VeriTest® Benchmark and Performance Testing
Microsoft® .NET Pet Shop, May 2002

1. VeriTest Conducted Benchmark Testing of the .NET Pet Shop Application to Compare with Results Published by Oracle®

Both Microsoft and Oracle were invited to have their Pet Store benchmark applications re-tested by VeriTest and observe the testing; Oracle declined to participate. In the testing, VeriTest used the same Mercury Interactive® LoadRunner® test scripts as used by Oracle by downloading them from the Oracle web site (www.oracle.com) to conduct this benchmark analysis of the .NET Pet Shop.

Based on this benchmark testing of Microsoft's .NET Pet Shop against the previously published results of Oracle's Java Pet Store application using the same hardware as was used in Microsoft's original testing (see Section 2 of this report), the data in Table 1 (below) illustrates the differences in response times, in both the Cached and Non-Cached scenarios.

Microsoft's .NET application clearly out-performed the Java application by responding, in the Non-Cached scenario, more than 10 times faster at 5,000 virtual users, and performing over twice as fast in the cached scenario. These were the highest user loads tested by Oracle.

Table 1. Microsoft .NET and Oracle Java Response Times *(milliseconds)*

Virtual Users	Non-Cached		Cached	
	Microsoft .NET	Oracle* Java	Microsoft .NET	Oracle* Java
450	16	Not Tested	13	Not Tested
1,000	16	37	14	10
1,500	16	38	12	13
2,000	17	42	10	13
2,500	18	46	9	14
3,000	18	50	9	16
3,500	19	57	9	19
4,000	20	69	10	21
4,500	22	97	10	25
5,000	23	302	12	29
6,000	31	Not Tested	11	Not Tested

** Reflects Oracle's latest published benchmark test results, dated March 2002 - reviewed on page 2 of this report*

2. Microsoft .NET Environment

The testing was conducted on backend enterprise servers from Compaq Computer Corporation. These servers included:

Application Server Hardware – Compaq ProLiant 8500 with Dual 550mhz Xeon processor, 1 GB PC 100 RAM, 9 GB SCSI HardDrive (9 GB NTFS Partition)

Application Server Software – Windows 2000 Advanced Server, .NET Framework, all Windows Updates, .NET Pet Shop Web application version 1.5

Database Server Hardware – Compaq ProLiant 8500 with Quad 550mhz Xeon processor, 1 GB PC 100 RAM, (3) 4.3 GB SCSI drives

Database Server Software - Windows 2000 Advanced Server, all Windows Updates, SQL Server 2000 Standard Edition SP2

3. Latest Published Oracle® Benchmark Comparison was Technically Flawed

VeriTest noted the following factors in Oracle's benchmark comparison which was conducted in March 2002 (http://otn.oracle.com/tech/java/oc4j/pdf/9ias_net_bench.pdf):

Functional Issues within Oracle's Pet Store Application

Oracle published their application with the following defects:

A. The Update Cart feature did not work. Updating the Cart is one of the most intensive functions of the application, taking the longest average time to complete.

B. The list of Favorites did not appear on the Cart page. The Favorites list also involves a database query and dynamically generates an HTML page.

VeriTest believes that the presence of these defects in the Oracle Java Pet Store application misrepresented Oracle's performance as reported in their March 2002 benchmark results.

Oracle's Best-Case Scenario Configuration

VeriTest audited the data from the previously published Oracle Benchmark Test, and has made the following observations, supported by additional input from Mercury Interactive:

A. Oracle used a different load test tool than Microsoft to generate results. Oracle used Mercury Interactive LoadRunner version 6.5 to generate their latest results, and compared their results to Microsoft results generated by Quest Software Benchmark Factory version 3.1. In Oracle's original testing report, dated July 2001, which Microsoft used as the basis of comparison, Oracle used an unpublished proprietary Java load test tool to generate results. For an accurate comparison to Microsoft results, Oracle should have used the same load test tool as used by Microsoft (Quest Benchmark Factory 3.1, a publicly available third party test tool).

B. As verified by Mercury Interactive, the version of Mercury LoadRunner® which Oracle used during their benchmark test does not automatically check for errors. Since the Oracle published test scripts do not have error-checking coded into them, it would have been impossible to detect HTTP error responses in the Oracle test passes, as opposed to valid HTTP responses. Thus, it is impossible to tell if the response times reported by Oracle reflected the return of valid pages from the server to the clients, or simply response times for HTTP errors, or a combination of the two.

C. Oracle conducted the testing, which led to their currently published results for the Java Pet Store, using Mercury LoadRunner version 6.5 which utilizes a single-threaded client. The client was installed on only five load-generator machines which, for this testing as confirmed by Mercury Interactive, would not have been capable of achieving the high user loads reported with the amount of memory installed in the client machines, as documented by Oracle.

D. Mercury Interactive verified that Oracle's scripts, as published by Oracle and loaded from the Oracle web site, were configured without setting new network context across simulated users, using recycled TCP/IP connections (this is a non-default setting) as opposed to creating new connections and closing unused connections for each simulated user. This improves the apparent performance on the web server, as it does not consume resources required for creating and closing connections.

E. Mercury Interactive verified that Oracle's scripts, as published by Oracle and loaded from the Oracle web site, ran with a simulated browser cache. This improves the apparent performance on the web server, as it does not require every unique user simulated by a given client machine to load all of the pages of the application.

In an effort to illustrate a comparison of real-world raw application server performance, VeriTest advises against Oracle's chosen method and settings, as described above.

Therefore, in the testing of the .NET Pet Shop application conducted by VeriTest, the following modifications and corrections were made:

A. Functional issues with the Pet Store application were resolved (see Section 3), allowing for the Cart to be updated and for the Favorites list to be displayed on the Cart page, per the original version of the .NET Pet Shop and Java Pet Store applications, as published by Microsoft and Sun Microsystems.

B. The newest Mercury Interactive LoadRunner version was used in the testing because of the features it supports, such as 1) full HTTP error checking, allowing for the monitoring of any errors returned by .NET, and 2) using a multi-threaded client driver, with client load generated by 100 PCs, ensuring that the tests were not skewed by client side test tool performance and true load was placed on the .NET application server.

C. TCP\IP connections were not set to recycle, rather, they were left at the default setting (reset context between users), ensuring that each new client connecting to the web site established a new connection, and unused connections were closed.

D. Simulated browser cache was turned off to ensure every page was loaded dynamically from the server across all simulated users.

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