Testing Web Services and Service-Oriented Architecture (SOA) Applications

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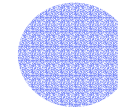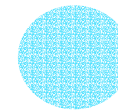## IBM Rational Software Development Conference UK 2007
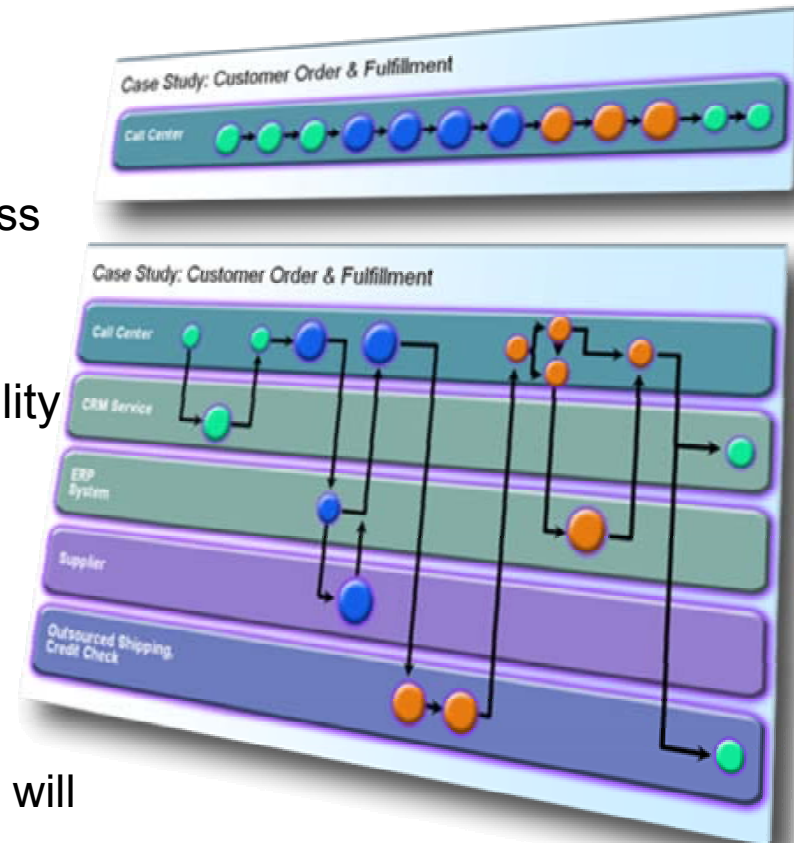
What keeps me **Rational**?

Agenda

- SOA characteristics & testing challenges

- Approach to testing SOA applications

- New solutions deep dive:
    - *IBM Rational Tester for SOA Quality*
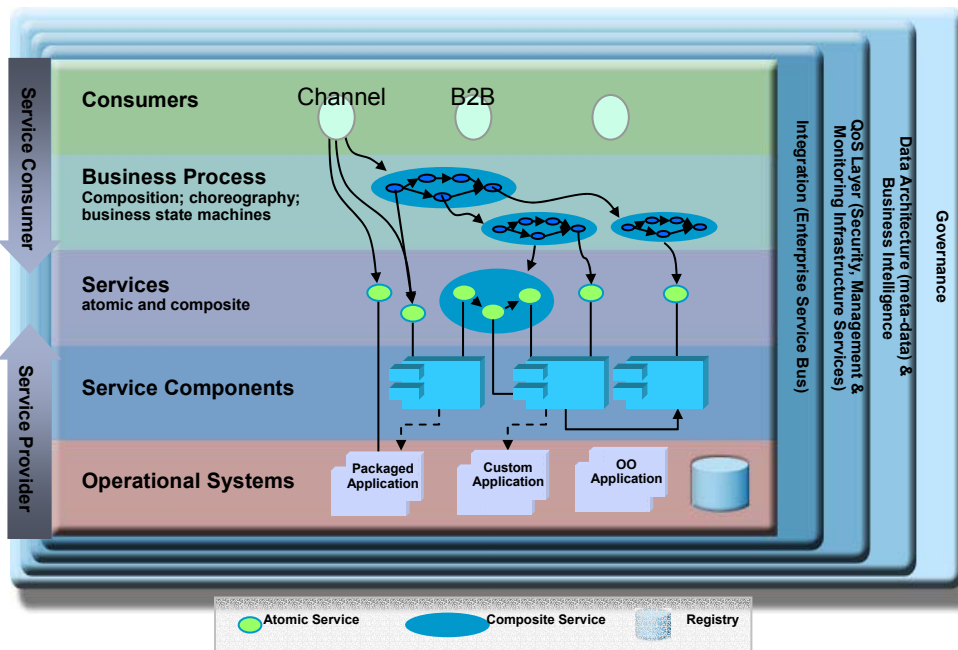   - *IBM Rational Performance Tester Extension for SOA Quality*

SOA characteristics & testing challenges

- **Business driven development**
  - ▶ Effective quality management calls for understanding of the business processes across several composite applications

- **Agile architecture that enables business flexibility**
  - ▶ Ever changing environment requires agile and continuous testing

- **Loosely coupled business processes and services**
  - ▶ No assumption can be made on how a service will be used
  - ▶ No control over the entire solution under test

Case Study: Customer Order & Fulfillment

Call Center

Case Study: Customer Order & Fulfillment

Call Center
CRM Service
ERP System
Supplier
Outsourced Shipping, Credit Check

SOA characteristics & testing challenges

- **Abstract and GUI-less services**
  - ▶ No user interface directly available to interact with the services
  - ▶ Hide the business logic to be tested

- **Reusable services**
  - ▶ One under performing service could slow down several composite applications
  - ▶ Impact of one single service failure can be catastrophic
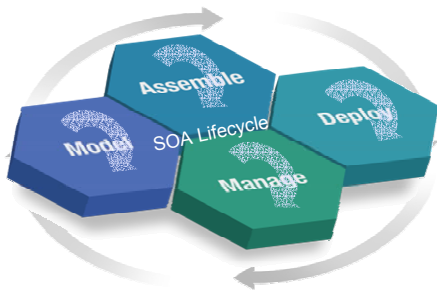
Approach to testing SOA applications

- Build a collaborative cross-functional test team

  ▸ Business analysts provide inputs for defining the test objectives and review the test strategy

  ▸ Test architects define test plans taking into account Service Level Agreements

 ▸ Testers, performance engineers and developers implements and automate the tests

- Continuous testing across the delivery lifecycle part of a global quality management strategy

  ▸ The "test early, test often" mantra is key to success with SOA

  ▸ Comprehensive functional and performance testing of each service

  ▸ Integration testing of services composed into business processes leveraging business process models

  ▸ System testing of composite applications to validate the solution meets the business objectives
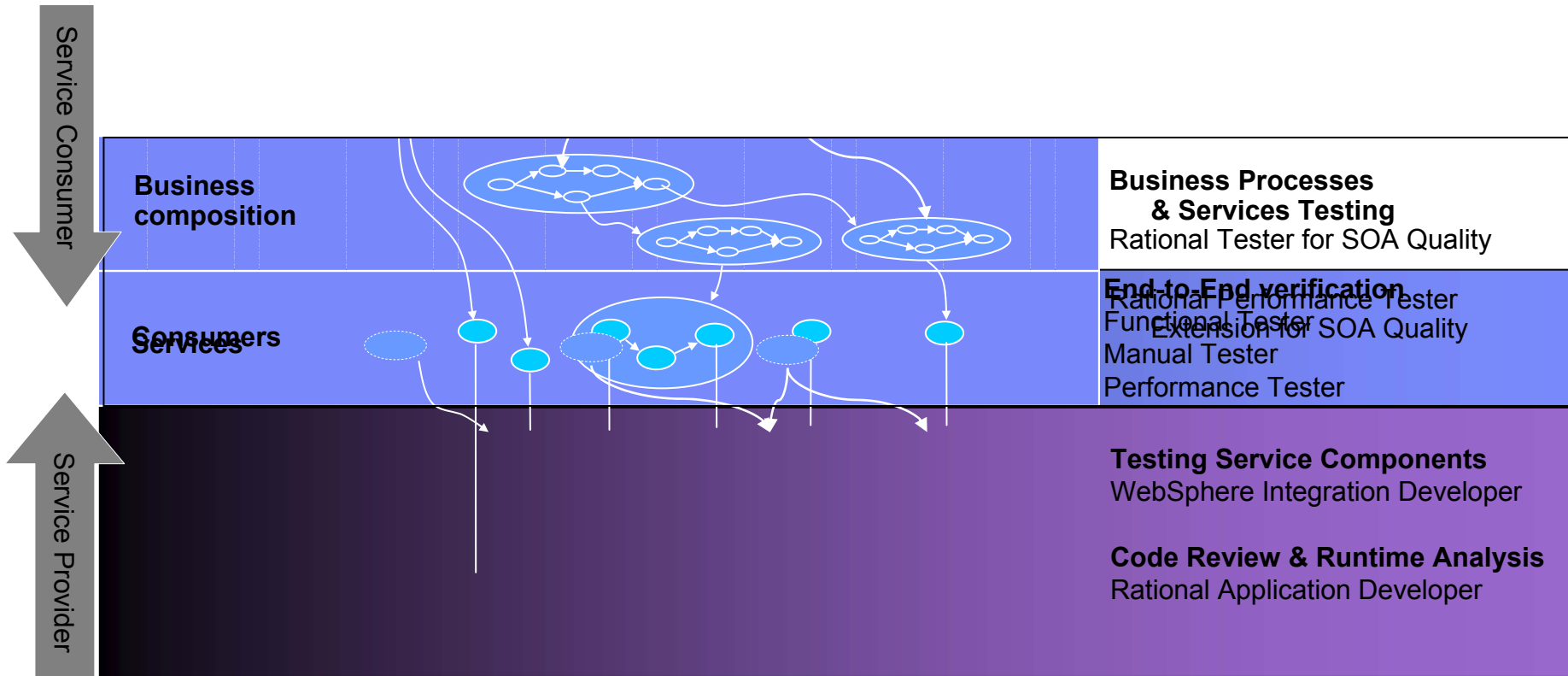
Approach to testing SOA applications
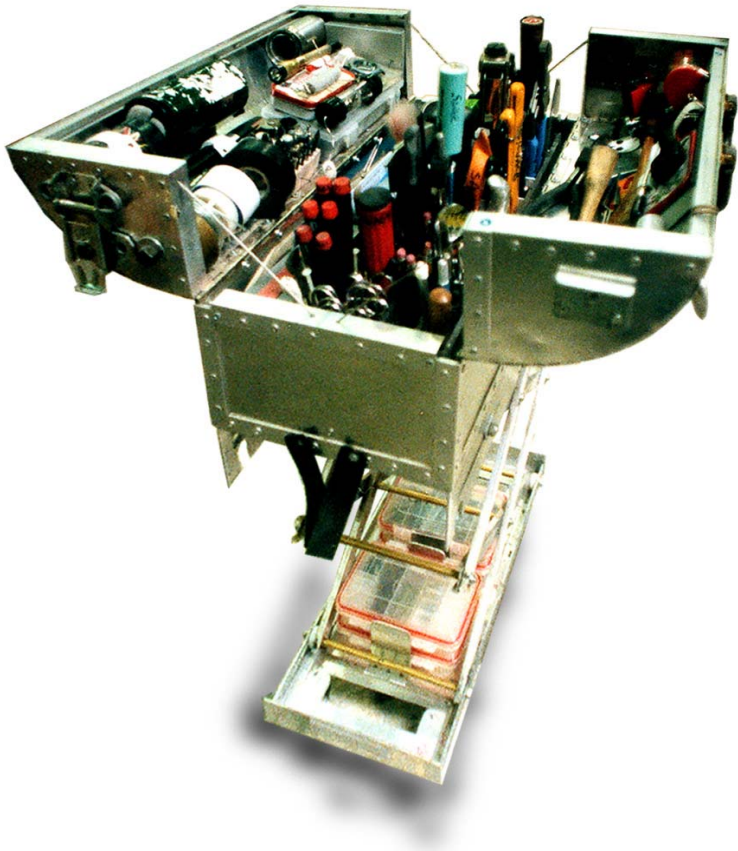
- **Effective test automation**
  - ▸ Plan the automation
  - ▸ Maintainability
  - ▸ Reuse of test steps and cases
- **Test automation tools**
  - ▸ For functional and performance testing
  - ▸ Integrated with development platform
  - ▸ Address the test of GUI-less services
  - ▸ Support open standards

Rational SOA Quality Management Solution

A Service Oriented Architecture is composed of multiple layers.
At the heart of SOA are services and components that realize services.

Service Consumer

Service Provider

Business composition

Consumers
Services

Business Processes
& Services Testing
Rational Tester for SOA Quality

End-to-End verification
Rational Performance Tester
Functional Tester
Extension for SOA Quality
Manual Tester
Performance Tester

Testing Service Components
WebSphere Integration Developer

Code Review & Runtime Analysis
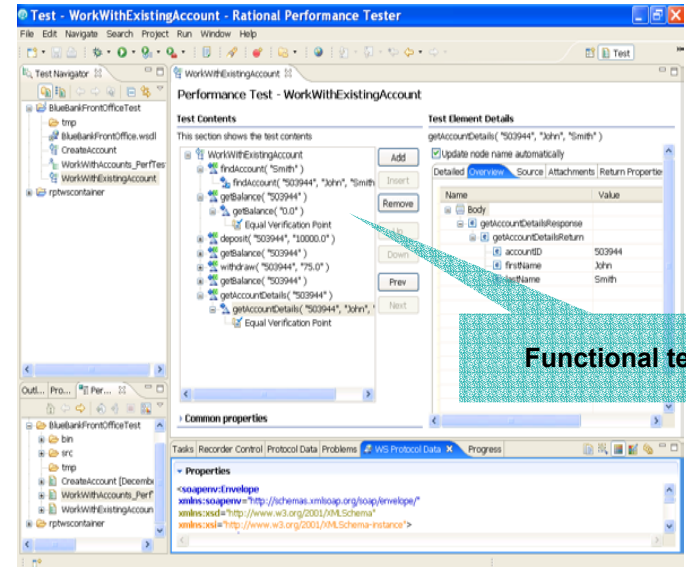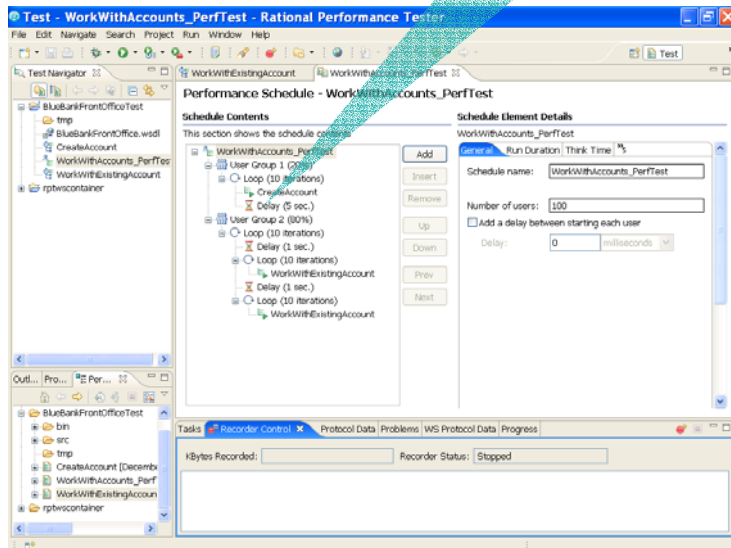Rational Application Developer

Test SOA applications early and often
With two new solutions from IBM Rational software

IBM Rational Tester for SOA Quality

Automated regression and functional testing for GUI-less Web services

Performance schedule

Functional test

IBM Rational Performance Tester Extension for SOA Quality

Performance Testing for Web service - based applications

IBM Rational Tester for SOA Quality

Code free testing of GUI-less services

Test creation WS-BPEL

Test log details

- **Simplify functional testing**
  - ‣ Generation of service test client
  - ‣ Code-free test authoring
  - ‣ Automated test creation from Business Process Execution Language (WS-BPEL)
  - ‣ Support Web services standards

- **Accelerate test creation and execution**
  - ‣ Automated data correlation and data driven testing
  - ‣ Supporting a wide variety of users on broad range of platforms

IBM Rational Performance Tester Extension for SOA Quality
One tool for service performance testing and problem analysis

Server response time of Web service

User action throughput
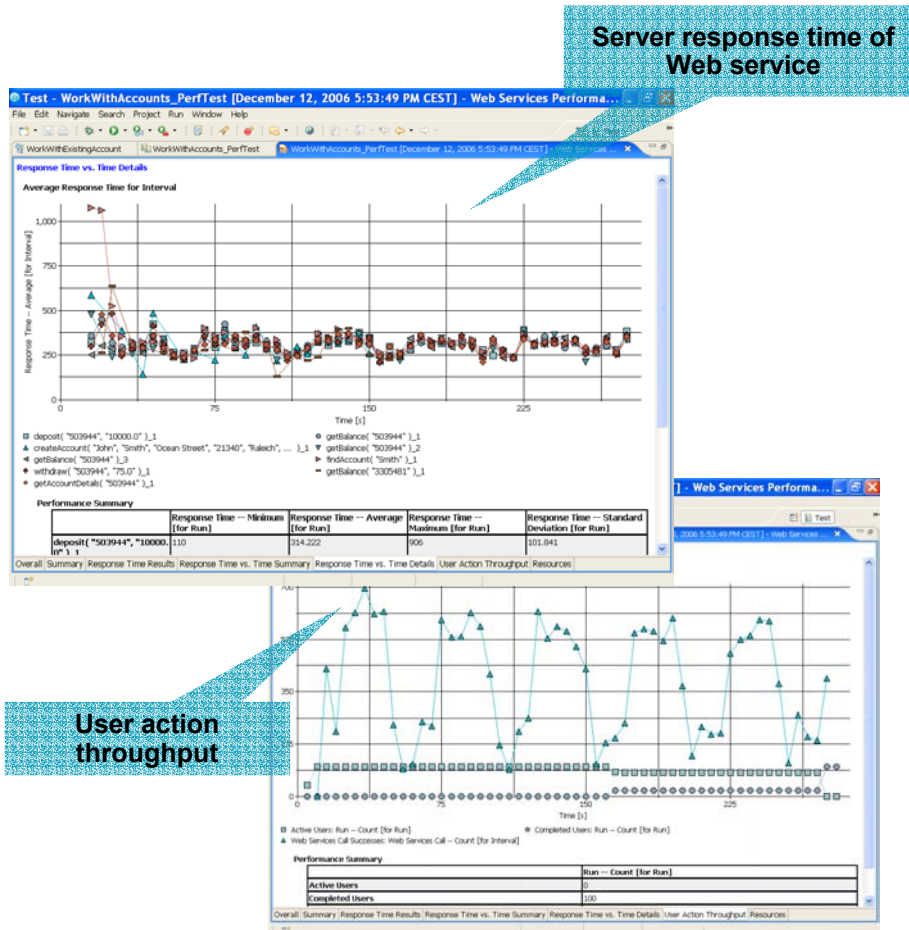
- All the capabilities of Rational Tester for SOA Quality plus:

- Validate system scalability
  - ▶ Flexible workload modeling
  - ▶ Real-time reporting of server response time and throughput

- Find performance bottlenecks
  - ▶ Broad platform monitoring support for deployed web services
  - ▶ Collection and visualization of server resource data – root cause analysis

Create a test
With IBM Rational Tester for SOA Quality

Record / Author

- Interactively given the description of services (WSDL)

  ▸ Automatically create web pages to interact with services

- Recording using an existing service consumer (client application)

  ▸ Using a HTTP proxy or Java instrumentation technique

- From the description of a business process (WS-BPEL)

  ▸ Automatic generation of tests by analysis of the business process workflows

- Automatic Identification and Correlation of Variable Data

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Enhance a test
With IBM Rational Tester for SOA Quality
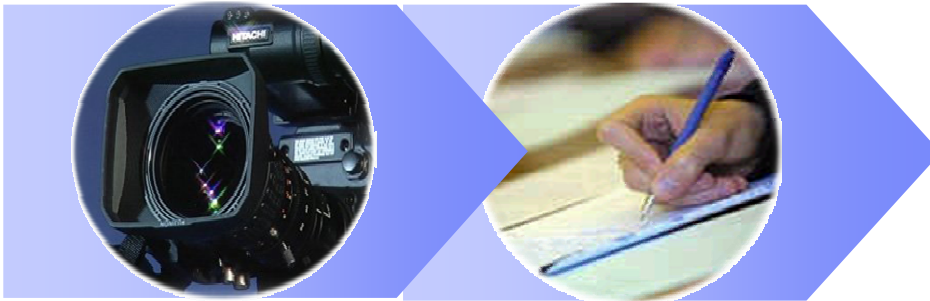
Record / Author   **Enhance**

- Visual test editor
  - ▶ Script-less edition of the tests
  - ▶ Tree view of the list of the operation calls and responses
  - ▶ Interactive invocation of operations and update of answers
  - ▶ Multiple views of the SOAP messages (values only, detailed view, raw XML, attachments)
  - ▶ Easy configuration of transport protocol & WS security parameters
- Data-driven and regression testing
  - ▶ Data pooling & manual correlation of SOAP data
  - ▶ Definition of verification points to set the baseline

What keeps me **Rational**?

Visual Test Editor

Details of the selected node

*CreateAccountTest ✕

Performance Test - CreateAccountTest

Test Contents

This section shows the test contents

- CreateAccountTest
  - createAccount("John", "Doe",
  - deposit("503944", "10000.0")
  - getBalance("503944")
  - getAccountDetails("503944")
  - findAccount("Doe")
  - findAccount("Doe")

Buttons: Add, Insert, Remove, Up, Down, Prev, Next

Common properties

Sequence of test steps (operation calls & returns)

Test Element Details

createAccount("John", "Doe", "200 Ocean Drive", "33392", "Miami Beach", ...)

☑ Update node name automatically

Operation: createAccount

WSDL Name:

WSDL Resource: /BlueBankFrontOffice/BlueBankFrontOffice.wsdl

Time Out (ms):   10000

Think Time (ms): 0

[Update Return ...] [Configure WSDL security] [Bind m]

Message data

Tabs: Overview | Source | Attachments | Protocol

Name	Value	
soapenv:Envelope		Add
soapenv:Body		Insert
q0:createAccount		Remove
q0:FirstName		
Text	John	
q0:LastName		Up
Text	Doe	
q0:StreetAddress		Down

What keeps me Rational?

Functional testing
With IBM Rational Tester for SOA Quality
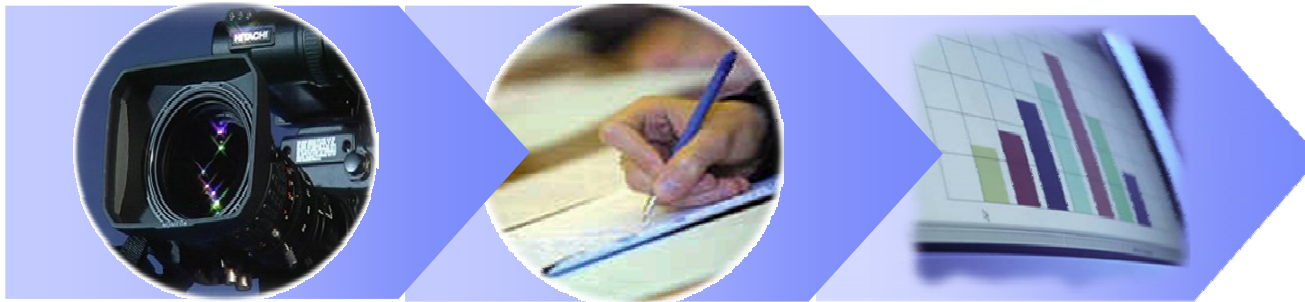
Record / Author   **Enhance**   **Execute Analyze**

- Run a single test or a suite of tests
  - From the tool user interface
  - From command line (batch mode)
  - From Rational ClearQuest test management solution

- Functional Test Report
  - Global verdict
  - Execution history view with all the messages exchanged and the verification points verdicts
  - Side-by-side comparison between expected and received responses

What keeps me **Rational**?

Performance testing
With IBM Rational Performance Tester Extension for SOA Quality

Record / Author   **Enhance**   **Workload Schedule**

- Powerful and flexible scheduling
  - ▶ Visual schedule editor for no code scheduling
  - ▶ Accurately model production-like workloads
  - ▶ Coordinate timing and dependencies
  - ▶ Dynamically increase the load during the run
- Reuse function tests
- Distributed load generation
  - ▶ Leverage several load generation machines including IBM mainframes

What keeps me **Rational**?

Performance testing
With IBM Rational Performance Tester Extension for SOA Quality

Record / Author   **Enhance**   **Workload Schedule**   **Execute Analyze**

- Performance test report
  - ▸ On-the-fly results
  - ▸ Detailed response time data presented in customizable charts and tables
  - ▸ Export to HTML
- Simultaneously monitor resources utilization during the test
- Identify the root cause of performance problems
  - ▸ Response time break down
  - ▸ Integration with Tivoli monitoring infrastructure

What keeps me **Rational**?

Demo

Questions

Thank You

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