An Oracle White Paper
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Ensuring Web Service Quality for Service-Oriented Architectures

Introduction

Web services hold the promise of integrating software applications from heterogeneous networks and exchanging information in a simple, standardized manner. Current trends show that the vast majority of companies are moving to services-oriented architectures (SOAs) and deploying Web services within and across their IT infrastructure. However, the success of those deployments is determined not only by the integrations and innovations that Web services make possible, but also by how Web services affect the quality and performance of the mission-critical applications with which they interface. As such, it is crucial to thoroughly test Web services before they are deployed in order to ensure service level compliance in production.

This white paper discusses the testing challenges presented by Web services, and introduces best practices to ensure SOA application quality through the use of Oracle's integrated Web service testing solution, Oracle Application Testing Suite.

Importance of Web Services Testing

The great advantage of Web services is that they empower different types of entities to communicate with one another through platform-independent protocols such as SOAP, XML, and HTTP. However, the tradeoff for this flexibility is that this open, non-native traffic brings with it additional overhead. Take, for example, an enterprise that wants to use a Web service to integrate a J2EE application with a variety of client types or other applications. Figure 1 shows how a Web service could be implemented to meet this business requirement.

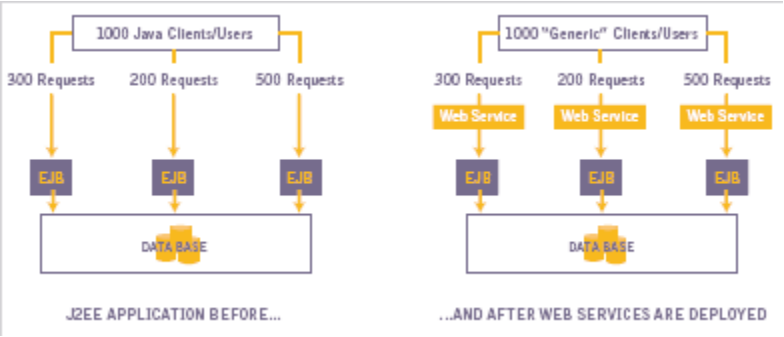

Figure 1: Using Web services to give access to information contained within the EJB

In this situation, many different types of clients can now access the information contained within the EJBs by going through the Web service layer. But this introduces a potential issue: a new layer of communication has been added with its own overhead and potential for failure into an application whose quality and performance was formerly under control. If the Web service layer makes the application slower or introduces quality issues it could affect application service-levels and negatively impact end users. The only way to ensure that this doesn't happen is to test the quality and performance of these Web Services before they are deployed.

Challenges in Testing Web Services

Let's begin by discussing the requirements for testing Web services. The following types of tests must be run against each Web service to ensure that it is ready to be deployed:

- The Web service must work functionally (correctly) for a single request or sequence of requests, and always return the correct information in response to each request.
- The Web service must provide information within a reasonable amount of time, scaling or performing well in relation to the number of simultaneous requests.
- The Web service must not crash in response to an anticipated (or even unanticipated) maximum number of simultaneous requests.

Testing Web services presents a unique challenge since, by definition, Web services themselves have no inherent user interface (UI). Traditional automated testing solutions rely on recording end-user transactions to create automated test scripts, which can be used for functional testing or in the case of load testing tools, be scaled up across hundreds or thousands of virtual users for performance testing. Without a UI, Web services testers have either foregone testing entirely or relied on manual testing for functionality and built performance test harnesses from scratch.

Writing software to test Web services or relying on redundant manual testing is an inefficient use of quality assurance (QA) resources. However, most automated testing solutions on the market carry a steep learning curve and require that testers become programmers in order to test, particularly when there is no graphical user interface to record test scripts. Worse still is the fact that even after dealing with this learning curve, most automated testing solutions available today have no link between automated functional test scripts and performance test scripts, forcing testers to do the same work twice.

Simplify Web Services Testing With Application Testing Suite

Oracle provides automated Web services testing in Oracle Enterprise Manager's flagship solution for application testing, Oracle Application Testing Suite. Application Testing Suite eliminates the problems associated with traditional test automation tools, by providing a uniquely specialized solution for testing Web-based technologies, allowing testers to quickly and efficiently test both Web services and Web applications in a single integrated test platform. By enabling script creation through a graphical user interface, a specialized Web services scripting wizard addresses the challenge of creating automated test scripts for Web services where no user interface is available to test against. These scripts can then be used for both functional testing and load testing, eliminating the need to learn multiple test tools or create custom test harnesses. Application Testing Suite consists of three related products

- Oracle Functional Testing is an automated functional and regression testing solution for Web, SOA and packaged applications. It provides multiple ways for testers to automatically create Web services test scripts, including a wizard-driven scripting interface utilizing WSDL files which are automatically parsed to generate Web service requests. Users can then sequence multiple Web service requests to create their automated test scripts, parameterize data inputs, extend scripts programmatically in Java, run their test scripts and analyze results, using Oracle's powerful scripting interface.
- Oracle Load Testing lets you run realistic load tests for Web, SOA and packaged applications – helping you simulate thousands of concurrent users and analyze the impact of production load levels on application performance. Oracle Load Testing provides load testing of Web services, using the same scripts, without modification, that users create with Oracle Functional Testing. In Oracle Load Testing, users can configure one or more scripts to run with hundreds or thousands of concurrent users simulating the load that their Web services would experience in production to assess performance. Oracle Load Testing also allows users to monitor the performance of back-end application infrastructure during the load test to help identify bottlenecks. The solution also provides detailed reports for in-depth analysis of load test results.

- Oracle Test Manager provides a complete test process management solution – helping you manage all of your test cases, test requirements and issues from a central repository to improve the effectiveness of your test process.

Application Testing Suite's OpenScript integrated scripting platform enables users to create automated test scripts that simulate complex business transactions. The same solution is used to create both automated functional test scripts and load test scripts, so users aren't forced to learn different tools and scripting languages for each task. OpenScript provides an intuitive visual scripting interface that simplifies the scripting process combined with a powerful Java IDE that provides superior scripting extensibility for advanced users.

For Web services, Oracle Application Testing Suite and its integrated Web services testing capabilities enables testers to quickly and easily incorporate testing Web services into their overall testing activities, without the need to learn multiple products or develop alternate test methodologies.

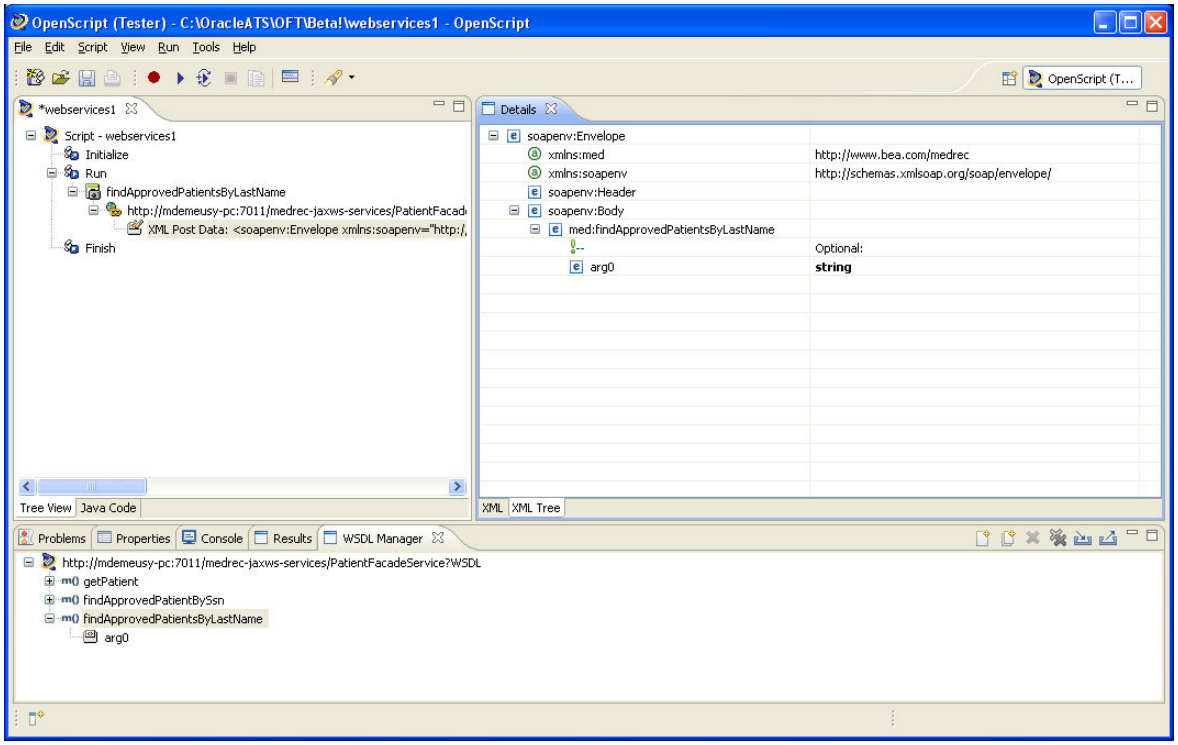

Figure 2: Using Oracle Functional Testing for Web Services Testing

Conclusion

Web services provide the ability to efficiently transfer information among disparate applications, hardware, operating systems, and programming languages. Their benefits, however, come with increased performance overhead and potential for quality issues, caused by adding another layer to enterprise software applications. To ensure that deployed applications will meet user expectations, it's important to test Web service quality and performance as early as possible in the development cycle.

Oracle Application Testing Suite is a complete Web services testing solution. It allows both development and QA organizations to quickly and automatically create and execute Web services tests, detect and isolate performance problems, and evaluate functional correctness under load for Web services. Web services performance and functional testing, conducted early and often using Oracle Application Testing Suite, can help ensure that enterprise software projects are completed on time and under budget.

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