



Tendances Logicielles

L'architecture pour répondre aux besoins métier

Service-Oriented Architecture Quality Management & Testing Best Practices

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What is?

... a service?

A **repeatable business task** – e.g., check customer credit; open new account

... service orientation?

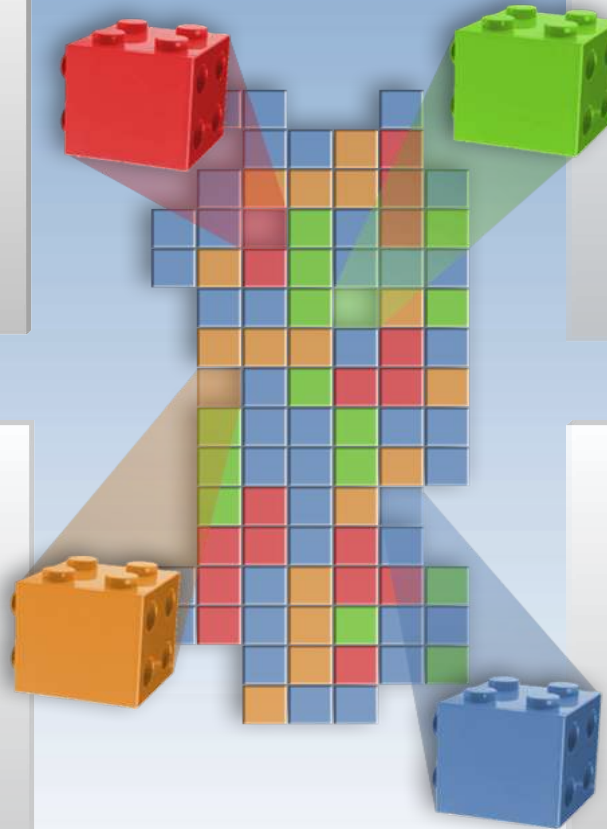
A way of integrating your **business as linked services** and the outcomes that they bring

... service oriented architecture (SOA)?

An IT **architectural style** that supports service orientation

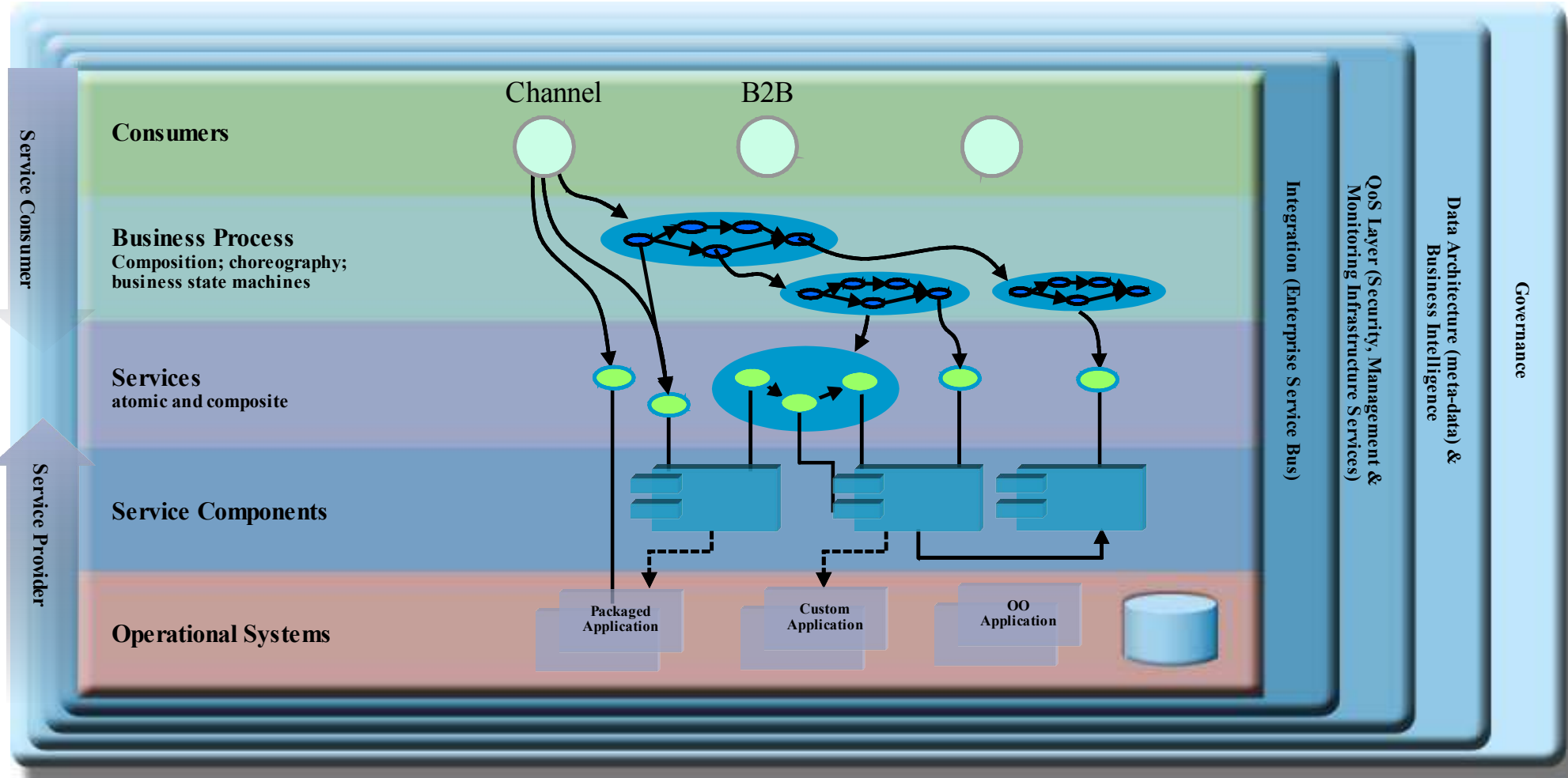
... a composite application?

A set of **related & integrated** services that support a business process built on an SOA

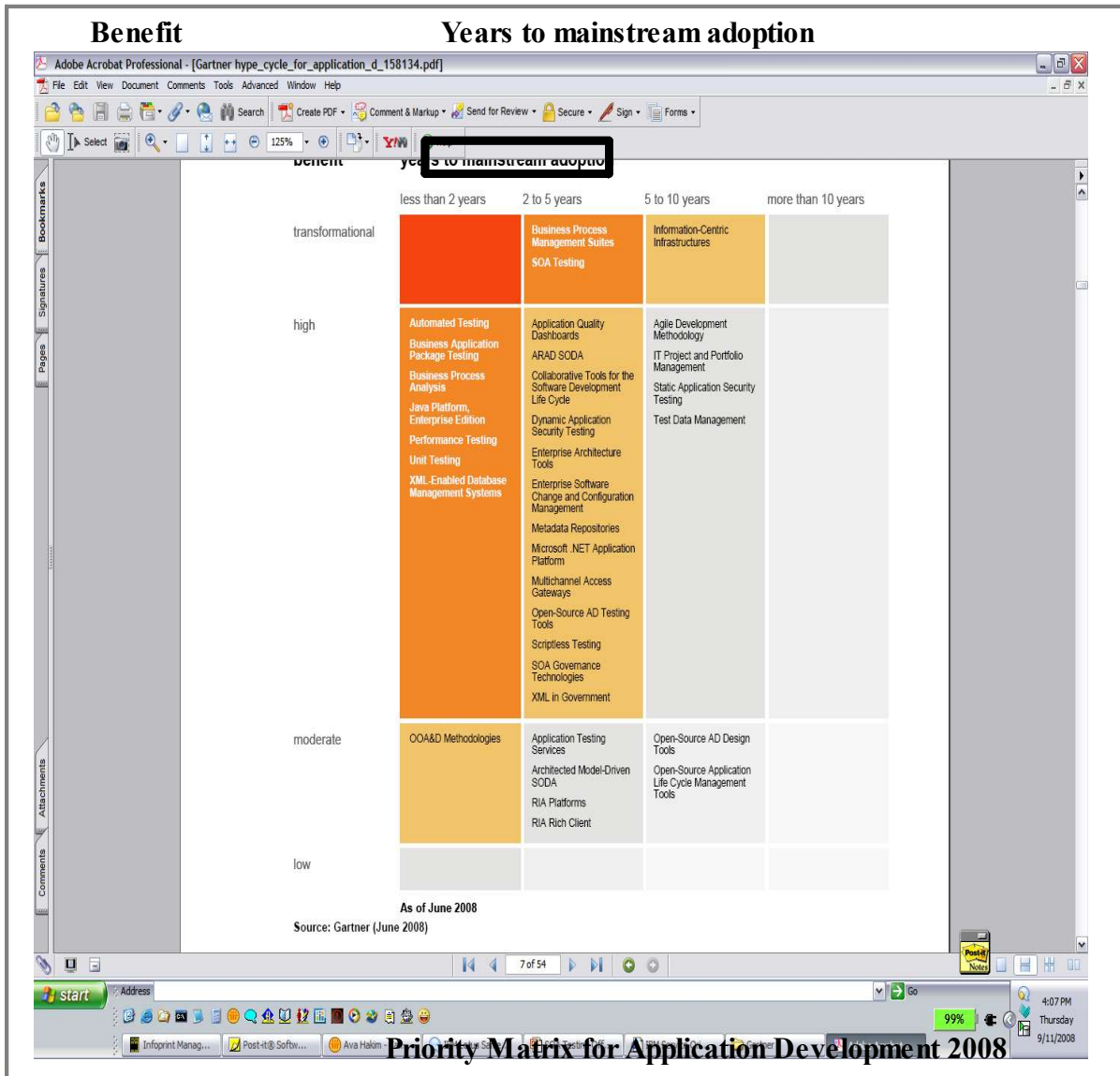


SOA Solution Layering

At the heart of the SOA are Services



SOA Testing: a Transformational Priority



From Gartner's Hype Cycle for Application Development 2008

“ Users are moving beyond simple Web services, and are quickly finding the **need for more robust tools to drive quality and to support the goals of agility promised by SOA**

Web services must be stable and reliable for applications to be built on top of them. **They need a solid testing focus, or the services will become liabilities to application stability.**

”



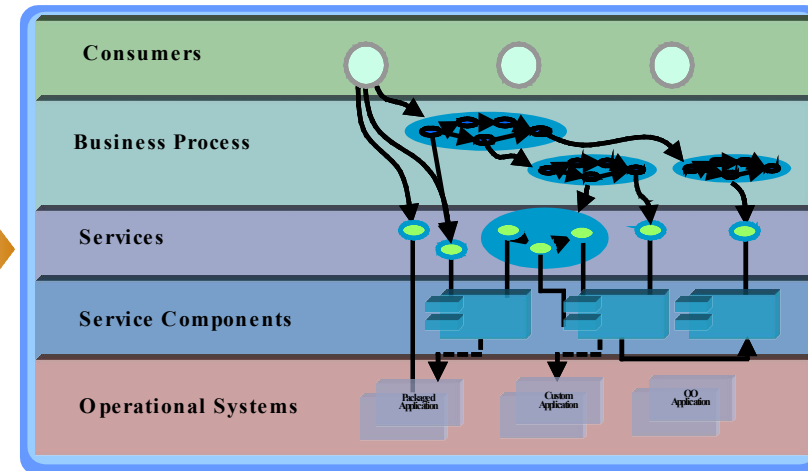
What is a Good Quality Service?

■ Standard Quality Factors

- Correctness, Reliability, Performance, Interoperability, Security

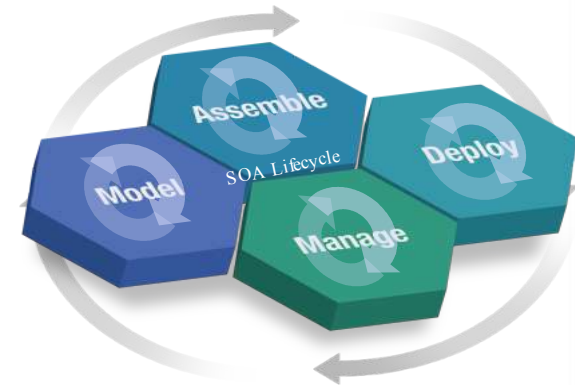
■ SOA Specific Quality Factors

- Meet Business Goals
- Loose coupling
 - Changes on the service consumer or provider should not require a change of the other one (e.g. service provider location change)
- Encapsulation
 - Well-defined interface that hides internal data not needed for the consumer
- Stateless Service
 - Transient state to a particular consumer add complexity and prevent readily scalable and highly available service provide
- Technology neutral
 - Invoke a service with any technology



SOA Testing Strategy

- **Continuous testing across the delivery lifecycle**
 - Focus on **Business Goals**
 - **Quality & test management** should be first and central
 - The “**test early, test often**” mantra is key to success with SOA
 - Comprehensive **testing of each service**
 - **Performance testing** of critical services
 - **Integration testing** of services composed into business processes leveraging business process models
 - System verification testing of composite applications to **validate the solution meets the business objectives**



Build a collaborative cross-functional test team

■ Business analysts

- Provide inputs for defining the test objectives
- Review the test strategy and test plans
- Supports the team during test design phase

■ Architects

- Identify unknown factors in using the services
- Assess the impact of changes and fixes onto the design

■ Developers

- Provides Schema and WSDL of the Services
- Review the test cases
- Provides technical details on how a service works

■ Test managers

- Define overall test strategy in regards to the business objectives
- Write test plans taking into account Service Level Agreements

■ Testers, performance engineers

- Write the detailed test cases
- Execute the tests
- Automate the tests
- Feedback the architects and developers with lessons learned



QA Team Skills Training

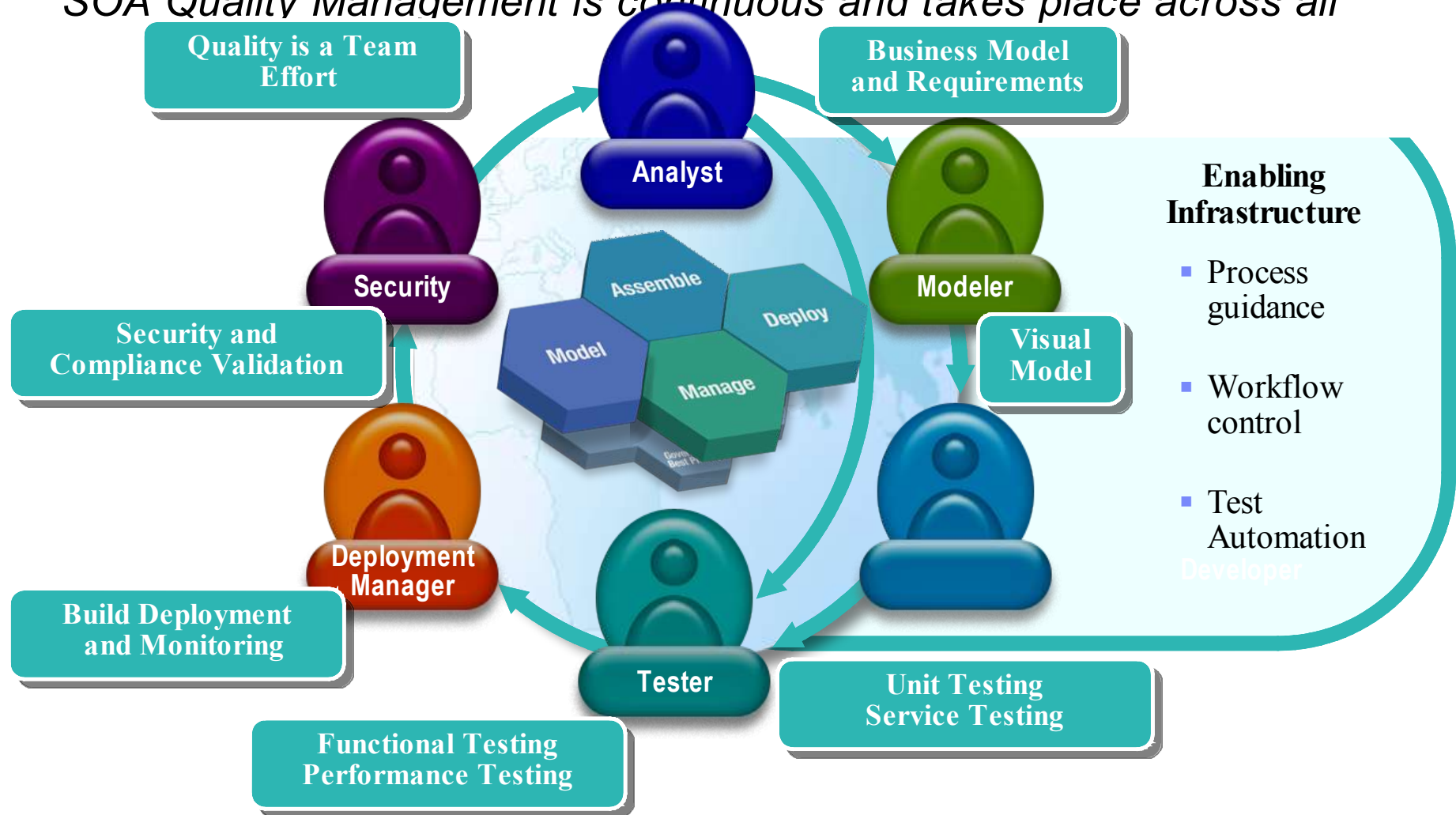


- **Start Small – Basics first**
 - Learn the SOA theology
 - Learn the benefits of SOA
 - Understanding the new processes and deliverables
- **Methodology Training**
 - The complexity introduced by SOA demands an organized standardized approach
 - The key is to be able to track, and trace your testing, defects and results in a fashion that you can consistently reproduce them without impacting your timelines severely.
- **Technology Training**
 - WS Standards, WSDL, XML, SOAP, ...
- **SOA Testing Tools Training**



SOA Quality Management in Action

SOA Quality Management is continuous and takes place across all



IBM Rational SOA Quality Management

<i>SOA Layer</i>	<i>Examples of IBM middleware that support SOA</i>	<i>Rational SOA Quality Management</i>
Consumer	Portlets or Web 2.0 App Build with: Rational Application Developer Deploy on: Websphere Portal Server	Rational Functional Tester Rational Performance Tester
Business Process	Business Process Build with: Websphere Integration Developer Deploy on: Websphere Process Server	Rational Service Tester for SOA Quality
Services	Services exposed as Web Services Build with: <ul style="list-style-type: none"> ▪ Rational Software Architect ▪ Rational Developer for Z ▪ Websphere Message Broker Toolkit Deploy on: <ul style="list-style-type: none"> ▪ Websphere Application Server ▪ Websphere Service Registry & Repository ▪ CICS Transaction Gateway / Server ▪ Websphere MQ / Message Broker ▪ IMS SOAP Gateway / Connect / Transaction 	Rational Service Tester for SOA Quality
Service Components	Java classes, EJB, SCA module, Web Services Build with: Rational Application Developer Deploy on: Websphere Application Server	Rational Application Developer Rational Service Tester for SOA Quality
Operation Systems	Database, CICS applications, Package applications Build with: Rational Developer for Z, Rational Data Architect Deploy on: CICS, DB2,	Rational Functional Tester Rational Performance Tester ext.

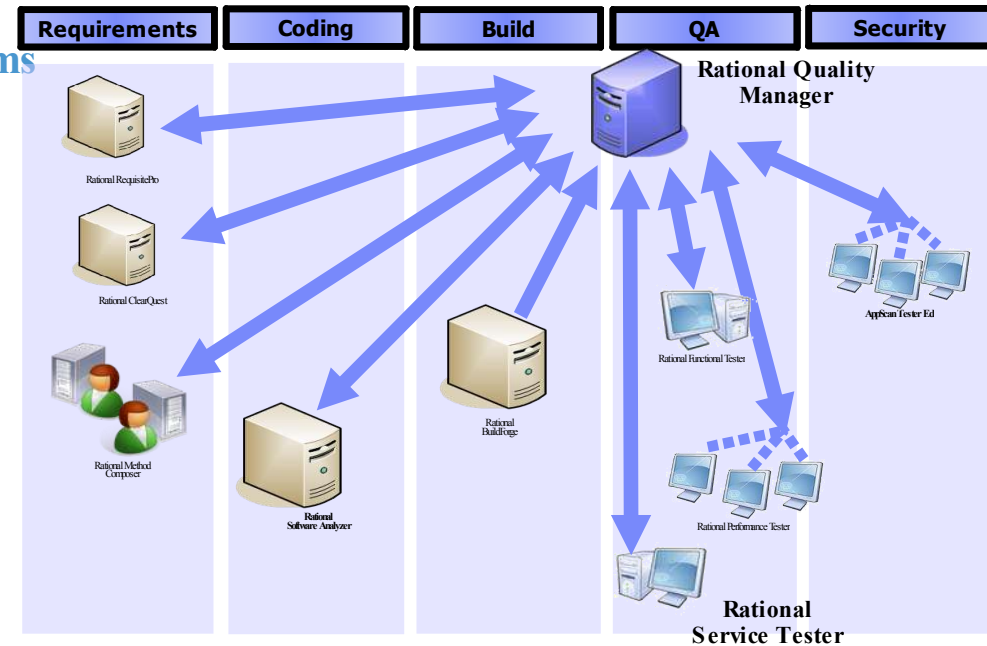
Rational Quality Manager



Rational Quality Manager

Providing full control, execution, and governance to improve the quality

- **Web 2.0 interface** designed for globally distributed teams
- **Integrated Test Plan data**
- **Process Enactment** that can be customer customized
- **Work Item Collaboration** across roles
- **Test Plan/Case Versioning**
- **Customized dashboards** for each user
- **Dynamic linkages** to requirements and defects
- **Full feature Manual Tester in QM**
- **Management and execution of testing tools**
- **Open Test Framework** with published schema and APIs



Customizable Test Plans


Adaptive and automated test plan management



Table Of Contents

- Summary
- Business Objectives**
- Test Objectives
- Review and Approvals
- Requirements
- Application Security
- Test Iterations
- Sizing
- Environments
- Test Team
- Quality Goals
- Entry Criteria
- Exit Criteria
- Test Cases
- Attachments

Show All Sections

 Add New Section

Live Documentation
Customizable
Test Plan sections can be assigned to individual user roles.

- Rich test plan captures dynamic data, **synchronizes team efforts**
- Every changing requirements and test cases are **captured in live documentation**
- **Testing tasks** can be assigned to owners and **tracked via the test plan**

Reviews and Approvals

Stakeholders remain actively engaged throughout the quality lifecycle

Artifact Reviews and Approvals

Review and Approvals

List the people who will be reviewers and approvers of this content and define your approval process.

View: All | Type Filter Text

	Review Type	Name	Status	Comments	Modified
<input type="checkbox"/>	Approver	Mary (Manager)	Pending		
<input type="checkbox"/>	Reviewer	Larry (Lab Manager)	Pending		

- All project stakeholders can **review, refine and sign-off** on all quality related artifacts
 - Requirements, test plans, test cases, exit criteria, etc.

- **Business participation** in acceptance testing activities
 - Business can walk through the changes prior to deployment
 - Acceptance testing results are integrated and stored with all other test results

Web Based Acceptance Testing

Environment

Test Script Name: Usability Web UI Test 1 Script #1
 Browsers: Firefox
 CPU: x86
 OperatingSystem: Windows XP

Script Steps

Passed | Apply | Apply All

#	Type	Result	Description
1	Step	Passed	Login to web storefront
2	Step	Passed	Validate that the welcome page displays with customer name and account info
3	Step	Passed	Enter pencil in the catalog search box and click Go
4	Step	Passed	Validate the search returns the correct information
5	Step	Passed	Logout and close browser



Collaboration Work Items

Task management for individuals and teams

Individual Task List

My Tasks

Show All Items per page Previous: | 1 - 4 of 4 | Next

Id	Summary	Artifact
Authoring 3	The artifact has been approved	Classics CD
Authoring 3	Provide the Review and Approvals Section for Classics CD	Classics CD
Authoring 2	Provide the Summary Section for ClassicsCD	Classics Admin
Authoring 1	Provide the Summary Section for Classics CD	Classics CD

Previous: | 1 - 4 of 4 | Next

Team event log

QM Event Log (17 new)

[9] Provide the Review and Approvals Section for Classics CD (3)	3 hours ago
* Login window does not appear (38)	3 hours ago
* Classics Request (37)	5 hours ago
* Provide the Test Scripts Section for New Customer Order (36)	5 hours ago

Page 1 of 3

- Visualize commitments to **reduce rework**
 - Know what others are doing
 - Know what others expect from you
- **Monitor team events**
 - Event logs update automatically as activities occur
- **Track tasks** assigned to each team member

Traceability and versioning of all quality artifacts

Centralized history of artifacts and activities eases compliance exercises

- **Complete record** of quality related activities and artifacts
- Snapshots of quality artifacts provide a window into **how past decisions were made**
- History of results provide testers with insight on **how functionality has evolved over time**
- **Trace test results to changes in production** in Rational Team Concert or Rational ClearQuest

Artifact history

Start Date	Start Time	Total Run Time	Script Name	Script Type	Overall Verdict	Pass	Fail	Inconclusive	Blocked	Log
Jul 15, 2008	11:23:08	6 sec	Usability Web UI Test 1 Script #1	Manual	Passed	1	0	0	0	
Jul 15, 2008	11:22:00	12 sec	Usability Web UI Test 1 Script #1	Manual	Failed	0	1	0	0	
Jul 15, 2008	10:07:42	3 min	Usability Web UI Test 1 Script #1	Manual	Passed	0	0	0	0	
Jul 15, 2008	10:07:42	2 min	Usability Web UI Test 1 Script #1	Manual	Passed	0	0	0	0	
Jul 15, 2008	10:07:43	1 min	Usability Web UI Test 1 Script #1	Manual	Failed	0	0	0	0	
Jul 15, 2008	10:07:42	1 min	Usability Web UI Test 1 Script #1	Manual	Blocked	0	0	0	0	
Jul 15, 2008	10:07:41	1 min	Usability Web UI Test 1 Script #1	Manual	Inconclusive	0	0	0	0	

Artifact versioning

Java PetStore Test Plan Saved successfully at: 20:47:42 [Create New Snapshot](#)

[Test Plan Overview](#) | [View Snapshots](#)

Type Filter Text

Type	Revision	Name	Date	Originator	Details	Copy
	1	Draft version	1 minute ago	ADMIN		



Quality Governance

Customized dashboards for each user

- Automate team workflow **improving productivity**
- Real time reporting and alerts **reduces project risk**
- Automate data collection **eliminating administrative overhead**

Marissa's Dashboard

Recently modified (7) Owned By

Owner	Count
Stacey	3
Marissa	2
Scott	1
Unassigned	1

Environment Requests

ID	Summary	Created	Respond By	Assigned To	Priority
1	Eway Catalog Upgrade	4 minutes ago	May 23, 2008		High

Artifact List

Id	Name	State	Modified
1	Java PetStore Test Plan	Draft	Yesterday at 8:56:23 PM
2	Release 938	In Progress	28 minutes ago

My Tasks

Id	Summary	Artifact
21	Provide the Test Team Section for Release 938	Release 938
19	Provide the Test Objectives Section for Release 938	Release 938

Live Execution Status

Execution status pie chart for Java PetStore Test Plan:

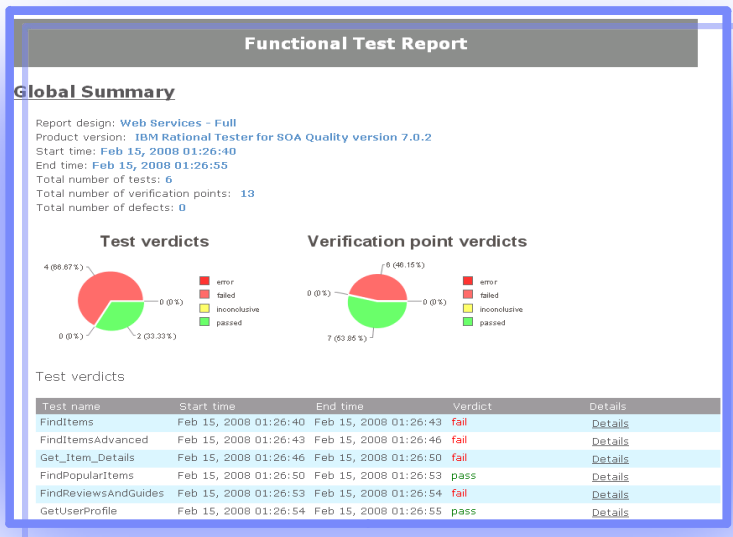
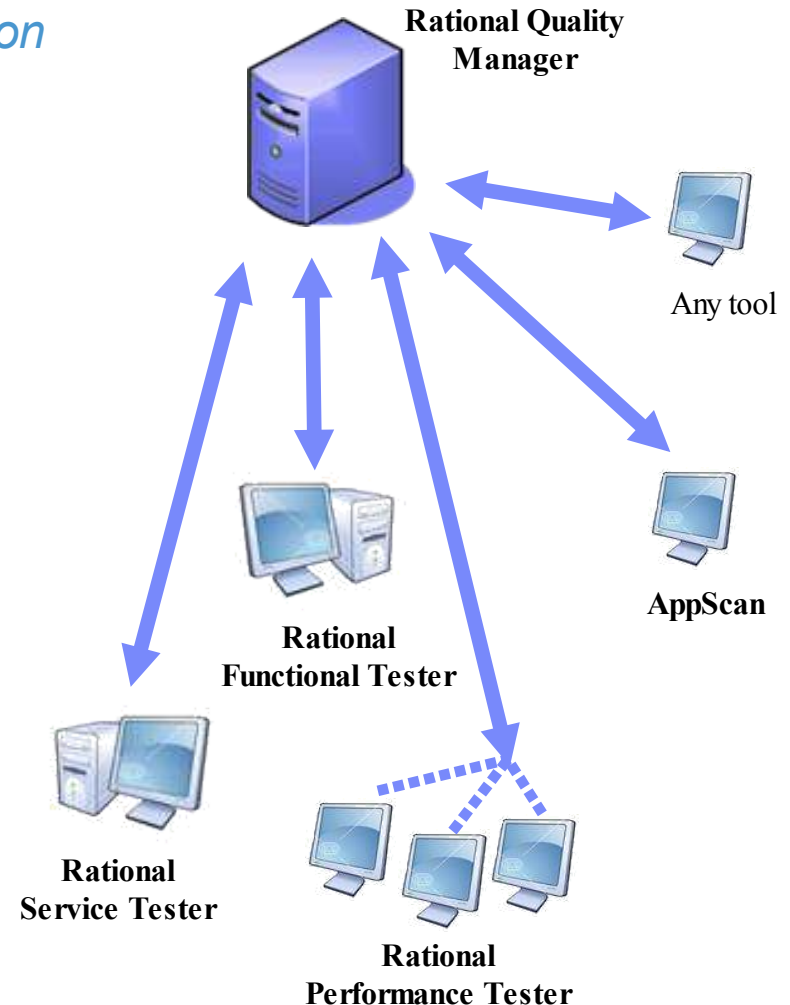
Color	Count
Green	155
Red	75
Yellow	9
Grey	40

User customized layout and content

Manage and Execute Automated Tests

Distributed automated test execution

- Launch and control test automation tools
- Remote execution through web console
- Automated test log execution collection
- Open platform allows testing with all testing tools – not proprietary



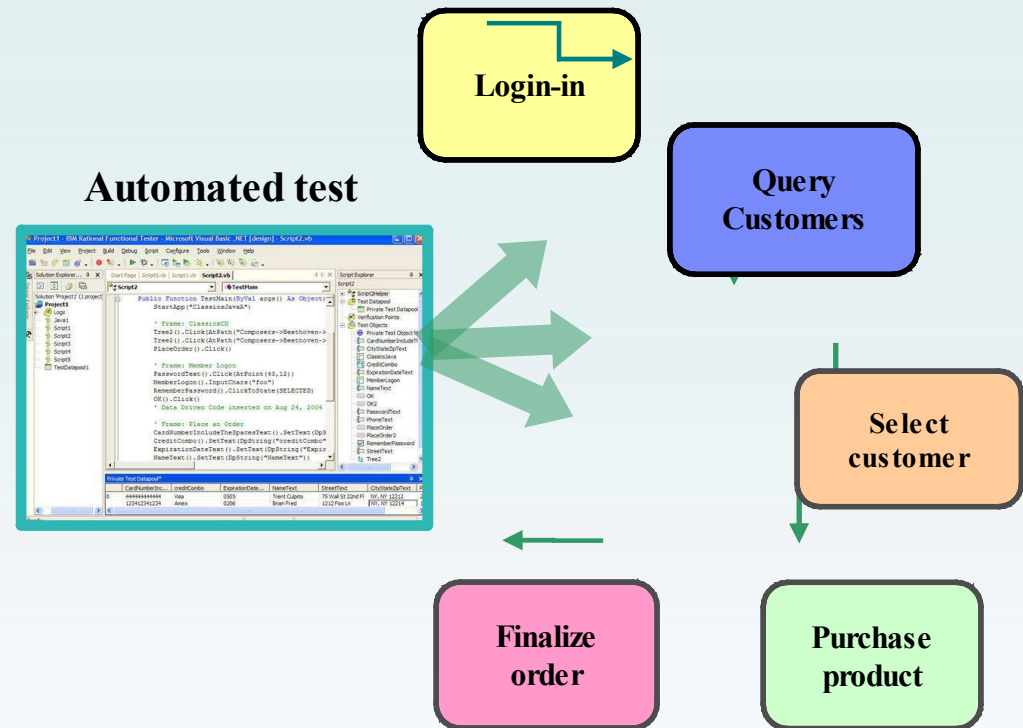
Composite Application Functional Test Automation

with IBM Rational Functional Tester

Benefits:

- Lowers cost of application testing
- Improves test productivity and accuracy
- Formalize end-to-end tests that exercise business processes
- Provides test automation and support for manual testing
- Broad support for modern and legacy application environments
- Minimizes test maintenance with tests resilient to the frequent changes of SOA system

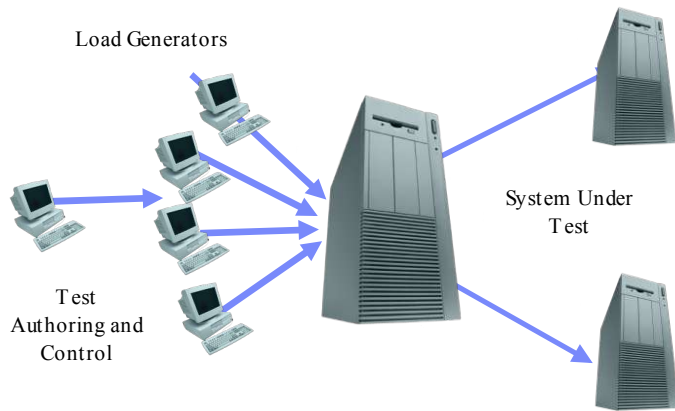
Automate functional tests in composite application



Load Testing

with IBM Rational Performance Tester

1. Create **realistic** user scenarios that exercise key business transactions



1. Identify the **root cause** of problems

Powerful workload scheduler simplifies the creation of realistic user workloads

Schedule Contents
This section shows the schedule contents

- Browsing_and_Bidding_save
- Browsers (50%)
- Browse_Items
- Bidders (50%)
- Browse_Items
- Bid_on_Item

Buttons: Add, Insert, Test, Random Selector, Loop, Delay, Comment

Advanced Data Correlation features significantly reduce test development effort

Verification Points | **Data Correlation** | **Protocol**

- Automatically Correlate HTTP Data
- Optimize automatic data correlation for execution: Accuracy
- URL re-writing for execution: Automatic
- Automatically correlate URL pathname if redirected by response code:
 - 301
 - 302
 - 303
 - 307

Test Data

Name	Value	Substituted with
searchview:c...		
catid	1	"1" - Content
loginform:bid...	16	
loginform:bid...	18	
loginform:us...	jack	"password" variable, of It...
loginform:us...	jack@acme.com	"login" variable, of Item_Bid...
loginform		"loginform" - Content
searchview:c...	searchview:catl...	"searchview:catlistform" - C...
__LINK_TAR...	searchview:catl...	"searchview:catlistform:dat...

Easily identify parameters and enable scenarios for data-driven testing

Quickly identify poor-performing transactions

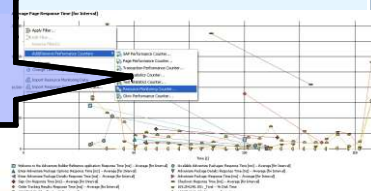


Breakdown response times across application tiers and drill down to source

Page Performance > Response Time Breakdown Statistics

Component	Base Time (seconds)	Success Count	Cumulative Time ...	Calls
CAPSAN	311.612	77,879	470,908	12
IBM Rational Performance Test	311.512	77,879	470,908	12
- Delivery Time	26.500	6,425	26,500	4
- Response Time	208.748	32,187	208,748	4
- data	76.264	19,066	236,660	4
- data	2,109,979	179,482	5,468,143	156
- JSE/Win/Shell(5.0.0.1)ItemNo001	2,109,979	179,482	5,468,143	100
- PFR	96.210	6,948	700,276	4
- JSP	1,873,199	70,362	1,760,052	126
- JSP	33.572	8,393	373,776	28
- P4E ECP	6.280	6,660	6,280	8
- Servlet	26.112	6,529	261,788	8
- Session EJB	560.628	40,157	161,280	4
- Web Services Provider	2.040	6,710	104,120	4
- Web Services Requestor	568.616	42,124	166,616	4

Correlate response times with system resource measurements

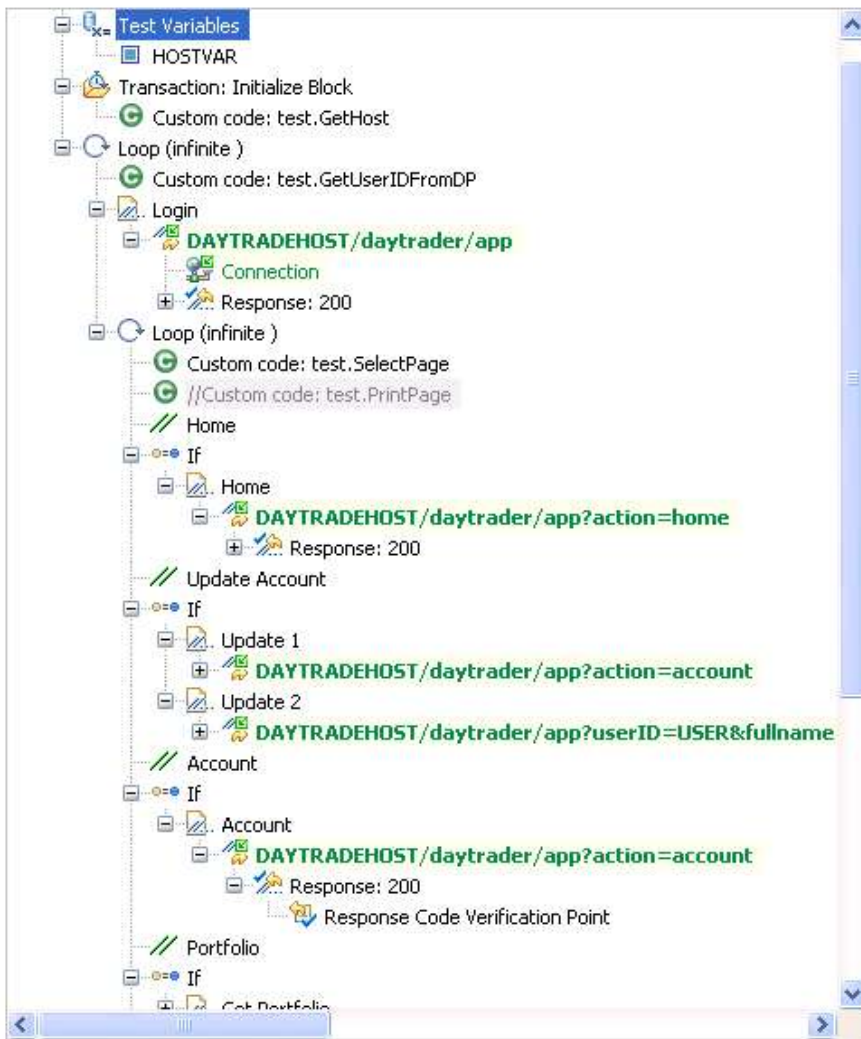


Rational Performance Tester: No-Code Tests

Performance Test - DayTrade

Test Contents

This section shows the test contents:



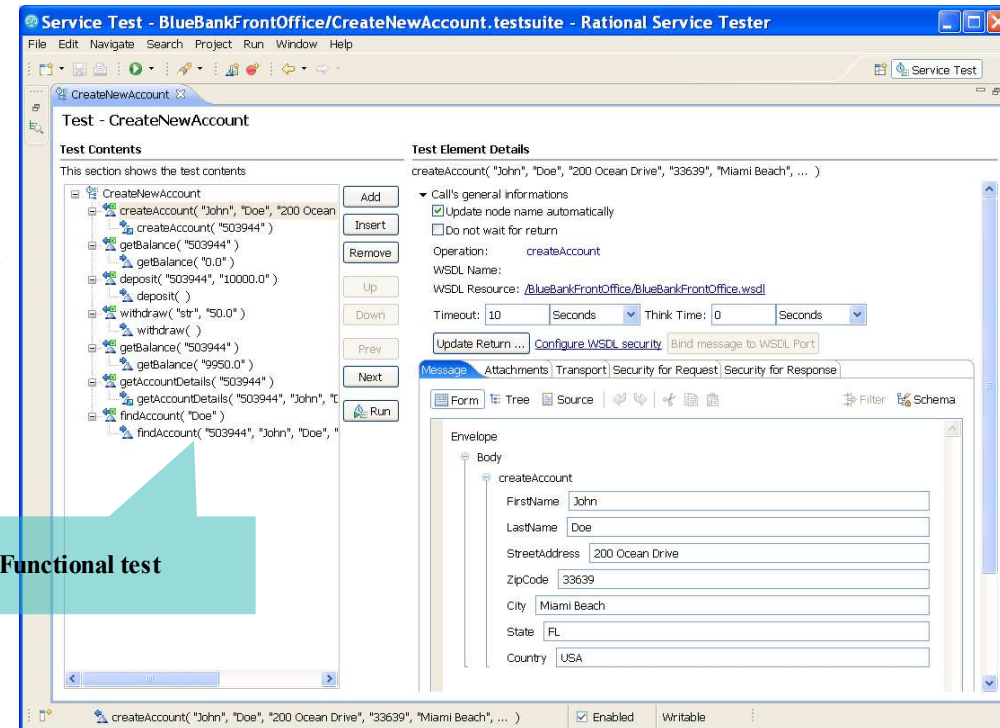
- Create tests by **capturing** user interactions with a server
- Edit tests in a tree view editor:
no scripting language
- **Automatic data correlation** of system responses
- Point & Click creation of **parameterized tests**
- Use **custom code** to simulate complex behavior if needed



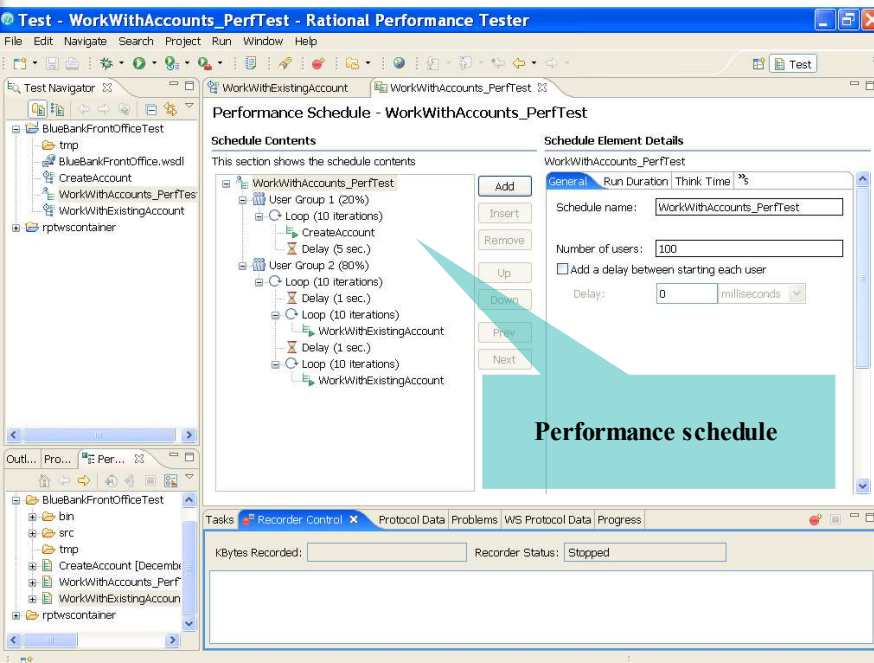
Testing SOA & Web Services

IBM Rational Service Tester for SOA Quality

Automated regression and functional testing for GUI-less services



Functional test



Performance schedule

IBM Rational Performance Tester Extension for SOA Quality

Performance Testing for Service - based applications

Generic Service Client

Input:
WSDL or XSD files

Editable
Forms

Automatic
Creation

Speed up test creation

Reduce the complexity of WSDL
files and XML data

The screenshot displays the Rational Service Tester interface. On the left, a browser window shows the WSDL file content for a service named 'BlueBankFrontOffice'. The main window shows a 'Call Library' with various service operations like 'createAccount', 'findAccount', 'getAccountDetails', 'getBalance', 'deposit', and 'withdraw'. A 'Call' is selected, and the 'Edit Data' button is highlighted. Below this, an 'Envelope' view shows a form for the 'createAccount' operation with fields for 'FirstName', 'LastName', 'StreetAddress', 'ZipCode', 'City', 'State', and 'Country', each with a dropdown menu.



Comprehensive Functional Test Report

- Customizable Report
 - HTML or PDF
 - BIRT designer or XSLT

Functional Test Report

Global Summary

Report design: [Web Services - Full](#)
 Product version: [IBM Rational Tester for SOA Quality version 7.0.2](#)
 Start time: [Feb 15, 2008 01:26:40](#)
 End time: [Feb 15, 2008 01:26:55](#)
 Total number of tests: [6](#)
 Total number of verification points: [13](#)
 Total number of defects: [0](#)

Test verdicts

Verdict	Count	Percentage
error	0	0%
failed	4	66.67%
inconclusive	0	0%
passed	2	33.33%

Test verdicts

Test name	Start time
FindItems	Feb 15, 2008 01:26
FindItemsAdvanced	Feb 15, 2008 01:26
Get_Item_Details	Feb 15, 2008 01:26
FindPopularItems	Feb 15, 2008 01:26
FindReviewsAndGuides	Feb 15, 2008 01:26
GetUserProfile	Feb 15, 2008 01:26

Test: FindItems

Total number of verification points: [3](#)
 Total number of calls: [3](#)
 Total number of returns: [3](#)

Verification point verdicts

Verdict	Count	Percentage
error	0	0%
failed	1	33.33%
inconclusive	0	0%
passed	2	66.67%

Call verdicts

Verdict	Count	Percentage
error	0	0%
failed	0	0%
inconclusive	0	0%
passed	3	100%

Return verdicts

Verdict	Count	Percentage
error	0	0%
failed	0	0%
inconclusive	0	0%
passed	3	100%

Verification point verdicts

VP name	Timestamp	Verdict	Details
Contain Verification Point	Feb 15, 2008 01:26:41	pass	Details
Contain Verification Point	Feb 15, 2008 01:26:43	fail	Details
Contain Verification Point	Feb 15, 2008 01:26:43	pass	Details

Call verdicts

Call Name	Timestamp	Verdict	Details
FindItems("IBM", "3")	Feb 15, 2008 01:26:41	pass	Details



Visual Schedule Editor for Load Testing

Functional Test Report Load_Test_1 x

Performance Schedule - Load_Test_1

Schedule Contents
This section shows the schedule contents

- Load_Test_1
 - User Group 1 (100%)
 - Loop (infinite)
 - FindPopularSearches
 - FindReviewsAndGuide
 - FindItemsAdvanced
 - GetItemDetails
 - FindPopularItems
 - FindItems
 - GetUserProfile

Schedule Element Details
Load_Test_1

Users	Stage ...	Chang...	S...
1	1 Minute	0	0
10	1 Minute	One/1 ...	0
5	3 Minutes	One/1 ...	0

Time limit for a user to respond to a stop request: 3 Seconds

User Load Preview

Users

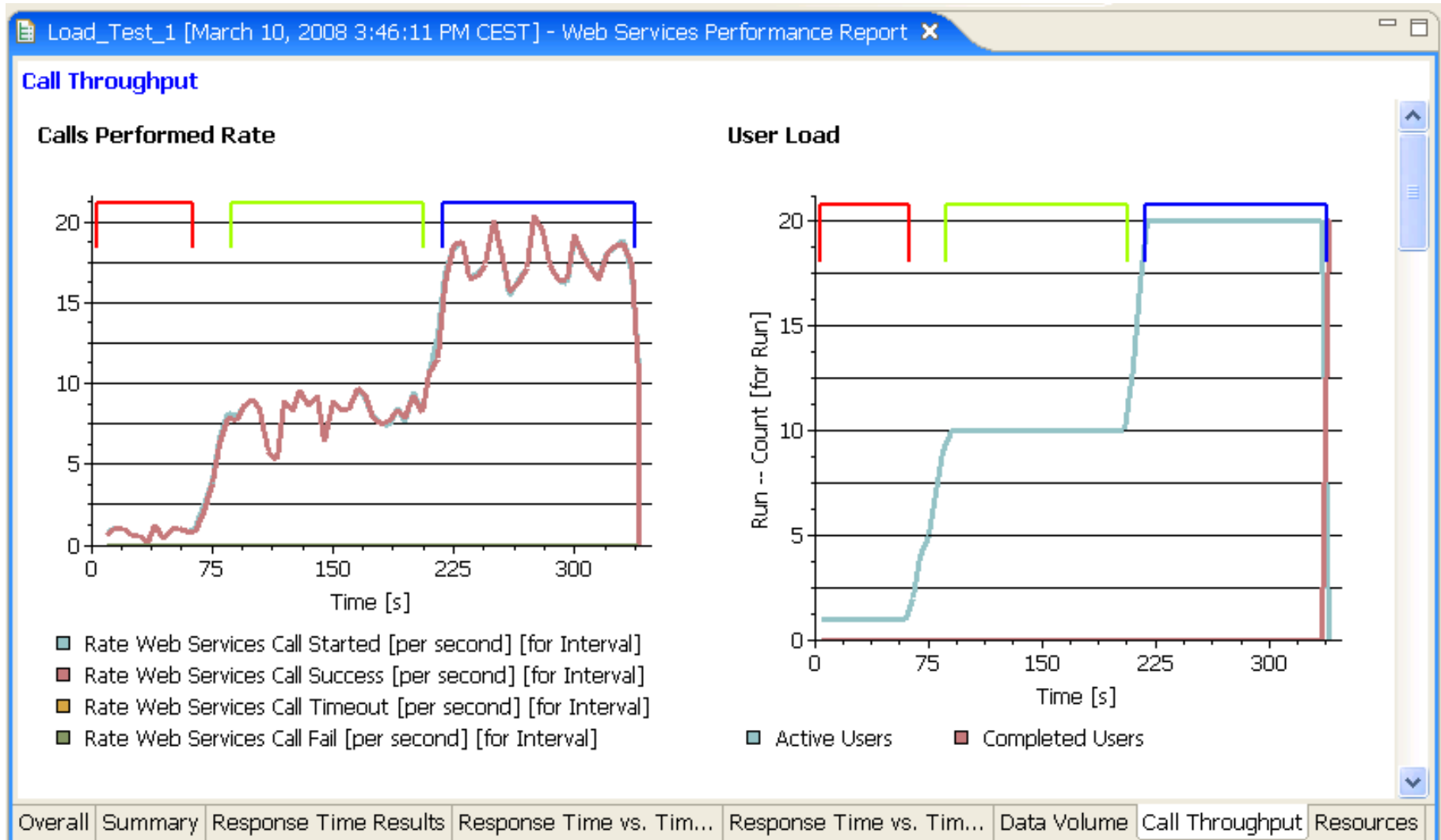
9
6
3
0

0 2 4

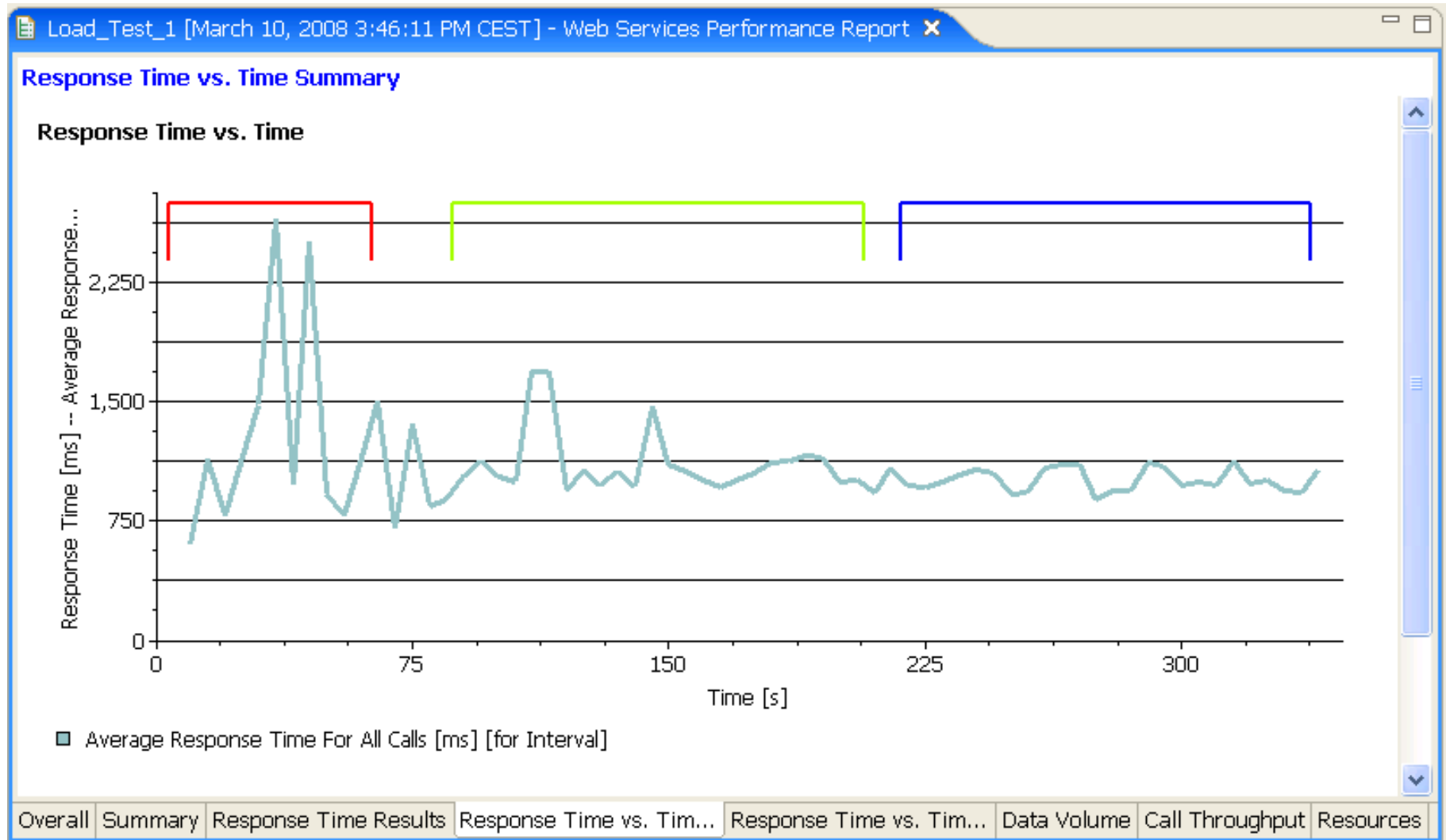
Definition of the load profile: numbers of virtual testers, ramp up, ramp down

Sequence of tests run by several virtual testers in parallel

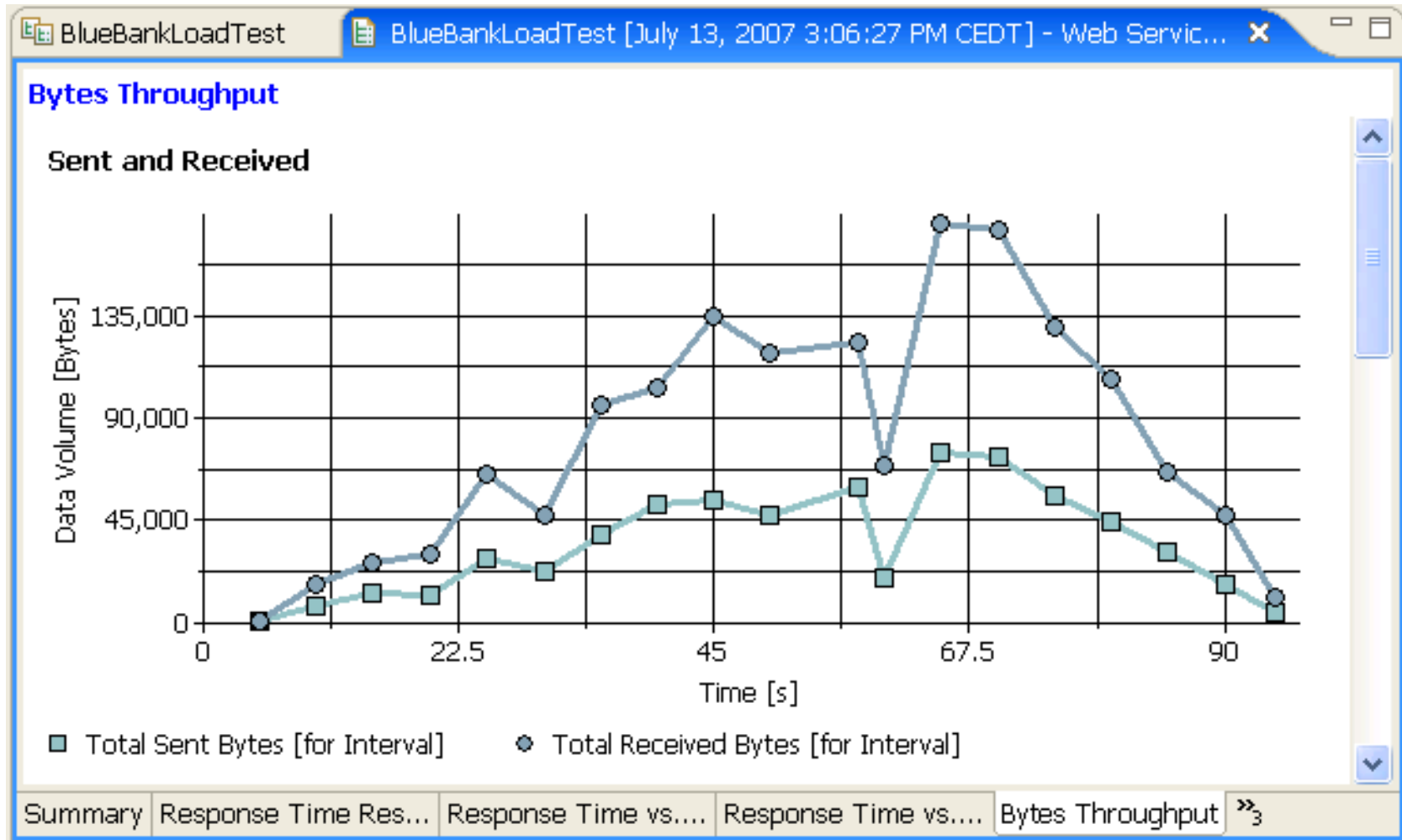
Load Testing Report – Calls Rate & User Load



Load Testing Report – Response Time



Load Testing Report – Comparison of 2 Runs



Supported Standards and Technologies

- Supported Standards
 - WSDL 1.0 & 1.1
 - SOAP 1.1 & 1.2
 - XSD 1.0 / XML 1.0 & 1.1
 - JSON / Text
 - HTTP 1.0 & 1.1
 - JMS 1.1
 - WebSphere MQ 6.0
 - MIME, MTOM, SwA attachments

- Support for Secure Web Services Testing
 - Create/Edit Security Profile for a WSDL
 - XML signature and encryption (WS-Security 1.0)
 - User Name Token (WS-Security 1.0)
 - X509 Binary Token (WS-Security 1.0)
 - Custom Security Algorithm
 - HTTPS (SSL 3.0)
 - HTTP Simple & Double Authentication

	HTTP	JMS	MQ
SOAP 1.2	7.0.2	7.0.2	7.0.2
SOAP 1.1	7.0	7.0	7.0.1
XML	7.0.1	7.0.1	7.0.1
Text/JSON	8.0	8.0	8.0





DEMO:

IBM Rational Service Tester v8.0





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

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