A-Team Tech Talk Series

SOA Unit Testing

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Agenda

- What is Unit Testing
- Service Unit Testing
- SOA Unit Testing
- Techniques and Tools
- Demo
- Challenges
- Questions?
What is Unit Testing

- Where this comes from
  - "Let them write code!"
  - Whoever writes code also writes the code to test it.

- Designed to nail down the *origins* of a problem

- Not necessarily dedicated to Java

- JUnit
  - Annotations and Reflection

- Compatible with Ant

- Compatible with Continuous Build Systems
Service Unit Testing

- **What is a Service?**
  - Whatever comes with a Web Service Description Language (WSDL) document.
Service Unit Testing

- **Service Patterns**
  - Synchronous
  - Asynchronous 1 way
  - Asynchronous 2 way
  - ...
- **Security**
  - With or without security
- **Timeout**
  - With or without timeout
Service Unit Testing

- **Service Reaction**
  - Positive & Negative Testing
    - Positive: Does it *work* as expected?
    - Negative: Does it *fail* as expected?
      - For example: raises the appropriate error
      - For example: appropriately rejects invalid credentials
  - Does it "react" in a timely manner?
Service Unit Testing

- **Patterns**
  - All services that follow the same pattern can be tested with the same code
  - The only differences between two such tests will be the values used for the test
    - Value of the endpoint URL
    - Value of the input payload
    - Value of the namespace URI
    - And so on
  - Those values can be externalized
    - Properties files, Databank, NoSQL DB, etc.
Service Unit Testing

- A service is not necessarily written in Java
  - For example: an SOA Composite

- The author of the service is also the author of the tests
  - As such, the author of the properties files containing the data to test the service with, according to its pattern.

- The test *pattern* development belongs to another team.
Service Unit Testing

- All patterns may have actions in common, performed before the actual test:
  - Is the WSDL URL valid?
  - Is the service up?
  - Is the service name valid?
  - Is the input payload valid?
  - Are the port name, operation valid?
  - And so on
Service Unit Testing

- A challenge/requirement
  - Implementation of a test pattern should be as easy as possible (or even more)
- Once a pattern is developed, it's all driven by external data (like properties files)
- The *services development teams* should collaborate with the *service test patterns development team* to elaborate a test patterns catalog.
Service Unit Testing

- Example
  - Service Test Patterns, using Java and JAX-WS

```xml
<property name="ASYNC.ONE.WAY" value="unitests.patterns.services.AsynchronousOneWayUnitTest"/>
<property name="SYNCHRONOUS" value="unitests.patterns.services.SynchronousServiceUnitTest"/>
<property name="ASYNC.TWO.WAYS" value="unitests.patterns.services.AsynchronousTwoWayUnitTest"/>

- Invoked from Ant & JUnit

```xml
<target name="unit.test.synchronous">
  <echo>
    =====================================
    Testing Synchronous Service
    =====================================
    outputfile: synchronous
  </echo>
  <junit printsummary="yes" fork="yes" showoutput="yes" failureproperty="synchronous.fail">
    <classpath refid="classpath"/>
    <formatter type="xml"/>
    <sysproperty key="verbose" value="${verbose}"/>
    <sysproperty key="properties.file.name" value="generic-service-test-synchronous.properties"/>
    <test name="${SYNCHRONOUS}" haltonfailure="no" outfile="synchronous"/>
  </junit>
  <antcall target="in.case.synchronous.fails"/>
</target>
```
Service Unit Testing

- Example
  - Properties file for a given test

```verbatim
wsdl.url=http://${proxy.name}:${soa.port.number}/soa-infra/.../.../synchronousbpelprocess_client_ep?WSDL
service.name=synchronousbpelprocess_client_ep
service.port=SynchronousBPELProcess_pt
service.operation=process
service.ns.uri=http://xmlns.oracle.com/soatesthelper/S.../SynchronousBPELProcess
service.input.payload.file=generic-sync.input.xml
service.output.payload.file=generic-sync.output.xml
move.on.if.payload.is.invalid=true
# service.response.timeout=2000
```
SOA Unit testing

- More patterns, more complex
  - Responding synchronously and moving on asynchronously
  - Responding asynchronously, several times in a row
  - Interacting with the Tasklist Service (parallel tasks within a test)
  - Interacting with Rules Engine
  - Reacting to Business Event(s)

- Availability of the Audit Trail
  - Go to the repository to check the Audit Trail of a given instance
SOA Unit testing

- As with any other kind of testing, SOA Tests must be non-intrusive.
- That means that no extra components need to be deployed or installed on the server(s) where the target services reside.
SOA Unit testing

- **A note about Rules**
  - Rules can be run – and tested – outside of the scope of a Composite.
  - A Rules Dictionary does not even need to be deployed anywhere to be run.
  - Rules can be unit tested in standalone mode.

- **Rules are used in the SOA World through a Decision Service**
  - Invoke a Decision Function that:
    - Assert facts
    - Run RuleSet(s)
    - Retrieve facts
Testing Tools

- **SOAP-UI**
  - Free version available (http://soapui.org)
  - Powerful and easy to use

- **JAX-WS**
  - Not a testing tool in itself, But part of the JDK, since Java 1.6

- **SOA Test Suite**

- **Oracle Application Testing Suite (OATS)**
  - OpenScript
Demo

With Ant and JUnit
Testing Services & SOA Artifacts
With OATS/OpenScript

- **OpenScript runs as an Eclipse plugin**
  - It loads its own stack of components and classes
  - Some are conflicting with the utility classes used previously
  - The easiest way to avoid those conflicts is to have two separate JVMs.
  - An RMI connection will allow the two JVMs to communicate
    - RMI requires no extra infrastructure (no WLS, etc.)

- The *same scripts* can be used for Unit Testing *and* Load testing
With OATS/OpenScript

Only Serializable types can go back and forth between the JVMs.
Demo
With OpenScript
Remaining Challenges

- Test coverage
  - A test that fails means there is a problem
  - If none of your tests fail, that does *not* mean there are no problems

- Test execution time
  - Allocate enough time and resources for test development and execution, this is not to be under-estimated

- Test execution reporting
  - Send the reports to the relevant persons
Questions?
Software Links

- **WebLogic**

- **SOA Suite**

- **JDeveloper**

- **OATS and OpenScript**

- **SOA Testing Snippets**
  http://java.net/projects/soa-testing-snippets
  https://code.google.com/p/oracle-business-rules-tester/
Recommended reading

The Art of Software Testing

Glenford J. Myers
Tom Badgett · Corey Sandler

Third Edition
A-Team Tech Talks Series

SOA Unit Testing