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IBM Rational Performance Tester Tips & Tricks

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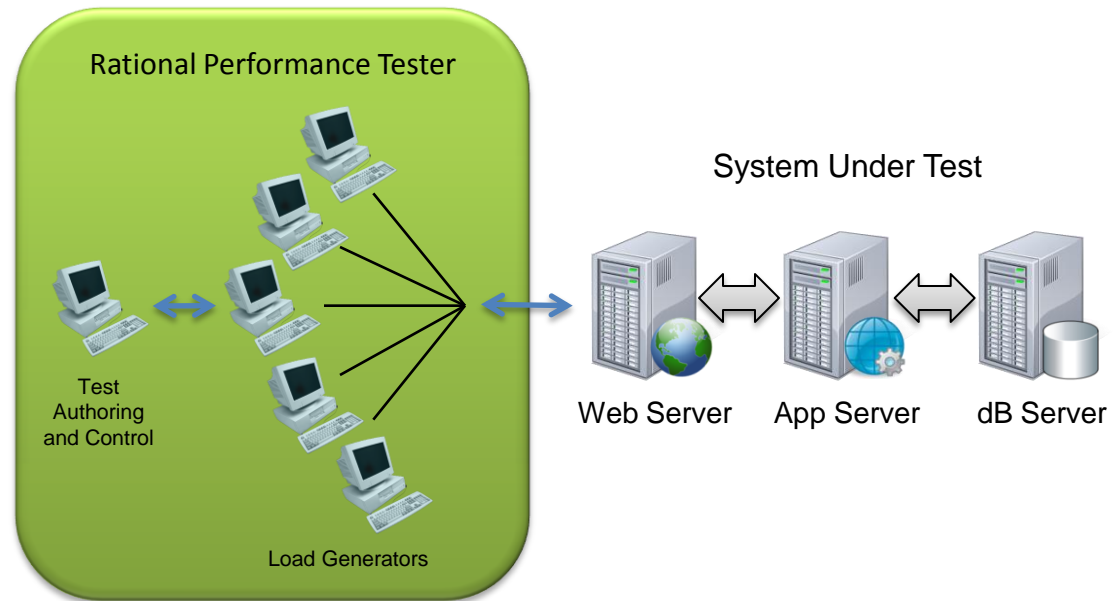
Agenda

- Getting Started
- Recording & Test Generation
- Executing Tests
- Reports
- Troubleshooting

Rational Performance Tester

Comprehensive test planning, authoring, and analysis to identify and manage the risk of application performance failures

1. Capture and track Business SLAs in your test plans
2. Create realistic user workloads that exercise the key business transactions
3. Automatically deploy the environment and schedule execution of your workload
4. Identify the root cause of performance problems
5. Communicate results and areas of non-compliance to the stakeholders



Tip – Take Baby Steps

- Running too many users too soon can mask lots of problems
 - Login failures
 - Server failures
 - Dynamic data failures
 - Duplicate keys
- The Solution
 - 1 User – is dynamic data handled correctly?
 - 2 Users – data that has to be unique using a datapool?
 - 10 Users – does login need to be staggered?
 - 50 Users – effect on agent & server cpu/memory as you increase users?
 - 100 Users – is your agent sized correctly for target load?

Tip – Performance Test Driven Development

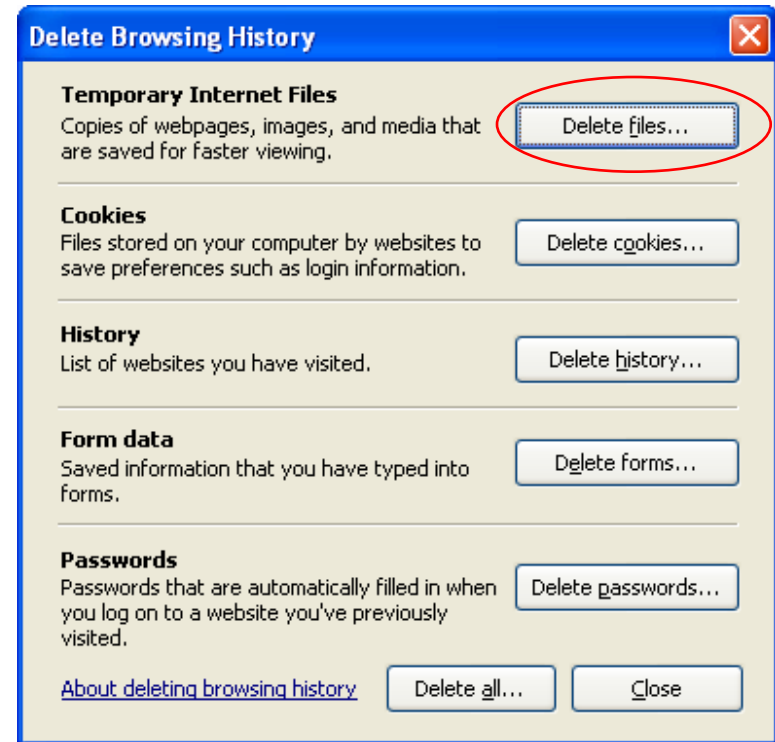
- Performance Test Early & Often
 - Easier to address issues if found right after delivery
 - Less costly to fix than when found late in development

Agenda

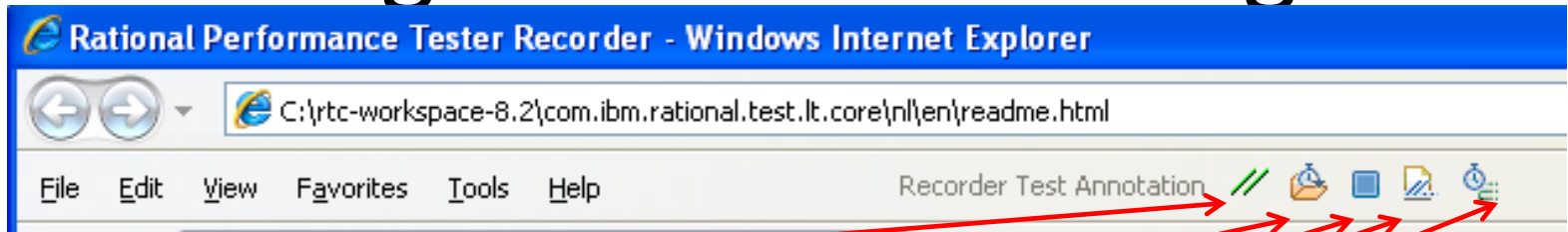
- Getting Started
- **Recording & Test Generation**
- Executing Tests
- Reports
- Troubleshooting

Test Creation Tips

- Clear browser cache & cookies
 - Browser responds with content, not 304
- Pause between pages (3-5 seconds)
 - Pages clearly separated in the test
- Mouse hovers
 - May result in unwanted server activity
 - Real application users are going to cause this sort of spurious activity



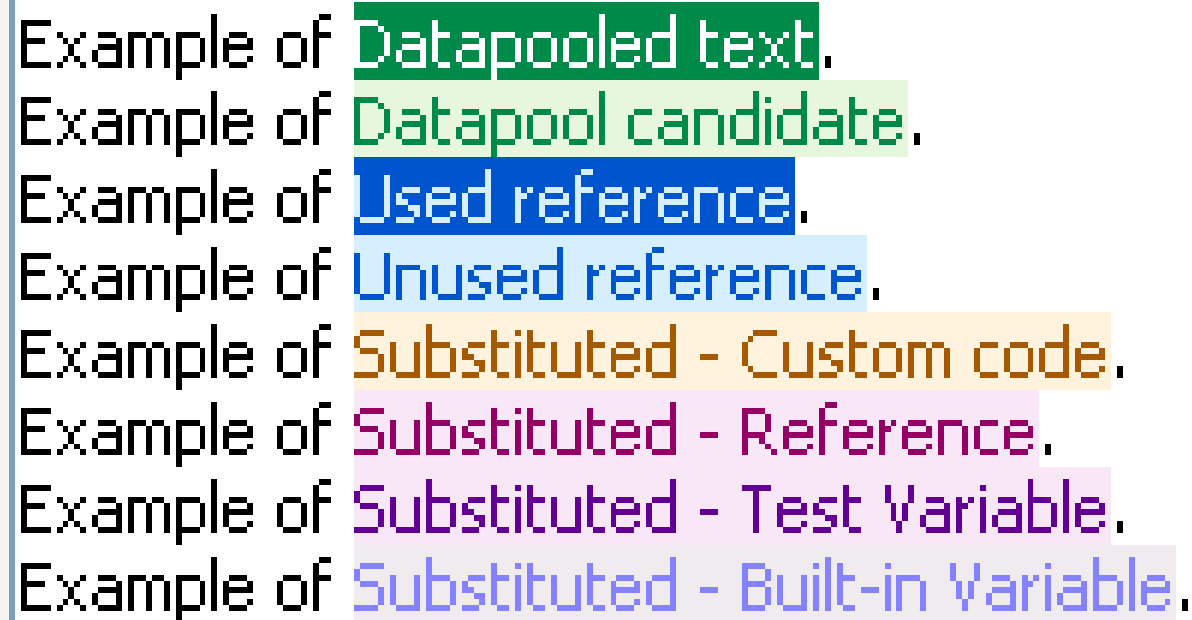
Creating a Test - Recording



- Comments
 - Add context if page name not clear
- Start Transaction
- Groups related actions
- Stop Transaction
- Name pages
 - Makes the test more readable
- Split test
 - Modularity for sharing assets
 - Split login & logout from application work

Color

- Window > Preferences > Test > Test Editor



Example of Datapooled text.

Example of Datapool candidate.

Example of Used reference.

Example of Unused reference.

Example of Substituted - Custom code.

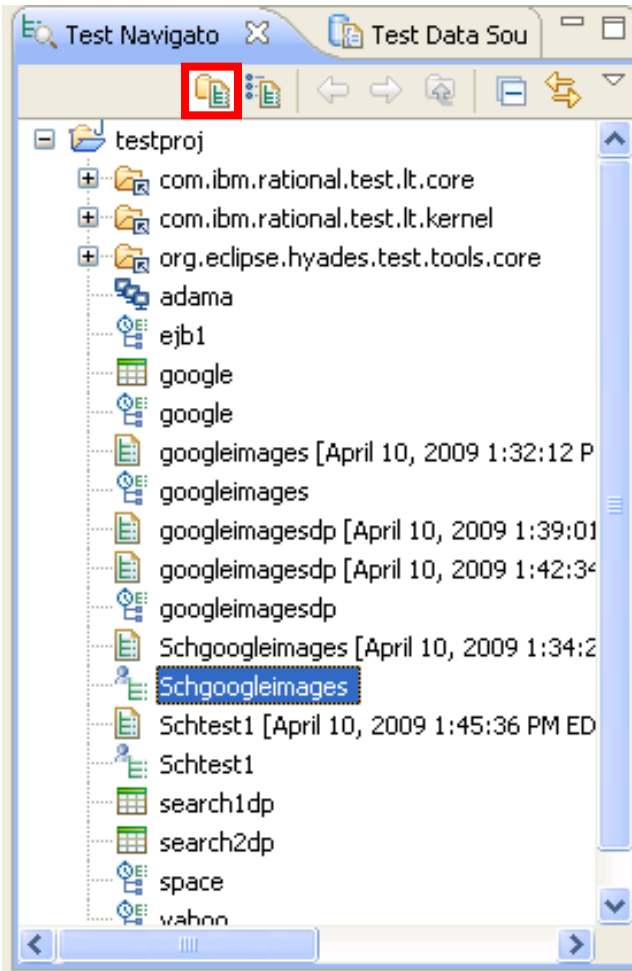
Example of Substituted - Reference.

Example of Substituted - Test Variable.

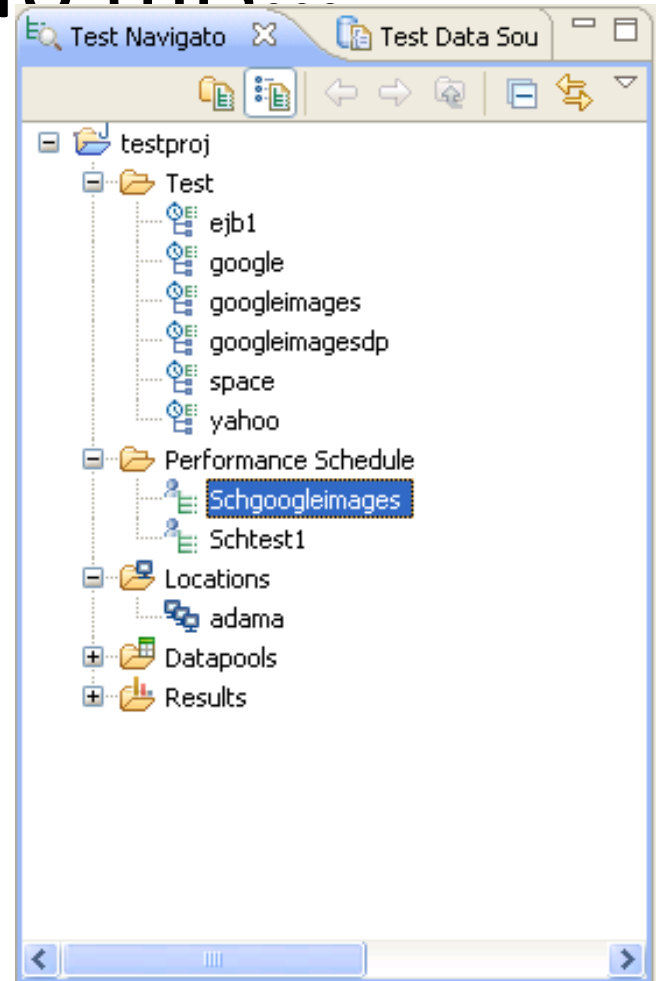
Example of Substituted - Built-in Variable.

Logical Test Navigator

• From this...

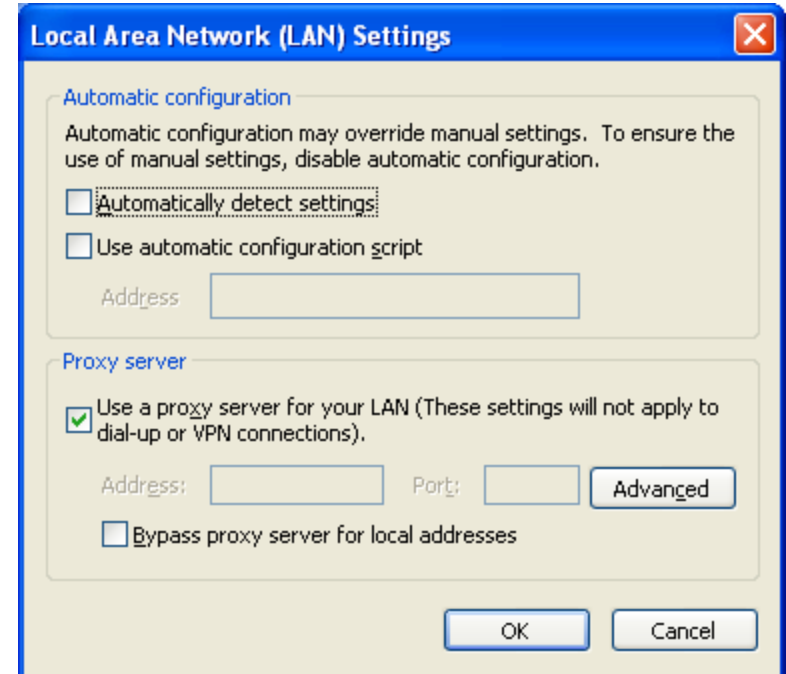
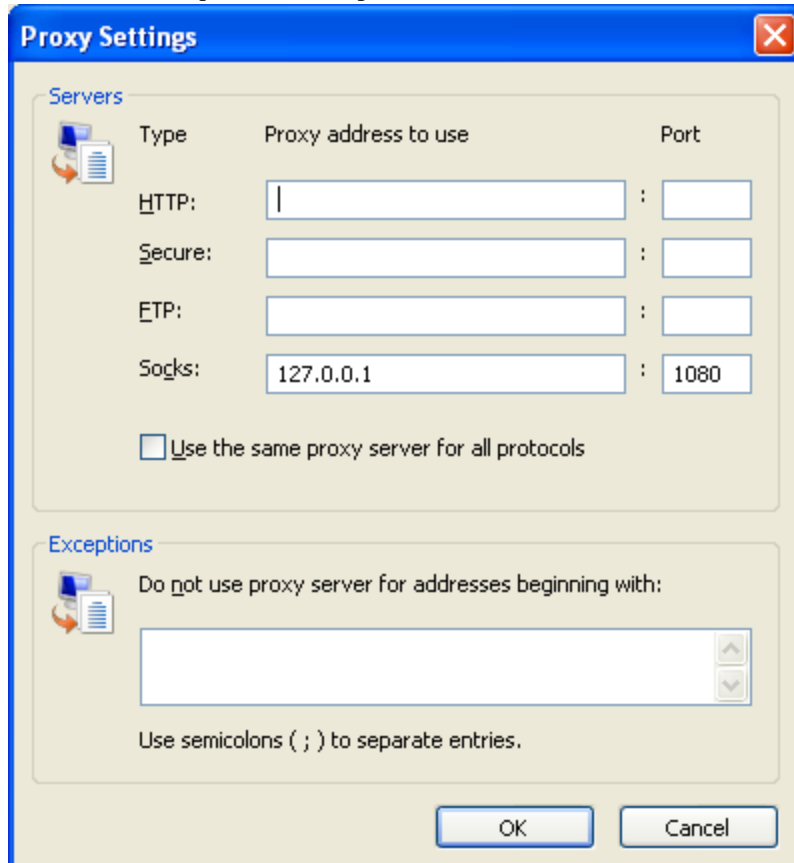


• To this



How RPT Recording Works

- SOCKS proxy recorder



Recorder Missing Some or All Data

- Check registry settings
 - Tools > Internet Options > Connections > LAN Settings > Advanced
 - Socks proxy should be chosen, port 1080
- Some portion of the application, like an applet, does not use the browser's connection settings
 - Try to configure the applet to use the proxy server
 - May be able to verify with wireshark
 - RPT socket recording may be an alternative

Best Practices for Sharing Test Assets

- A workspace and project cannot be shared directly with others for read/write
- Users with their own workspace can import a shared project for read-only usage such as test execution
- Projects can be versioned and shared through integration with Rational Team Concert
<http://www.ibm.com/developerworks/rational/library/09/integraterationalteammconcertandrationalperformancetester/index.html?ca=drs->
- Provide a copy of test assets using File > Export > Test > Test Asset with Dependencies. Import likewise.

Data-Correlation View Mode

- Editor tree shows only substitutions and datapool candidates
- Use with Quick Filter to easily locate interesting data
- Substitute and remove/modify substitution on one or more locations
- Find where a data-source is used
- Switch to Data-Correlation Mode and back to Full Test Contents Mode:
 - Context menu
 - “View” button

Test - test

Test Contents (filtered)

This section shows the test contents

performance

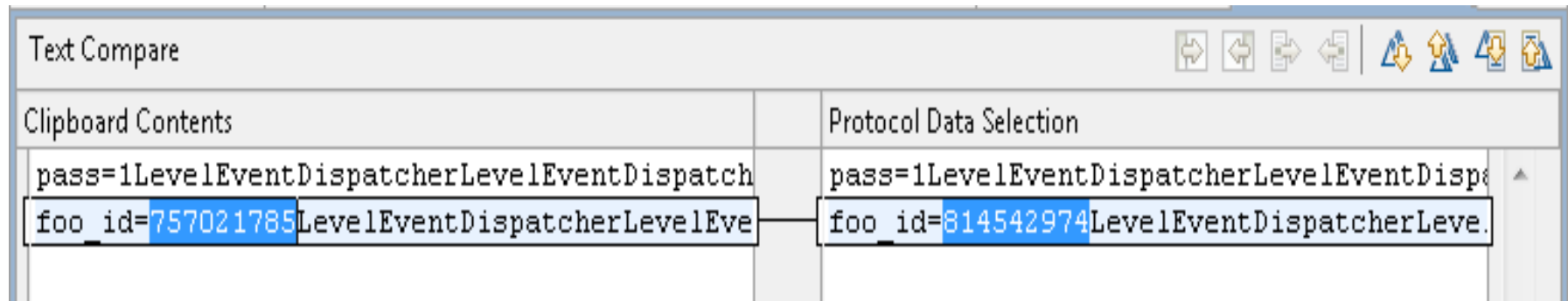
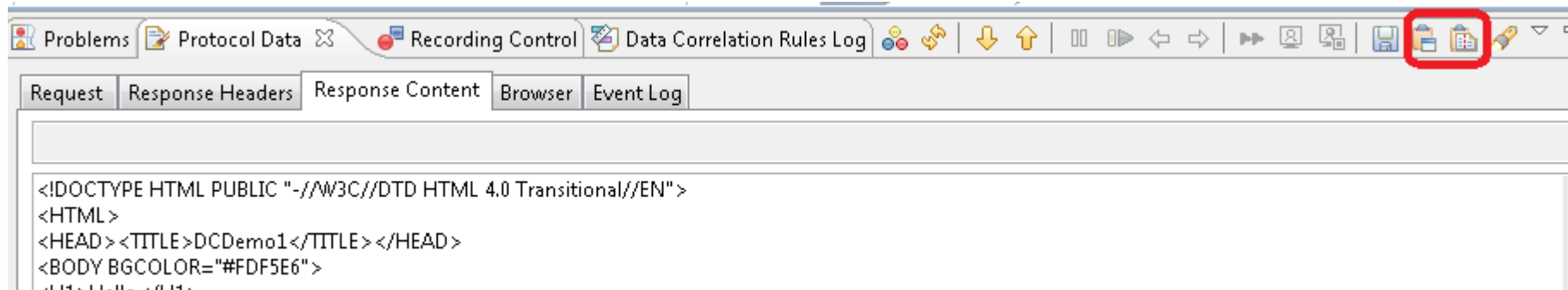
Options ▾

- Add
- Insert
- Select
- Remove
- Up
- Down
- Prev
- Next
- Bun
- View

```

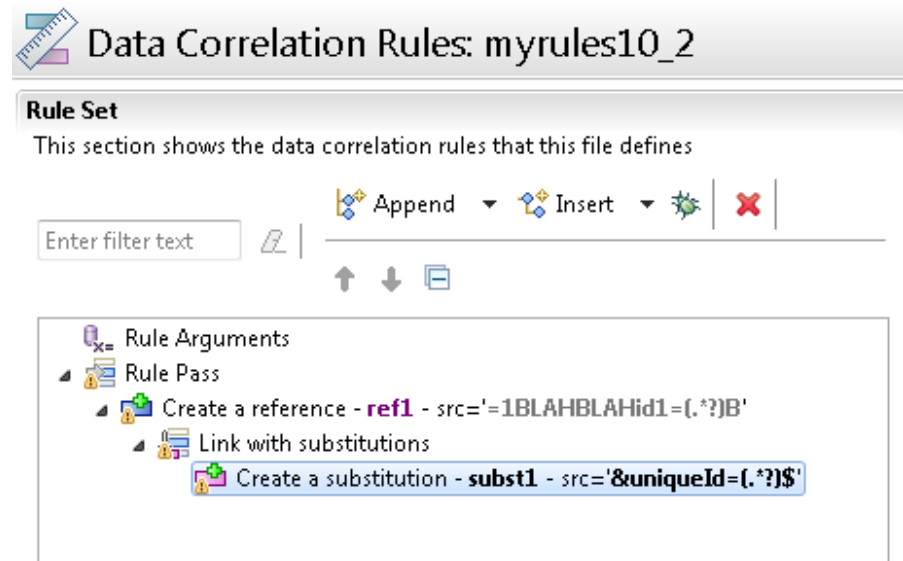
test
├── Datapool Candidate "command": "IBM performance"
├── Datapool Candidate "p": "ibm performance tester"
├── Substituter "ibm performance test_url": "/search?fr=yfp-t-701-s&toggle"
├── Substituter "Referer_26": "http://search.yahoo.com/search?fr=yfp-t-701-s&toggle"
├── Substituter "p": "ibm performance tester"
├── Datapool Candidate "title": "IBM Rational Performance Tester Tutorial"
├── Substituter "Referer_25": "http://search.yahoo.com/search?fr=yfp-t-701-s&toggle"
├── Substituter "Referer_24": "http://search.yahoo.com/search?fr=yfp-t-701-s&toggle"
├── Datapool Candidate "ref": "http://search.yahoo.com/search?fr=yfp-t-701-s&toggle"
├── Datapool Candidate "ref": "http://search.yahoo.com/search?fr=yfp-t-701-s&toggle"
├── Datapool Candidate "utmdt": "IBM Rational Performance Tester Tutorial"
├── Datapool Candidate "utm": "http://search.yahoo.com/search?fr=yfp-t-701-s&toggle"
├── Datapool Candidate "utmcc": "__utma=134961636.75634412.126572600.126572600.126572600.126572600"
├── Substituter "Referer_4": "http://googleads.g.doubleclick.net/pagead/ads?as"
├── Substituter "Referer_3": "http://googleads.g.doubleclick.net/pagead/ads?as"
├── Substituter "Referer_2": "http://googleads.g.doubleclick.net/pagead/ads?as"
└── Substituter "Referer": "http://googleads.g.doubleclick.net/pagead/ads?as"
    
```

Tip – Compare Test Data with Playback Data



Data Correlation Rules

- Organize related test changes
- Respond more rapidly to frequently changing applications
- Reduce test editing

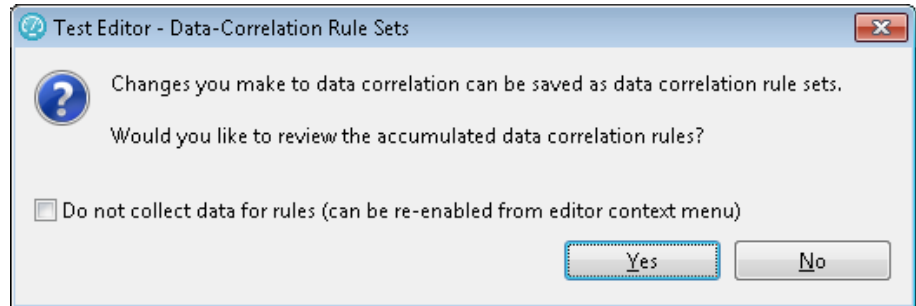


The screenshot shows the 'Data Correlation Rules: myrules10_2' interface. It features a 'Rule Set' section with a description: 'This section shows the data correlation rules that this file defines'. Below this is a toolbar with 'Append' and 'Insert' buttons, a search box labeled 'Enter filter text', and a red 'X' button. A tree view on the right shows the rule structure:

- Rule Arguments
 - Rule Pass
 - Create a reference - **ref1** - src='1BLAHBLAHid1=(.*)B'
 - Link with substitutions
 - Create a substitution - **subst1** - src='&uniqueId=(.*)\$'

Tip – Auto Generated Rules

- Performance Tester monitors your manual test edits
- Rules can be viewed when you save your test
- Great way to begin with rules if you don't know how to get started



Agenda

- Getting Started
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- **Executing Tests**
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- Troubleshooting

Setup with a Firewall

- Firewalls on the workbench and agents must be configured to:
 - Allow ephemeral ports on the workbench to connect to ports 10002 and 10005 on the agent
 - Allow ephemeral ports on the agent to connect to a range on the workbench
 - Windows > Preferences > Agent Controller > Firewall Settings
 - Specify a starting point for the range of ephemeral ports
 - Allow the agent to reach the server you are testing (ports 80 or 443 typically)

Test Log

- **Best Practice in Production**

- Large numbers of users
- Best performance

- **For Debug Only**

- Very small number of users
- Great detail

Schedule Element Details

Schedule_Monday

Think Time | Resource Monitoring | Statistics | **Test Log** »»₃

What to Log	Log Level
<input checked="" type="checkbox"/> Show <u>e</u> rrors and failures	All
<input checked="" type="checkbox"/> Also show <u>w</u> arnings	All
<input checked="" type="checkbox"/> And also show all <u>o</u> ther types	Primary Test Actions
<input checked="" type="checkbox"/> Only sample information from a subset of users	
<input checked="" type="radio"/> Fixed number of users: <input type="text" value="5"/> per user group <input type="radio"/> Percentage of users: _____ per user group	

Schedule Element Details

Schedule_Monday

Think Time | Resource Monitoring | Statistics | **Test Log** »»₃

What to Log	Log Level
<input checked="" type="checkbox"/> Show <u>e</u> rrors and failures	All
<input checked="" type="checkbox"/> Also show <u>w</u> arnings	All
<input checked="" type="checkbox"/> And also show all <u>o</u> ther types	All
<input type="checkbox"/> Only sample information from a subset of users:	
<input type="radio"/> Fixed number of users: 5 per user group <input checked="" type="radio"/> Percentage of users: 100 per user group	

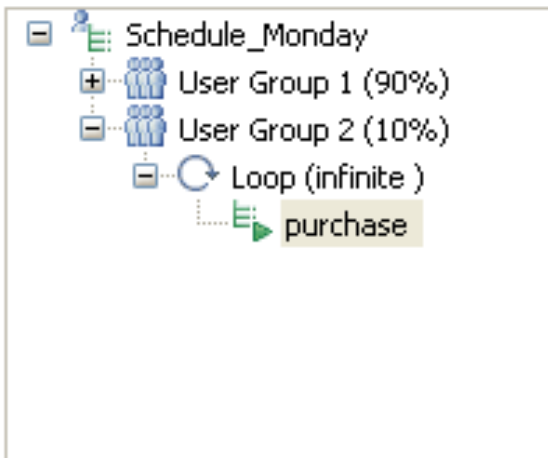
Loops

- Schedule
 - Start new connections on each iteration
 - Increased server workload

Performance Schedule - :

Schedule Contents

This section shows the schedule contents

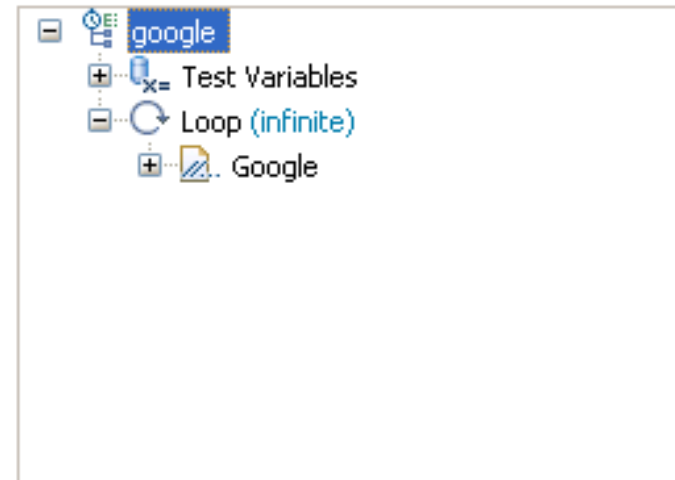


- Tests
 - Re-use connections on each iteration

Test - google

Test Contents

This section shows the test contents



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

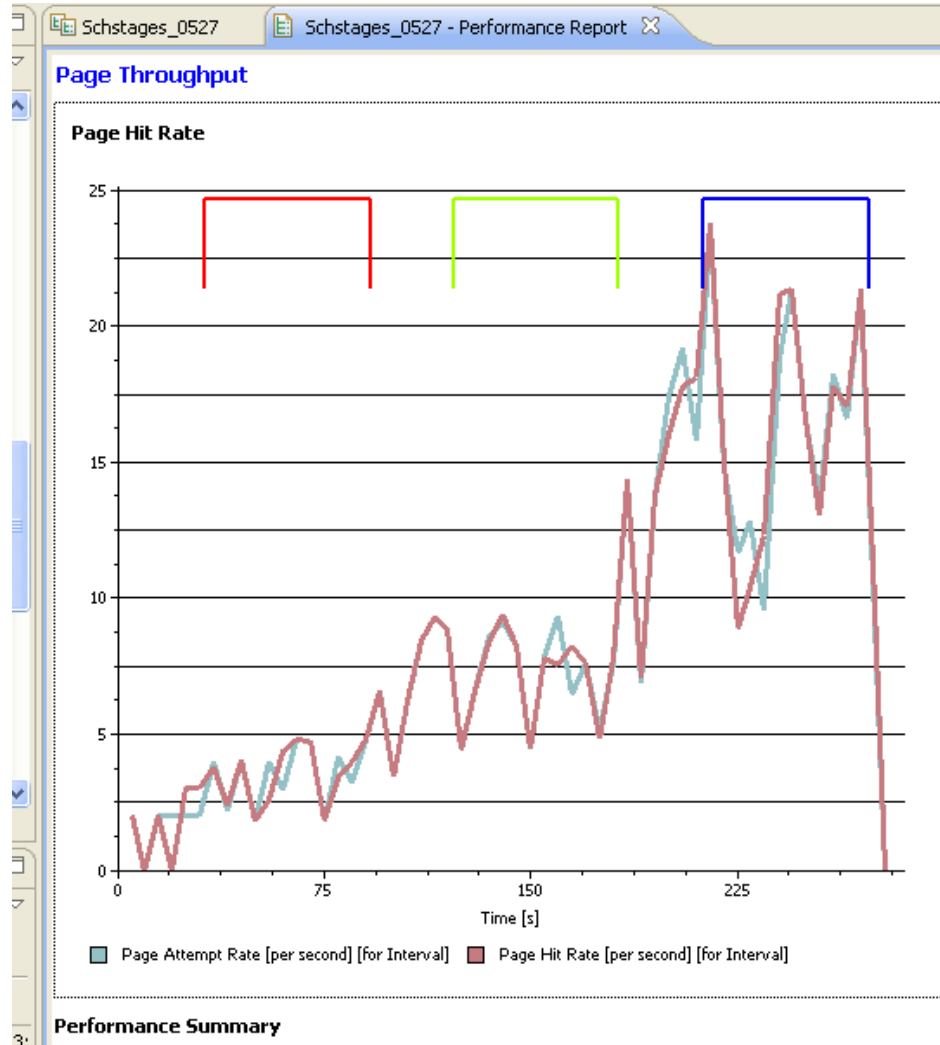
User Load | Think Time | Resource Monitoring | Statistics | Test Log »

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

Schedule Stages Example Report



Schedule Stages Best Practices

- More than one stage?
 - Designed to compare steady state behavior at multiple user load levels
 - Loop required – you do not want users to finish workload
 - Loop infinite – use time (duration) to control when the run ends

- Run Until Finished
 - Only if there is one stage

User Load	Think Time	Resource Monitori
Users	Stage Duration	
5	Until Finished	

Performance Schedule - Schsip

Schedule Contents

This section shows the schedule contents

Schedule Element Details

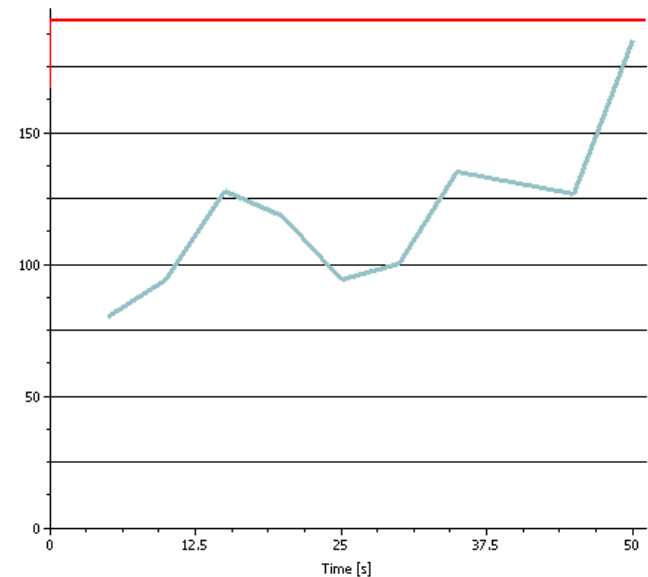
Schsip

User Load	Think Time	>>6
Users	Stage Duration	
50	10 Minutes	
100	10 Minutes	
500	10 Minutes	

Tips for Top Performance

- Never drive load from the RPT User Interface workbench machine
- Stay below 1200m workbench heap
 - Default is half physical memory up to 1024m
 - Set in eclipse.ini with maximum 1200m
 - Exceeding can ironically introduce out of men
- Agent computer maximum heap
 - Up to 1500m Windows
 - Up to 3000m Linux
 - Set using RPT_VMARGS general property in th editor
- Increase Linux per process file lim
 - Default is 1024. Increase to 10,000 – 30,000.

Page Element Response vs. Time



■ Average Response Time For All Page Elements [ms] [for Interval]

Windows XP & 2003 TCP/IP Tuning Recommendations

- Make sure you have sufficient # of TCP/IP ports
 - On Windows drivers the limit is typically 5000
 - Use the netstat -a command to observe port usage during run
 - If the largest number you see is 5000 then you have a problem!
 - You can increase it by adding a registry entry (need to reboot for it to take effect!)
HKEY_LOCAL_MACHINE > SYSTEM > CurrentControlSet > Services > Tcpip > Parameters > MaxUserPort
(dword, default is 5000, max is 65534)

Trick: Multiple engines on one box

- How can I take advantage of a hot box with lots of memory?
- RPT can run more than one engine as long as the *hostname* is different
- Create another location for that box using the IP address for the hostname
- Example (scooby IP is 9.42.117.101)
 - Name: scooby1 Name: scooby2
 - Hostname: scooby.rtp.ibm.com Hostname: 9.42.117.101
- Use hosts file for more than two engines

Engine Room – Unsupported Trick

Point browser to port 1903

RPT Engine Room - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://adama.rtp.raleigh.ibm.com:1903/

RPT Engine Room

RPT Engine Room on adama

[Engine Counters](#)

[Subsystems](#)

[Runner](#)

[Actions](#)

Engine Counters

Virtual Testers:	100
Average CPU	0.49
Bytes sent:	5109586
Bytes received:	313757396
Bytes sent per second	565.0
Bytes received per second	34756.0
KB in use	11183.25
KB per user	111
Process VM KB Average	66072.26
Process VM KB per user	660
Process VM KB Peak	76820
JVM Heap KB	19172.97
JVM Heap per user	191
JVM Heap maximum	24051712
Connections opened	1772
Connections closed	1772
I/O Retries	1772

```
Action queue size          0
Actions per second        192
```

Subsystems

```
Engine Status
Time in test: 635594
Wait subsystem: Thread[Kernel Wait,5,main]: WORKING, current: Executing A1DE659AF
I/O subsystem:
1: Thread[Kernel NIO 0,5,main]: OK, current: select(10000) keys=1, last: Process r
2: Thread[Kernel NIO 1,5,main]: OK, current: select(10000) keys=1, last: Process r
3: Thread[Kernel NIO 2,5,main]: OK, current: select(10000) keys=1, last: Process r
```

```
Other subsystems:
Thread[SyncPointSubsystem,5,main]: OK, current: Waiting for arrivals., last: Waiti
```

```
Brotherhood of RPT Engine Workers: 10 brothers are gainfully employed
Thread[Brother-9,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb9.jpg
Thread[Brother-10,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb12.gif
Thread[Brother-8,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb7.jpg
Thread[Brother-7,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb10.jpg
Thread[Brother-6,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb12.gif
Thread[Brother-5,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb8.jpg
Thread[Brother-4,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb11.jpg
Thread[Brother-3,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb11.jpg
Thread[Brother-2,5,Engine]: OK, current: Idle, last: 10.1.1.1/perseus/20kb9.jpg
Thread[Brother-1,5,Engine]: OK, current: Idle, last: PacedLoop Iteration Delay
```

Runner

Actions

```
test.Schbenchwin7491348258849741272_Schedule_DC55DF7858937DB505EBA3509F3A11DB chil
User Group 1 childCount=100 childrenFinished=0 stopReq=false
  [User Group 1][000001] childCount=2 childrenFinished=1 stopReq=false
    Default Scenario childCount=2 childrenFinished=0 stopReq=false
      Loop loopIteration=12 childCount=2 childrenFinished=0 stopReq=false
        PacedLoop Iteration Delay state Sleeping started=true finishStarted
```

Custom Code



- Execute your Java code during the test
- Manage loops (break, continue)
- Perform processing on response from the server and return results as references for future use
- Run programs

```
public String exec(ITestExecutionServices tes, String[] args) {
    int idexpected1 = -1;
    int idexpected2 = -1;
    StringBuffer response = new StringBuffer();
    Random rand = new Random();
    String pass = args[0];
    if (pass.equalsIgnoreCase("1")) {
        idexpected1 = rand.nextInt();
        response.append("SC_OK");
    } else if (pass.equalsIgnoreCase("2")) {
        String id = "12345";
        int num = Integer.parseInt(id);
        if (num == idexpected1) {
            idexpected2 = rand.nextInt();
        } else {
            response.append("SC_BAD_REQUEST " + idexpected2);
        }
    }
    return null;
}
```

Stop test & Stop user

```
// 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;
```

DEMO



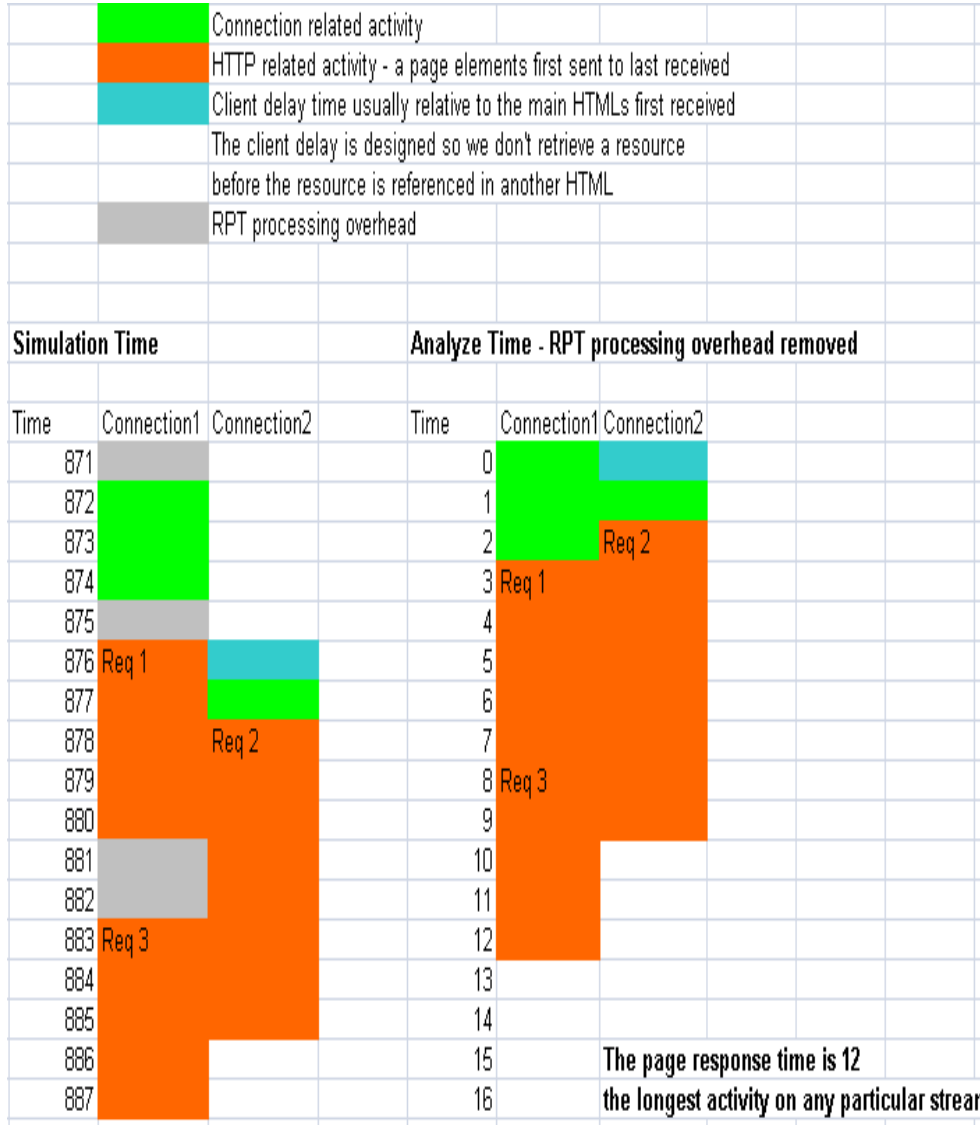
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- **Reports**
- Troubleshooting

HTTP Page Response Time

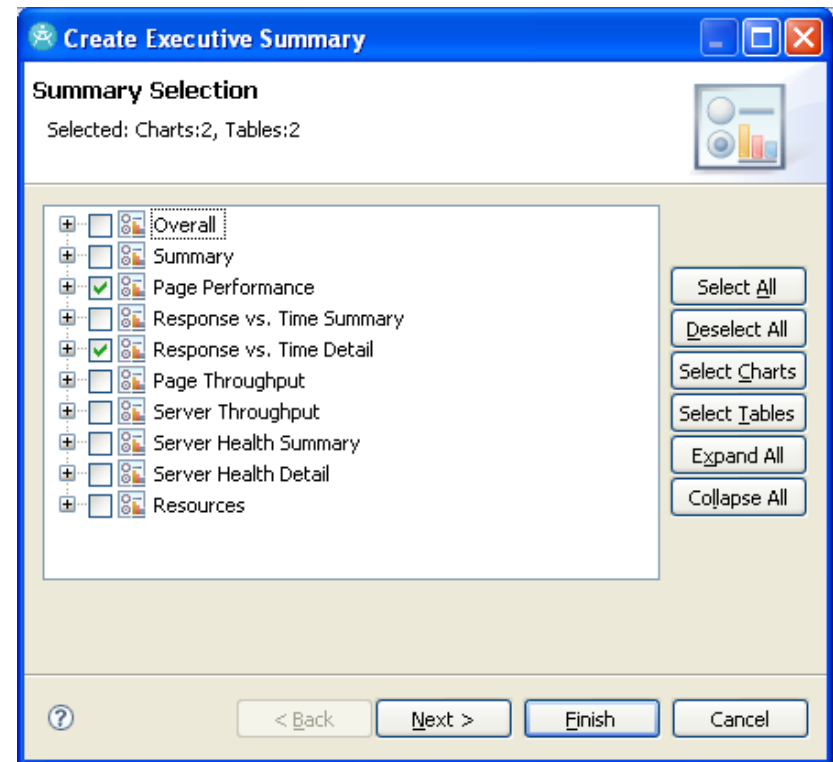
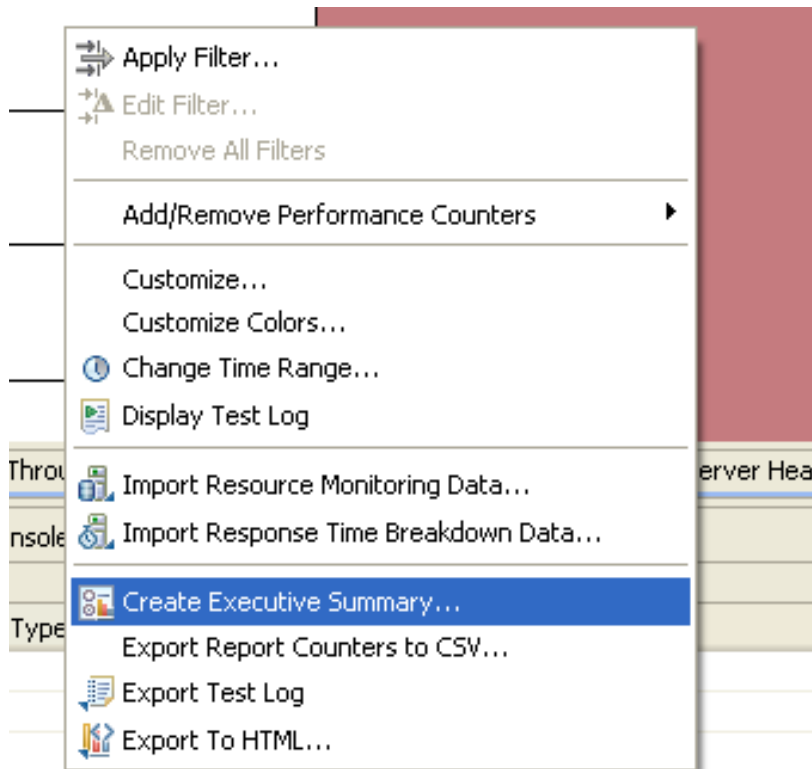
- A page consists of several connection streams executing page elements in parallel
- A page element is one part of the page such as an image or client-side script
- For each page element RPT issues an HTTP request which has a corresponding response from the server
- Page element response time is the time from first byte sent to last byte received
- The response time for a page connection stream is the total of all of its page element response times plus any additional time establishing connections, if any
- Page response time is the maximum response time of all page connection streams
- Processing overhead time is excluded
 - Data correlation harvesting
 - Action scheduling delays (under stress)
 - Custom Code processing
 - HTTP processing

HTTP Page Response Time Example



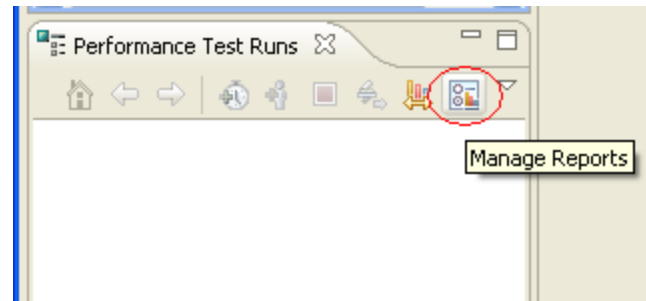
Executive View

- All report data in one RTF



Customizing Reports

- Customize an existing report
 - Manage Reports > Expand HTTP Reports > Select Report > Edit
- Create a custom report
 - Manage Reports > Create
- Make your custom report the default report
 - Window > Preferences > Test > Performance Test Reports > Default Report



DEMO

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Troubleshooting

- Attempts versus Hits
- Enable Verification Points
 - Look for 100% pass rate

Page Summary

Total Page Attempts [for Run]	1,190
Total Page Hits [for Run]	1,190

Page Element Summary

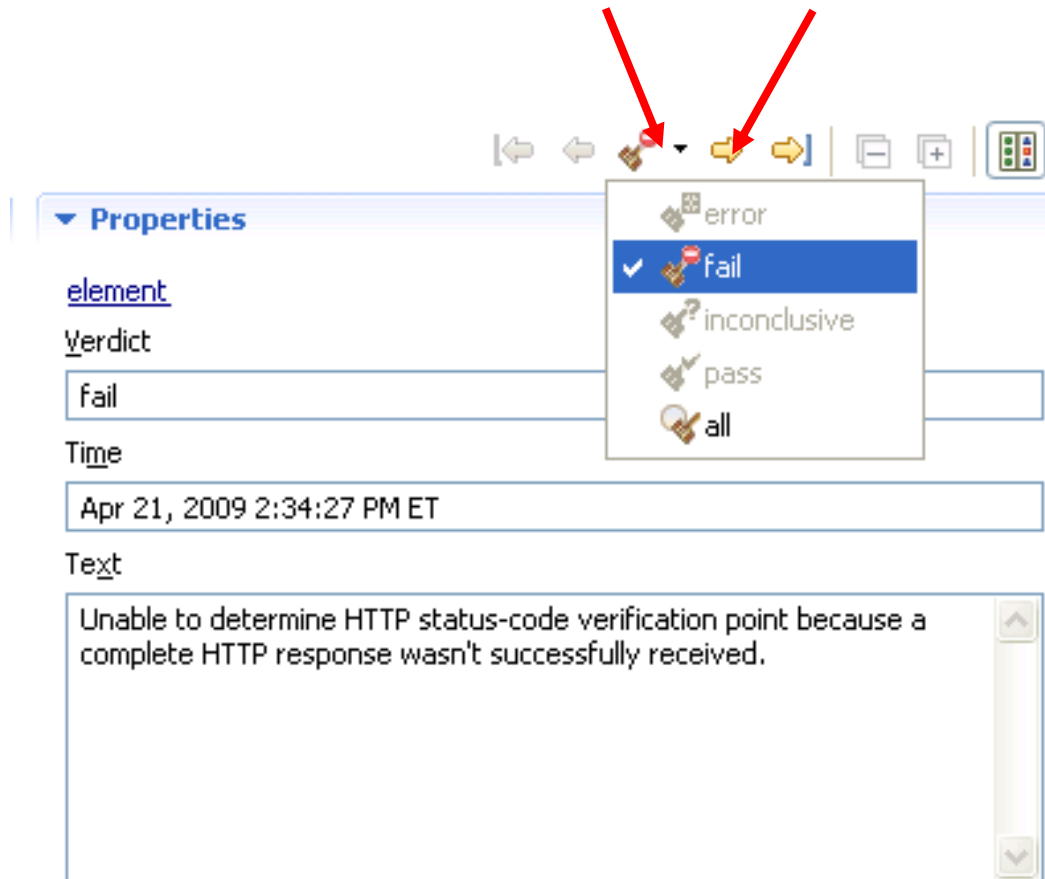
Total Page Element VPs Passed [for Run]	35
Percent Page Element VPs Passed [for Run]	100

The screenshot shows the 'Test - stdbench' window in the IBM Rational Performance Tester. The 'Test Contents' section is visible, showing a tree view with 'Verification Points' selected. A context menu is open, and the 'Enable' option is checked. The sub-menu shows the following options:

- Enable Content VPs
- Enable Response Code VPs
- Enable Response Size VPs
- Enable Page Title VPs

The 'Run' button is visible at the bottom right of the window.

Troubleshooting



The screenshot shows a web browser's developer console. The **Properties** panel is expanded, showing the following details:

- element**: [element](#)
- Verdict**: fail
- Time**: Apr 21, 2009 2:34:27 PM ET
- Text**: Unable to determine HTTP status-code verification point because a complete HTTP response wasn't successfully received.

 A context menu is open over the 'fail' verdict icon, with the following options:

- error
- fail** (selected)
- inconclusive
- pass
- all

 Two red arrows point to the 'fail' icon and the context menu.

Out of Memory – Workbench Tips

- Default schedule setting
- Max heap – Windows
 - More is not necessarily better
 - Default recommended is 1200m
 - Limit could be lower (eg 1024m)
- Max heap – Trick for Windows 64-bit
 - For max heap up to 1900m change in eclipse.ini
 - vm
 - D:\Program Files\IBM\SDP821\jdk\jre\bin\j9vm\jvm.dll
 - to
 - vm
 - D:\Program Files\IBM\SDP83\jdk\jre\bin\javaw.exe
- Longer statistics interval

Out of Memory – Agent

- See javacore file for hints
- Measure to determine memory requirement
 - 10, 100, 500, 1000, ... users
- Multiple engine on one agent trick

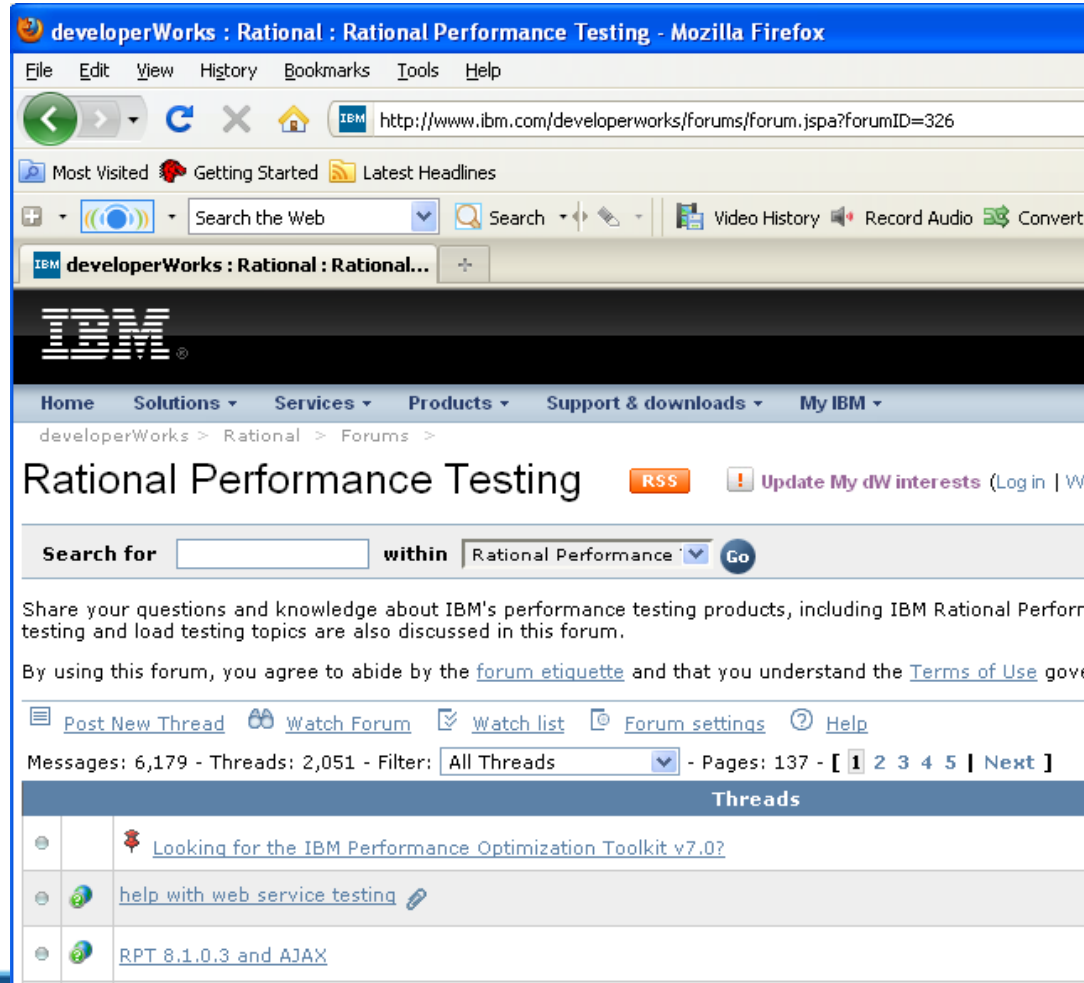
Recovery From Catastrophic Failure

Without Reboot




- Workbench
 - Stop and restart RPT
 - End stray processes: java, ACServer
 - Use Process Explorer and look at command line to identify process so you stop RPT related processes:
<http://technet.microsoft.com/en-us/sysinternals/bb896653.aspx>
- Agent
 - End stray processes: java, vmstat
 - Stop and restart all Agent Controllers
 - Linux uses RAStop.sh and RASstart.sh
 - Control Panel on Windows
 - Windows command line:
 - Windows stop command is **net stop “ibm rational agent controller”**
 - Windows start command is **net start “ibm rational agent controller”**

Forum

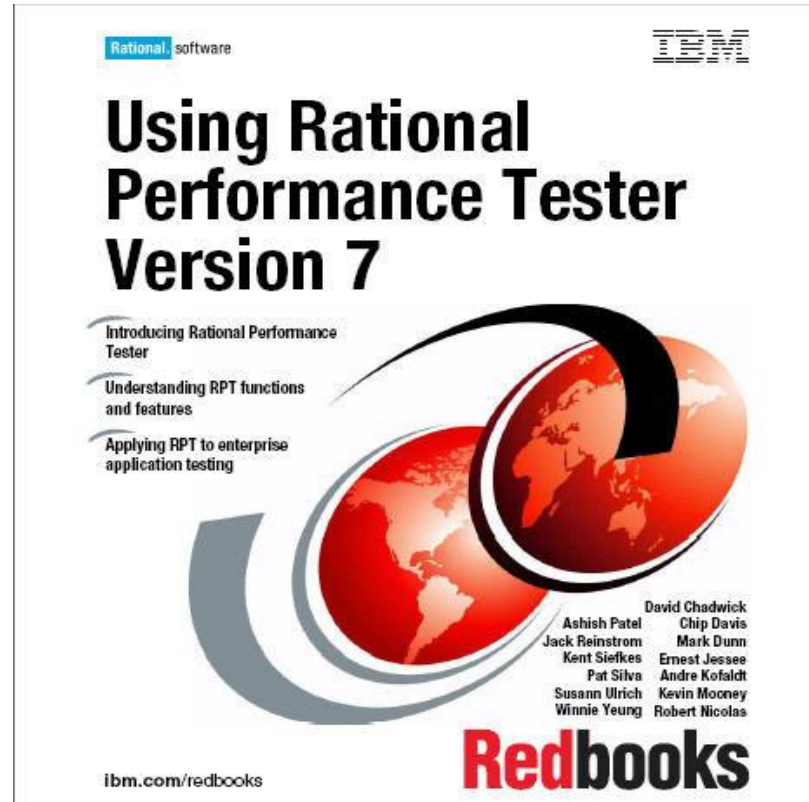
- <http://www.ibm.com/developerworks/forums/forum.jspa?forumID=326>



The screenshot shows a Mozilla Firefox browser window displaying the IBM developerWorks Rational Performance Testing forum. The browser's address bar shows the URL <http://www.ibm.com/developerworks/forums/forum.jspa?forumID=326>. The page header includes the IBM logo and navigation links: Home, Solutions, Services, Products, Support & downloads, and My IBM. The forum title is "Rational Performance Testing" with an RSS icon and a link to "Update My dW interests (Log in | W)". A search bar is present with the text "Search for" and "within Rational Performance". Below the search bar, there is a brief description of the forum: "Share your questions and knowledge about IBM's performance testing products, including IBM Rational Performance testing and load testing topics are also discussed in this forum." A notice states: "By using this forum, you agree to abide by the [forum etiquette](#) and that you understand the [Terms of Use](#) govern." The forum interface includes links for "Post New Thread", "Watch Forum", "Watch list", "Forum settings", and "Help". The message count is "Messages: 6,179 - Threads: 2,051 - Filter: All Threads" and the page navigation shows "Pages: 137 - [1 2 3 4 5 | Next]". The forum threads list includes:

Threads	
	Looking for the IBM Performance Optimization Toolkit v7.0?
	help with web service testing
	RPT 8.1.0.3 and AJAX

Valuable Resource



<http://www.redbooks.ibm.com/abstracts/sg247391.html>

QUESTIONS

www.ibm.com/software/rational

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