

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

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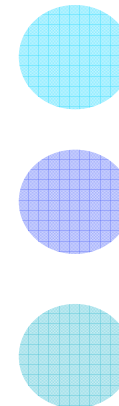
What keeps me **Rational**?



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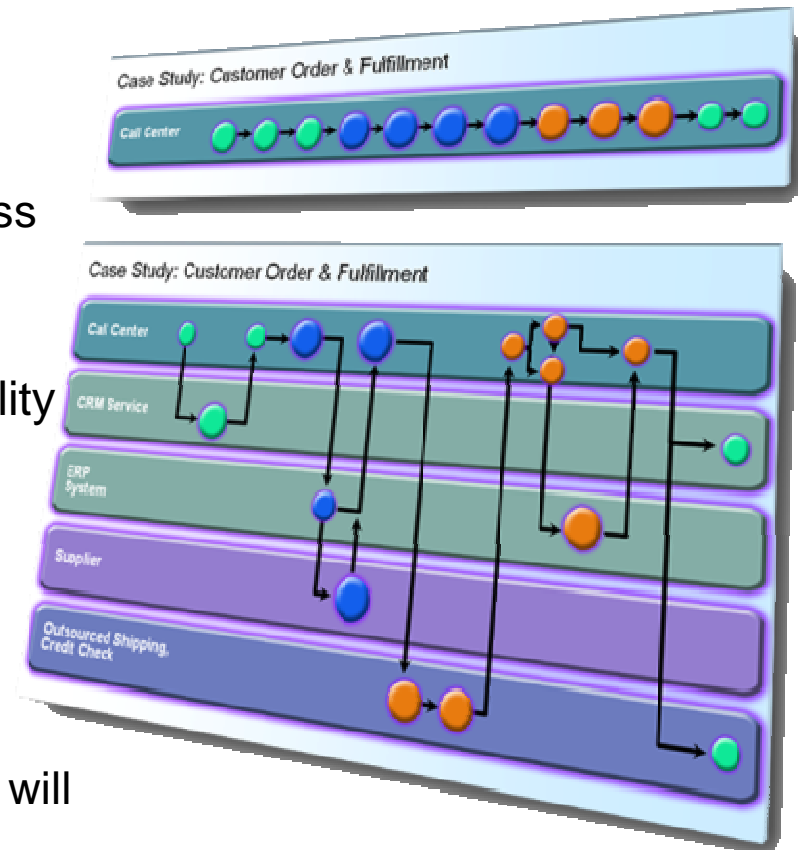
Agenda

- 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*

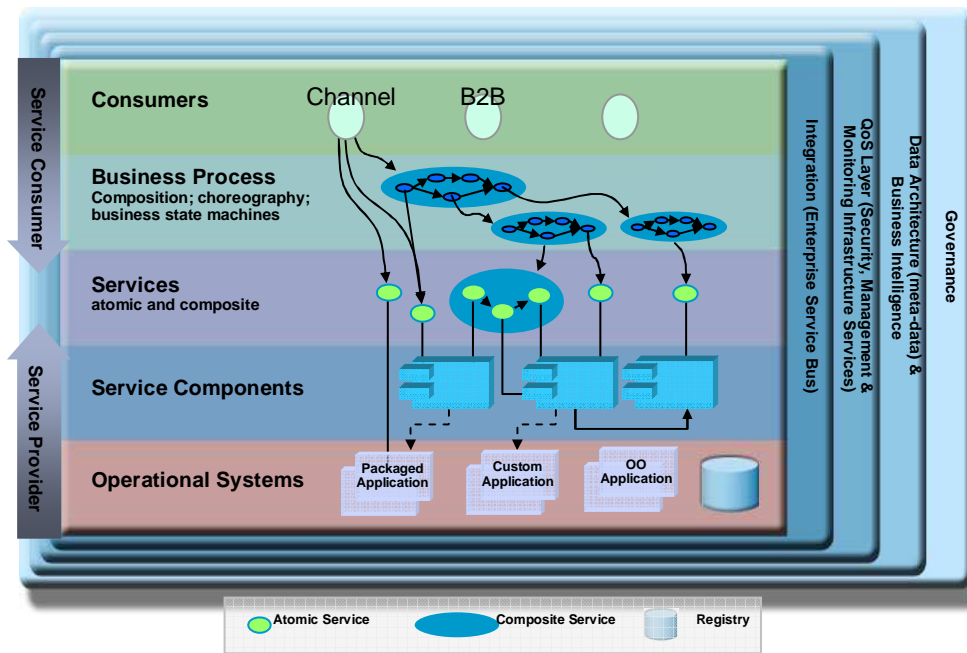


SOA characteristics & testing challenges

- 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



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

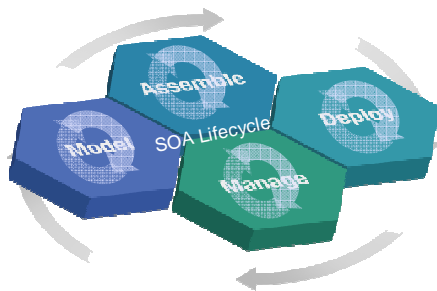


Approach to testing SOA applications

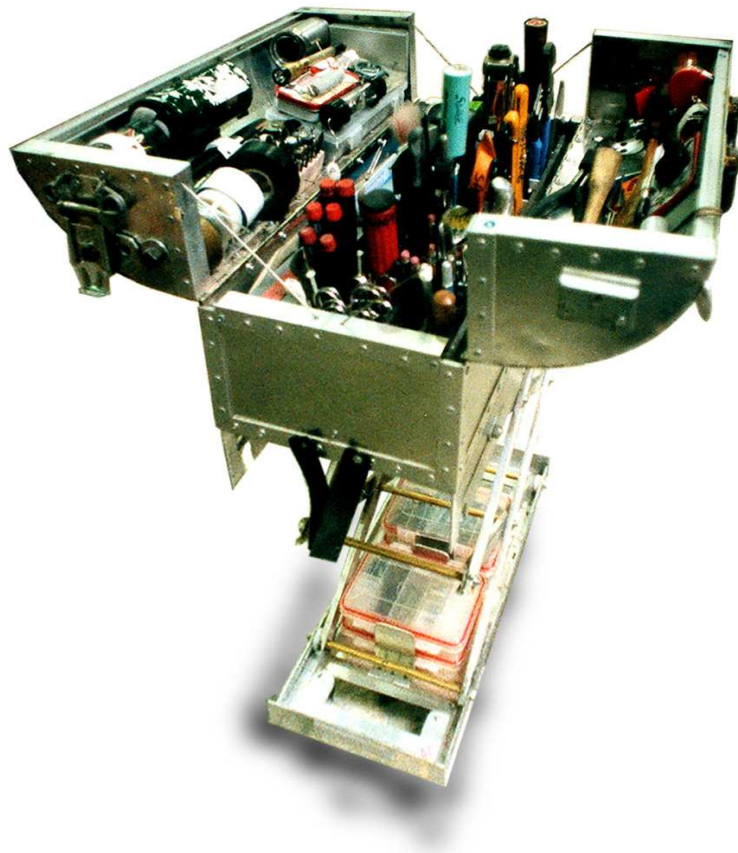
- Build a collaborative cross-functional test team
 - ▶ Business analysts provide inputs for defining the test objectives and review the test strategy
 - ▶ Test architects define test plans taking into account Service Level Agreements
 - ▶ Testers, performance engineers and developers implements and 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

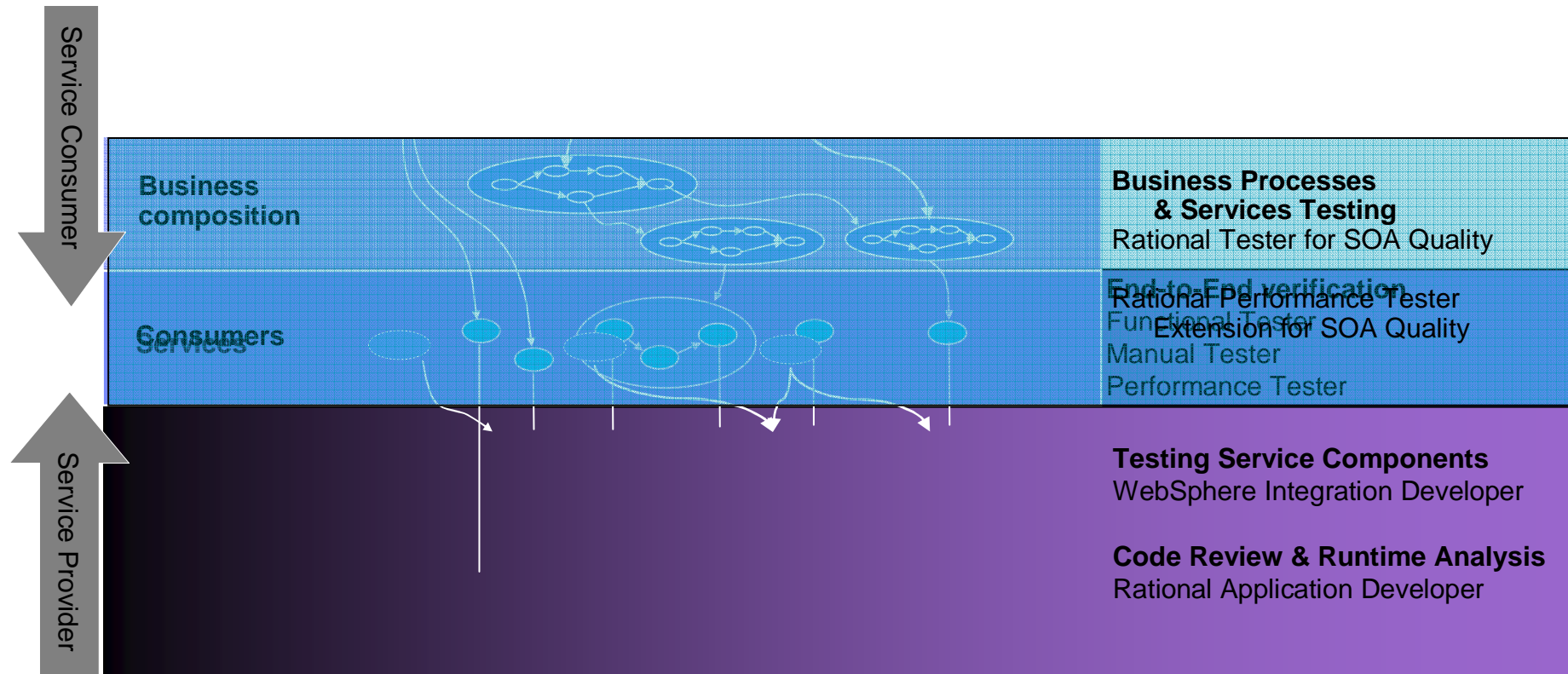


- Effective test automation
 - ▶ Plan the automation
 - ▶ Maintainability
 - ▶ Reuse of test steps and cases
- Test automation tools
 - ▶ For functional and performance testing
 - ▶ Integrated with development platform
 - ▶ Address the test of GUI-less services
 - ▶ Support open standards



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.**



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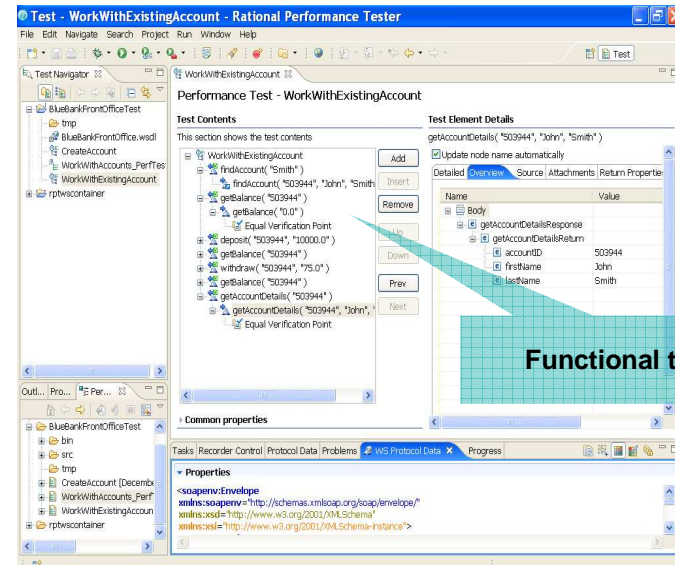
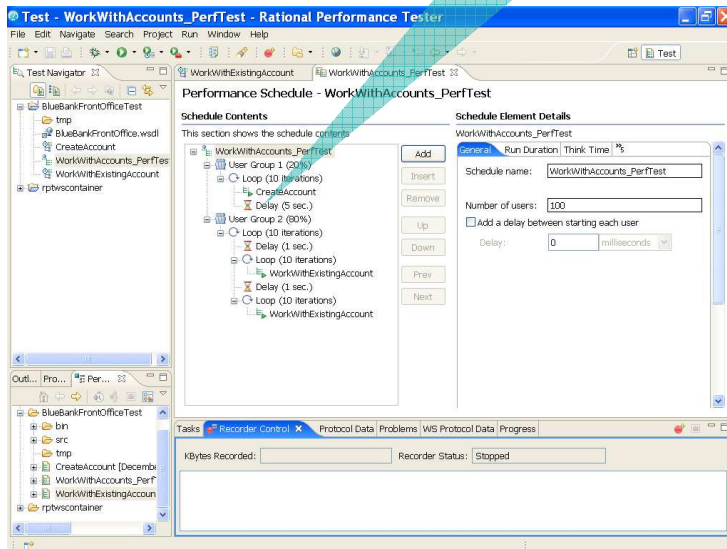
Test SOA applications early and often

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

The screenshot displays the IBM Rational Performance Tester interface. The top window shows the Test Log with a tree view of test events and a Properties pane. The bottom window shows the BPEL to Web service test generation dialog, which includes options for flow, switch, and invoke testing, and a checkbox for enabling data correlation. A blue callout box labeled "Test log details" points to the Test Log window, and another blue callout box labeled "Test creation WS-BPEL" points to the BPEL to Web service test generation dialog.

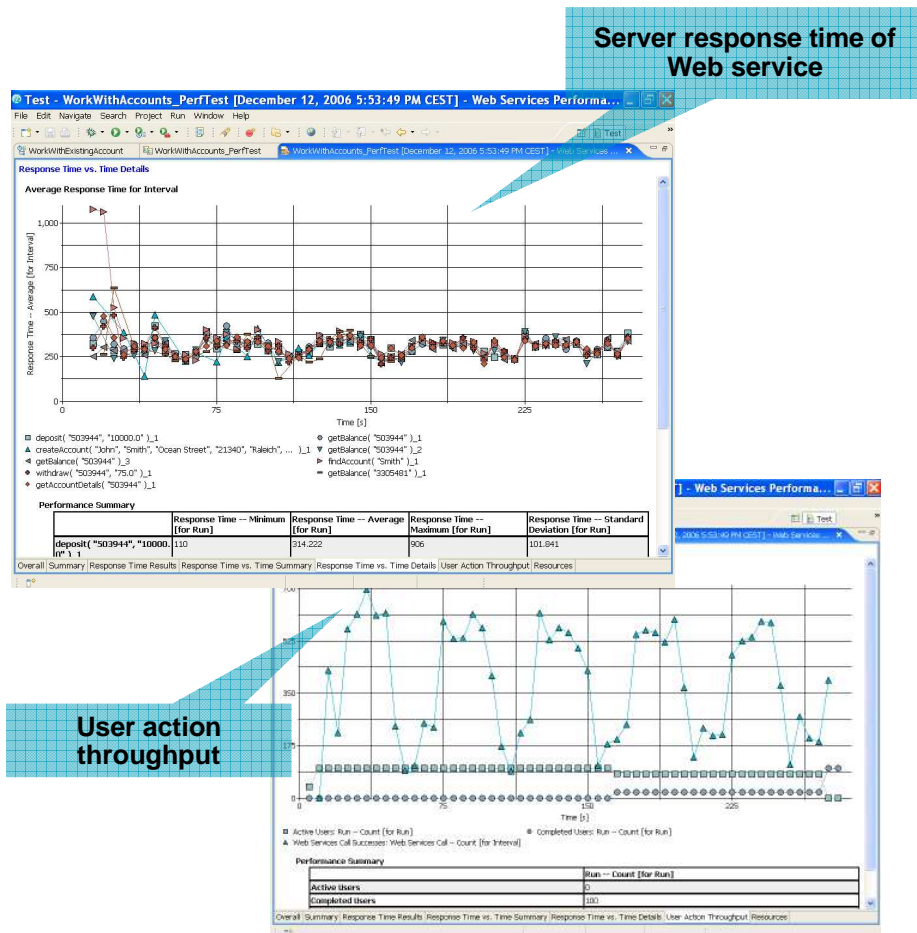
- Simplify functional testing
 - ▶ Generation of service test client
 - ▶ Code-free test authoring
 - ▶ Automated test creation from Business Process Execution Language (WS-BPEL)
 - ▶ Support Web services standards

- 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



- 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



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



Visual Test Editor

The screenshot displays the Visual Test Editor interface for a performance test named "CreateAccountTest".

Test Contents: A tree view on the left shows a sequence of test steps:

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

 A callout bubble points to this list, stating: "Sequence of test steps (operation calls & returns)".

Test Element Details: The right pane shows details for the selected "createAccount" node.

- Operation: createAccount
- WSDL Name: (empty)
- WSDL Resource: /BlueBankFrontOffice/BlueBankFrontOffice.wsdl
- Time Out (ms): 10000
- Think Time (ms): 0
- Update Return ...: Configure WSDL security
- Bind m: (empty)

 A callout bubble points to this section, stating: "Details of the selected node".

Message data: The bottom pane shows the message structure in a tree view:

- soapenv:Envelope
 - soapenv:Body
 - q0:createAccount
 - q0:FirstName: John
 - q0:LastName: Doe
 - q0:Street&address

 A callout bubble points to this section, stating: "Message data".

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



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



Performance testing

With IBM Rational Performance Tester Extension for SOA Quality



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Enhance

**Workload
Schedule**

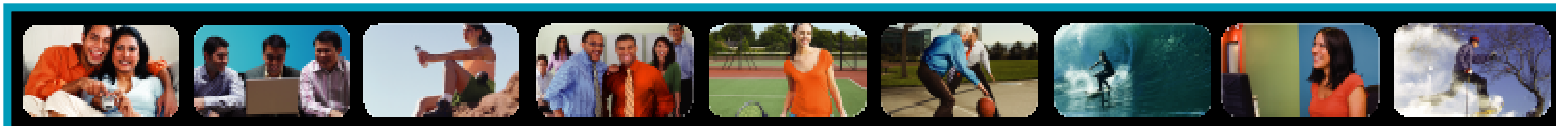
**Execute
Analyze**

- 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









Thank You

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