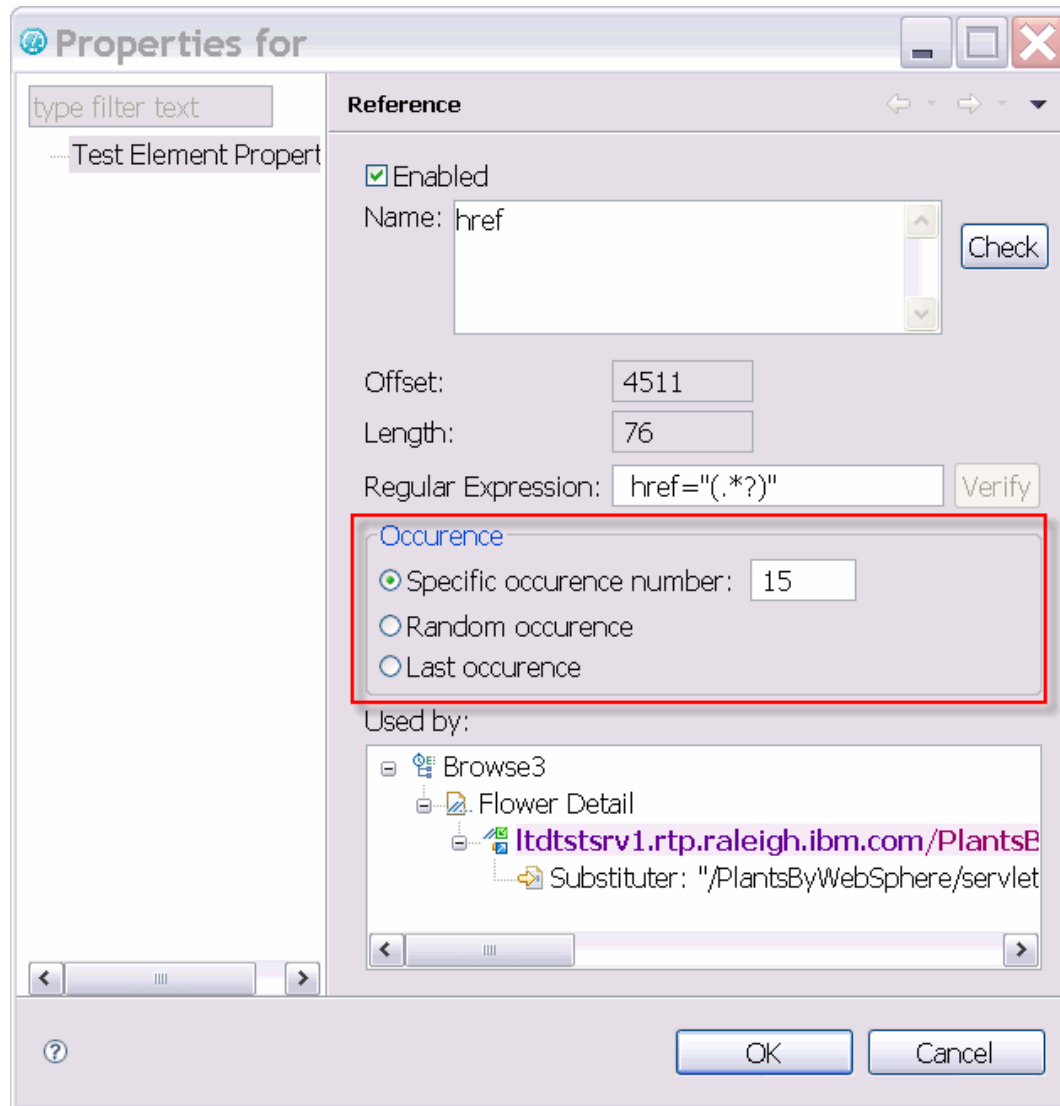
Not initialized

Run-time error if variable not initialized: Issue test log error

Variable Usage:



HTTP selecting a random reference from list



Test editor support for binary data

Down

Prev

Data: [-- Binary content: Press Ctrl+Shift+Space or Ctrl+LeftClick here to display it in binary editor. --]

Test Editor - Data

Offsets	Bytes	ISO-8859-1 (Latin 1)
000000	2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d	-----
000015	2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 37	----- 7
000030	64 38 31 63 36 33 31 34 30 36 30 30 0d 0a 43	d 8 1 c 6 3 1 4 0 6 0 0 . . C
000045	6f 6e 74 65 6e 74 2d 44 69 73 70 6f 73 69 74	o n t e n t - D i s p o s i t
000060	69 6f 6e 3a 20 66 6f 72 6d 2d 64 61 74 61 3b	i o n : f o r m - d a t a ;
000075	20 6e 61 6d 65 3d 2	a m e = " t y p e C o d e
000090	22 0d 0a 0d 0a 54 5	. . . T R N
000105	2d 2d 2d 2d 2d 2d 2	-----
000120	2d 2d 2d 2d 2d 2d 2	----- 7 d 8 1 c 6
000135	33 31 34 30 36 30 3	4 0 6 0 0 . . C o n t e n
000150	74 2d 44 69 73 70 6	D i s p o s i t i o n :
000165	66 6f 72 6d 2d 64 6	r m - d a t a ; n a m e
000180	3d 22 63 61 74 65 6	c a t e g o r y C o d e "
000195	0d 0a 0d 0a 54 52 4	. . . T R N B L
000210	2d 2d 2d 2d 2d 2d 2	
000225	2d 2d 2d 2d 2d 2d 2	
000240	36 33 31 34 30 36 3	
000255	6e 74 2d 44 69 73 70 6f 73 69 74 69 6f 6e 3a	n t
000270	20 66 6f 72 6d 2d 64 61 74 61 3b 20 6e 61 6d	t
000285	65 3d 22 61 63 63 65 70 74 61 6e 63 65 43 6f	e :

Offset : 71

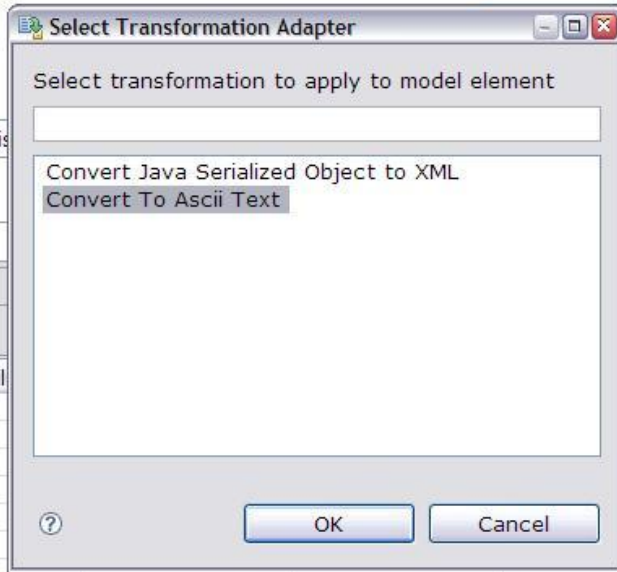
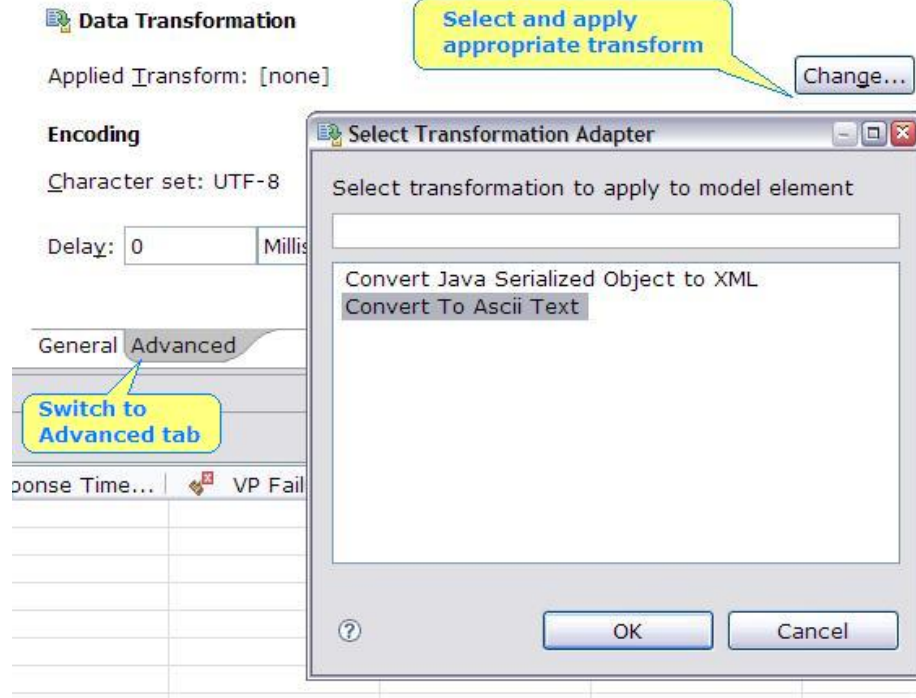
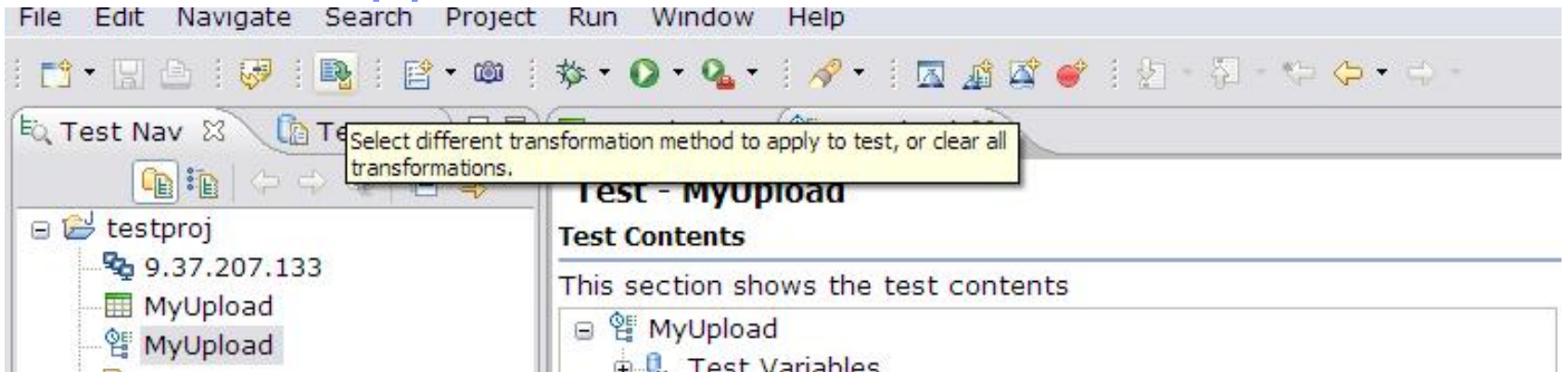
Context Menu:

- Cut
- Copy
- Paste
- Select All
- Select ...
- Show Integer value ...
- Binary Padding...
- Go to Offset ...
- Find ...
- Encodings
 - ASCII
 - EBCDIC
 - EUC-KR - Korean
 - GB18030
 - ISO-8859-1 (Latin 1)
 - KOI8-R - Russian
 - Shift JIS
 - UTF-16 Big Endian
 - UTF-8
 - UTF
- Read-only

Buttons: Add, Modify, Remove



Test editor support for data transforms



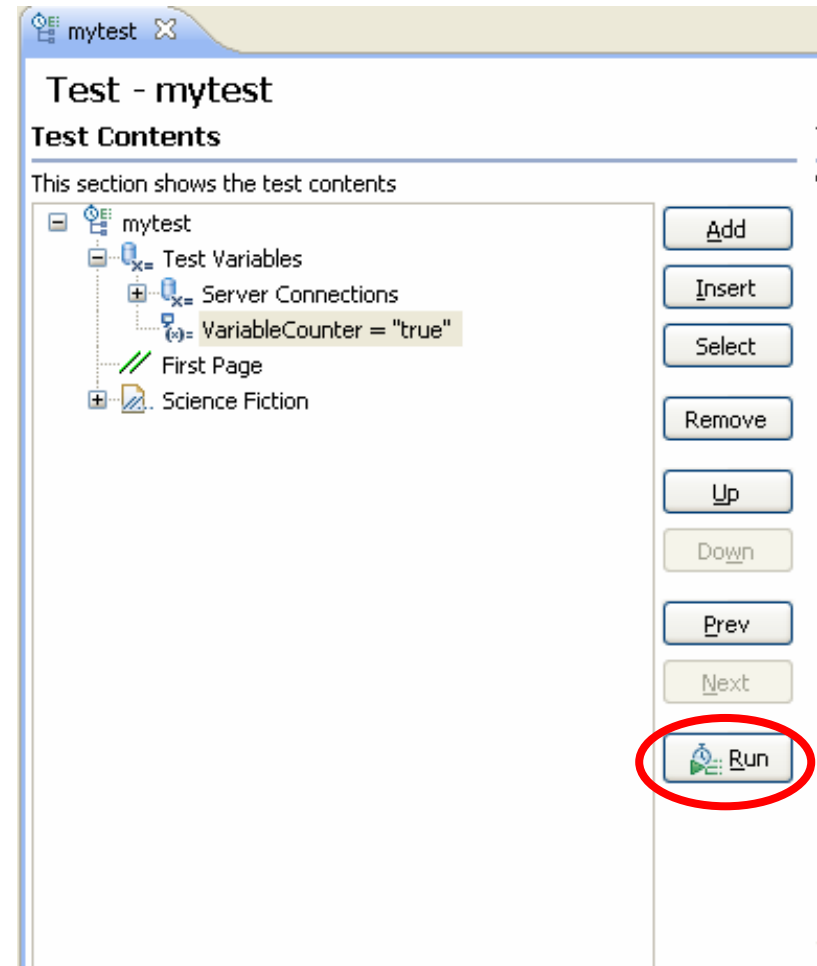
Stop test & stop user from custom code

```
// Stop the user
throw new RPTStopUserEvent("User Stopped");

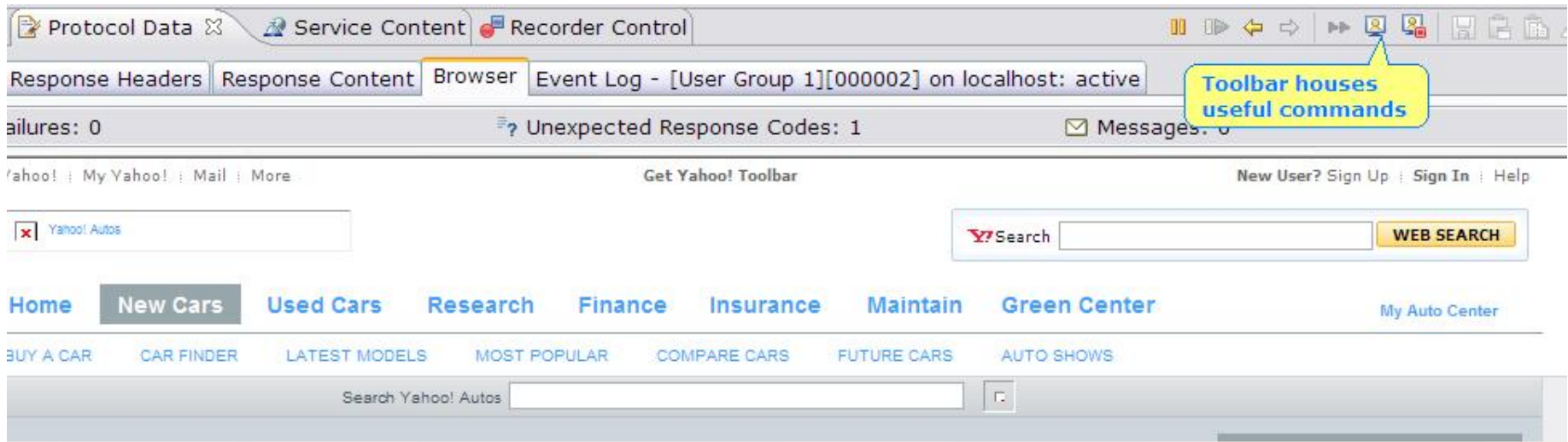
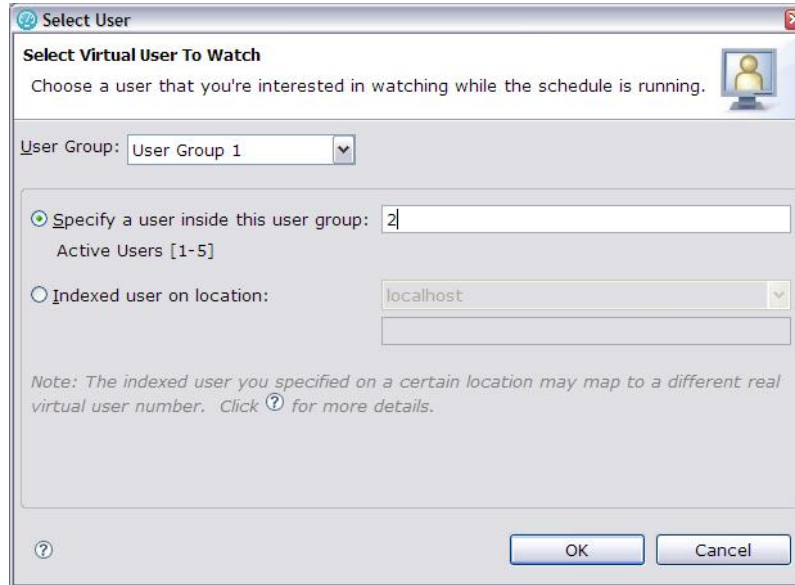
// Stop the test
RPTStopTestEvent stopTest =
    new RPTStopTestEvent("Test Stopped");
// Default is ERROR
stopTest.setSeverity(MessageEvent.WARNING);
// No stack trace in the test log
stopTest.setShowStackTrace(false);
throw stopTest;
```

Fast test launch

- In some cases up to 5x improvement
- Sub five second launch on T60



HTTP run-time protocol views for any virtual user





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RPT for the Performance Analyst

New Content in RPT 8.1 for analysis

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SmartLoad

- **Stage**
 - ▶ Time period with specified number of users
- **Users**
 - ▶ How many users should run at the same time during the stage
 - ▶ It is not how many users to add or subtract
- **Stage Duration**
 - ▶ How long the stage should last
 - ▶ It is not the time at which the stage should begin
 - ▶ It begins AFTER all users have been started for the stage and AFTER any Settle Time
- **Change Rate**
 - ▶ How quickly users should start
 - ▶ Default is to start all users as fast as possible
 - ▶ All / 1 Minute means users for the stage are added or removed in a random uniform fashion over 1 minute
- **Settle Time**
 - ▶ How long to delay before beginning Stage Duration
 - ▶ Affects when the time range for the stage is created
 - ▶ Allows the System Under Test to “settle” after the disruption of changing the number of users running

Schedule Element Details

Schedule_Monday

User Load Think Time Resource Monitoring Statistics Test Log >>2

Users	Stage Duration	Change Rate	Settle Time
5	10 Minutes	All/1 Minute	30 Seconds
50	10 Minutes	All/1 Minute	30 Seconds
500	10 Minutes	All/1 Minute	30 Seconds

Show Advanced

Time limit for a user to respond to a stop request: 30 Seconds

User Load Preview

The graph illustrates the user load profile over a 30-minute period. It starts at 0 users, remains at 0 until 10 minutes. At 12 minutes, the user count begins to rise, reaching 50 users by 13 minutes. At 23 minutes, the user count rises sharply to 500 users and remains constant at that level until the end of the 30-minute run.



Resource Monitoring

Resource Monitoring

Manage Location
Select data source and resources to collect

Host: 9.37.207.133

Data Sources:

- IBM Tivoli Monitoring
- IBM WebSphere PMI M
- JBoss Application Serv
- UNIX rstatd monitor
- Windows Performance

Location Resource Options

Specify the type of resource data you wish to collect.

- 9.37.207.133
 - beanModule
 - cacheModule
 - Object: ws/com.ibm.workplace/ExtensionRegis
 - cacheModule.objectCache
 - cacheModule.counters
 - Servlet: baseCache
 - connectionPoolModule
 - ExtensionRegistryStats.name
 - hamanagerModule
 - j2cModule
 - CloseCount

Show only selected counters

Deselect All
Refresh
Restore Defaults

< Back Next > Finish Cancel



Run-time Percentile Reports

90th Percentile

Percentile Page Response Time [for Run] (Filter applied: Count Filter: 10 highest)

Page Name	Response Time [ms]
New car pictures, prices and reviews - Yahoo! Autos	4,300
Yahoo!	7,859
/activity;src=1361549;met=1;v=1;pid=37857609;aid=215884934;ko=0;cid=32406210;rid=32424086;rv=1;×tamp=12470	47
/activity;src=1361549;met=1;v=1;pid=37857609;aid=215884934;ko=0;cid=32406210;rid=32424086;rv=1;×tamp=12470	46
Custom Page Name - Cars on Yahoo	78
New 2009 & 2010 Car Prices, Reviews, and Pictures - Yahoo! Autos	~2,800

Legend:

- New car pictures, prices and reviews - Yahoo! Autos
- Yahoo!
- /activity;src=1361549;met=1;v=1;pid=37857609;aid=215884934;ko=0;cid=32406210;rid=32424086;rv=1;×tamp=12470
- /activity;src=1361549;met=1;v=1;pid=37857609;aid=215884934;ko=0;cid=32406210;rid=32424086;rv=1;×tamp=12470
- Custom Page Name - Cars on Yahoo
- New 2009 & 2010 Car Prices, Reviews, and Pictures - Yahoo! Autos

Context Menu Options:

- Display Default Report
- Display Report...
- Display Performance Requirements Report
- Display Transaction Report
- Display Transaction Percentile Report
- Display Synchronization Point Report
- HTTP Reports
 - Page Performance Report
 - Page Element Report
 - Percentile Report
 - Verification Point Report
- Compare...
- Compare All Time Ranges
- Generate Functional Test Report...

Callouts:

- Percentile Groups are displayed as tabs.
- Display Percentile Report while the Schedule is running



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Backup Material – Background Sales Slides

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Performance Testing in Quality Management

Why do continuous performance testing?

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Additional Quality Management considerations drive up costs of remediation

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



During the coding phase
\$80/defect



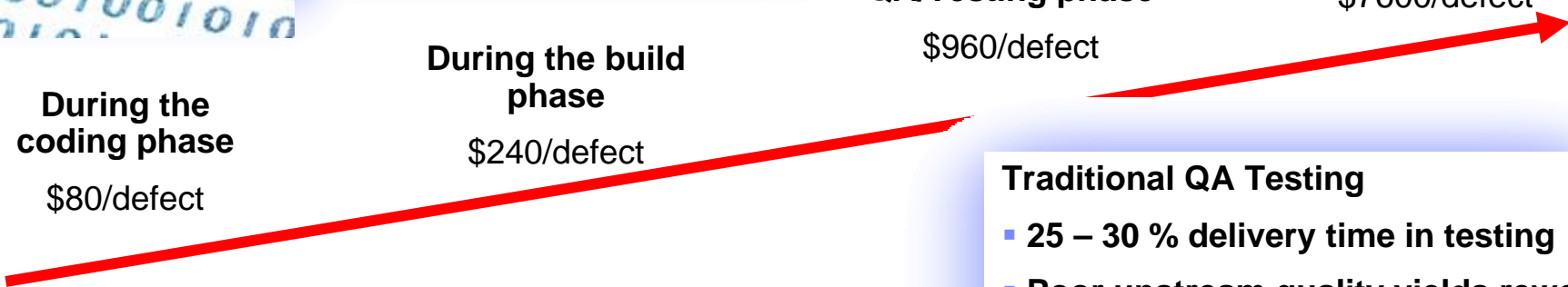
During the build phase
\$240/defect



During the QA/Testing phase
\$960/defect



Once released as a product
\$7600/defect



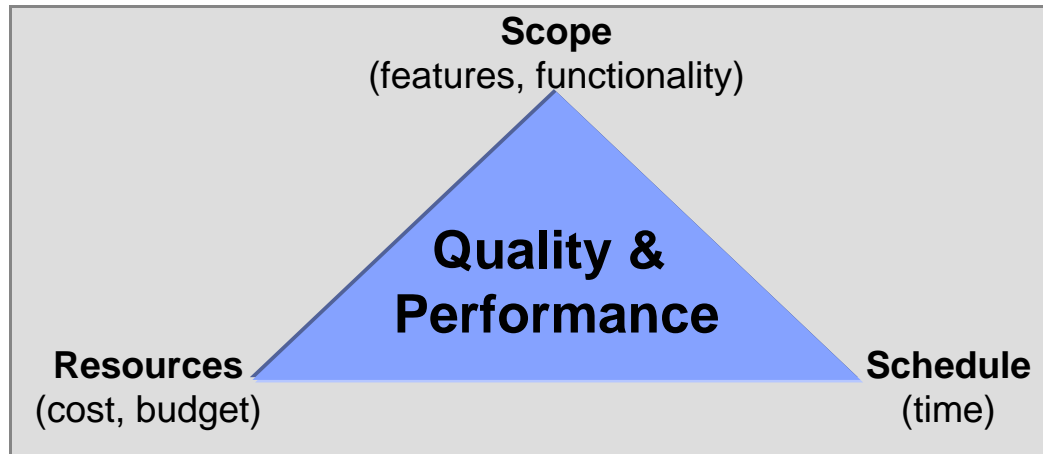
- Traditional QA Testing**
- 25 – 30 % delivery time in testing
 - Poor upstream quality yields rework
 - Compressed schedules make it worse

Source: 2008 GBS Industry standard study
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.



Quality Management Challenges & Importance to the Business

- Business Transformation through Innovation **creates tremendous pressure on IT**
 - ▶ Drives to SOA and agile practices for speed to market
- Must “Break the Iron Triangle” – **traditional methods will not deliver**
 - ▶ On time, with fixed budget and improved quality/performance
- Quality & performance require **continuous, iterative and integrated lifecycle processes**



Quality-enabling activities must start here and involve the entire team

IT Operations must be tied into the lifecycle



Quality paradigm is changing

Test – functional silo within software development

- Testing addressed by QA before deployment
- Test as gatekeeper on final release decisions
- Distributed, single project orientation
- Scope – fit for use, reduction of application level defects

Quality – A strategic IT competency

- Quality considerations addressed at all phases
- Agile iterations involve multiple business & technical stakeholders
- Consolidation with internal center of excellence or outsourcing
- Scope – Customer satisfaction and improved business performance



IBM Rational raises the bar for Quality Management

Collaborative process, powered by automation to govern software delivery

Mitigate Business Risk



Collaborate

Collaborative, continuous, and comprehensive information sharing reduces defects, improves handoff and increases customer satisfaction

Improve Operational Efficiency



Automate

Automating labor-intensive activities reduces time-to-market and increases predictability and consistency to improve return on investment

Make Confident Decisions



Report

Moment by moment understanding of software quality metrics for immediate corrective action and release decisions addressing both business and IT needs



Centralized test management hub allowing full lifecycle support across all types of testing and platforms

