Agile Web Service and REST Service Testing with soapUI

Robert D. Schneider
Principal
Think88 Ventures, LLC
robert.schneider@think88.com
www.think88.com/soapui
Agenda

- Introduction
- Challenges of Agile Development and Web/REST Service Testing
- Using soapUI to Address these Challenges
- Service Virtualization Scenarios
About Think88

- **SOA-focused consultancy**
  - Silicon Valley-based
  - Global alliances

- **Key practices**
  - Architecture, design, testing
  - Training
    - Hands-on soapUI Pro Bootcamp (3 days)
      - Offered in US, UK, Norway, Sweden, France, Poland, Denmark
    - Coming in Q4 2009: Advanced soapUI Pro
    - SOA workshops & certifications
  - Governance
    - SOA governance assessment
    - Independent governance vendor selection
About Eviware

- soapUI released open-source in 2005
- eviware software ab (Stockholm, Sweden) founded 2006
  - Ole Matzura, CTO > 10 years experience
  - Niclas Reimertz, CSO > 10 years experience
- Commercial soapUI Pro release 2007
  - More than 400,000 downloads
  - Plugins for Eclipse, NetBeans, Intellij IDEA, maven
- soapUI Pro > 1,000 licensees
  - All sectors, Telecom predominant
Challenges of Agile Development and Web/REST Service Testing
Agile Development & Web/REST Service Testing

- “Test first, early and often” is a key principle in agile development
- “Contract-first” design is a key underpinning of good SOA practices
- Unfortunately, there are several major problems in testing these kinds of services
  - WSDL complex to understand
  - WADL not widely adopted
  - Development delays
  - QA not equipped to write code for tests
  - Determining coverage
  - Governance & refactoring
Functional Testing

- soapUI is designed to automate functional testing of Web services
- Functional testing is typically used in the following situations:
  - Unit testing
  - Data driven testing
  - Compliance testing
  - Process testing
Load Testing

- Four primary styles of load testing:
  - Functional
  - Behavioral
  - Performance
  - Requirements-driven

- Multiple types of load test can be part of one TestCase
  - Lets you measure their effect on each other
Using soapUI to Address these Challenges
soapUI Test Structure & Terminology

- **Workspaces**
  - A grouping of projects
  - Similar in concept to tools such as Eclipse

- **Projects**
  - These are the primary container of soapUI objects. Made up of:
    - Interfaces (based on the SOAP/HTTP binding for the PortType)
    - Test Suites
    - Mock Services
soapUI Test Structure & Terminology

- **TestSuites**
  - These contain one or more TestCases

- **TestCases**
  - Serves as a container for one or more TestSteps
  - Also contains TestRequests
    - Enables applying assertions to a response for a message
      - SOAP
      - Schema validation
      - SOAP fault

- **TestSteps**
  - Individual Web service operation invocations
TestSteps

- Test Request
- Groovy script
- Properties
- Property Transfer
- Conditional Goto
- Delay
- Run TestCase
- REST Test Request
- HTTP Test Request
- Mock Response
- DataSource
- DataSource Loop
- DataSink
- DataGen
soapUI Test Structure & Terminology

**DataSource**

- Specialized type of TestStep, meant to streamline data-driven testing
  - JDBC
  - Excel
  - Grid
  - XML
  - File
  - Directory
  - Groovy
soapUI Test Structure & Terminology

- **Coverage**
  - Metrics that indicate the degree to your tests cover your WSDL
  - By functional test
  - By MockService
  - By Mock clients
  - By SOAP monitor clients

- **LoadTest**
  - Utility for configuring, running, and monitoring load tests on a Web service
  - Multiple scenarios can be set
  - Also implements functional validation
  - Load tests can be run in parallel
soapUI and Scripting

- Employs the Groovy programming language
  - Version 3.0 will also support JavaScript

- Designed to give tester maximal control and flexibility

- Can be used:
  - When opening/closing a project
  - Within a test suite or test case
  - When launching/halting a mock service
  - To generate dynamic mock service responses
  - To test assertions
  - To add functionality to the soapUI product
Groovy Fundamentals

- An open scripting language
  - Supports object-oriented and script-style programming
  - Supports GUI development
  - Integrates effortlessly with Java libraries
  - Dynamic scripting for soapUI
    - soapUI provides Object Library and Event Model

groovy.codehaus.org
What Can I Do From A Groovy Script?

- Virtually anything
  - Build entire TestCases (TestSteps, assertions, etc)
  - Example: Store all requests, assertions in a database and have a groovy-script that builds the TestCase and runs it dynamically

- Create/manage/run MockServices

- Create/open other projects
Where Can Groovy Scripts Run?

- In addition to Groovy Script Step, any extension points:
  - TestCase Setup/TearDown scripts
  - TestSuite Setup/TearDown scripts
  - Project afterLoad/beforeSave scripts
  - MockService onStart/onStop scripts
  - MockOperation dispatch scripts
  - MockResponse/MockResponseStep scripts
  - Groovy DataSource/DataSink
  - Script Assertions for TestRequestSteps and MockResponseSteps
soapUI Architecture

- WSDL-driven code generation for client and server-side artifacts:
Measuring Coverage

- When testing a piece of software, we want to know what percentage of its code has been “exercised”

- A similar concept exists for distributed computing technologies such as Web services
Measuring Coverage

- **Three types of coverage scenario**
  - Functional tests
  - Mock services
  - SOAP monitoring

- **Two classes of coverage**
  - WSDL coverage
    - How much of a contract has been invoked?
  - Assertion coverage
    - How many XPath assertions have been applied?
Measuring Coverage

- **Coverage statistics aggregated at the following levels:**
  - Project
  - TestSuite
  - TestCase

- **Two coverage measurement options:**
  - Count empty responses as covered
  - Count ? responses as covered
Measuring Coverage
Mock Services

- Sometimes, you just can’t connect to a Web service to test it
  - The service hasn’t been written yet, and/or
  - The service has bugs but you need to keep building tests, and/or
  - You’re on an airplane

- soapUI Mock Services let you build robust tests that utilized the contract
  - Supports agile development practices

- These services are then run inside the included Jetty engine
Mock Services and Responses

- One of the beauties of mock services is that responses are completely configurable.

- You can define many different responses for a given operation.

- Once responses are defined, you can then route incoming requests in a variety of ways:
  - Script
  - Sequence
  - Query match
  - XPath
  - Random
Differences between soapUI and soapUI Pro

- XML table inspection
- Form editor
- SOAP monitoring
- WSDL coverage
- Test refactoring
- Drag-and-drop
- Data source-driven tests

- Data collection
- Request/response coverage
- Team-based projects
- Script libraries
- Scripting libraries
- Code-free test assertions
Service Virtualization Scenarios
Virtualization Scenarios

- #1 WSDL defined, but service not yet written
- #2 Service written, but logic not fully implemented
- #3 Need to feed data to a virtual service
- #4 Need to feed large quantities of real data to a virtual service
- #5 Need to combine virtual service with a real service
“WSDL defined, but service isn’t yet written”

Discussion

Demonstration
soapUI reads WSDL (or WADL) and creates a mock service.
“Service written, but logic not fully implemented”

Discussion

Demonstration
You can dispatch requests to the mock service in several ways.
“Need to feed data to a virtual service”

Discussion

Demonstration
These properties will be fed into the mock service.
“Need to feed large quantities of data to a virtual service”

Discussion

Demonstration
Data from RDBMS (and other sources) can be fed to mock service
“Need to combine a virtual service with a live service”

Discussion

Demonstration
Multiple services (real and mock) can participate in a test case.
Questions
Agile Web Service and REST Service Testing with soapUI

Robert D. Schneider
Principal
Think88 Ventures, LLC
robert.schneider@think88.com
www.think88.com/soapui