

Blackboard Quickly Resolves Application Performance Issues with Foglight® and Foglight® Performance Analysis for Oracle

A global leader in education technology, Blackboard Inc. develops and licenses software applications for managing e-learning, transaction processing and e-commerce, and online communities. Blackboard turned to Quest Software to help find and fix performance bottlenecks while benchmarking Blackboard's new reference architecture.

The Challenge

Blackboard's online learning environment, Blackboard Learn, enables educational institutions and other organizations to add online elements to traditional classes and to develop and offer online courses. For example, instructors can use Blackboard to distribute course syllabuses and handouts; communicate with students via e-mail messages and discussion boards; and assess student learning through online assignments and tests. Blackboard Learn can be installed on local servers or hosted by Blackboard.

In large environments, such as universities, Blackboard Learn needs to be able to support tens of thousands of concurrent users. To ensure the best possible performance, Blackboard performs rigorous, iterative load testing and optimization activities. It then publishes architecture reference documents that detail the hardware and database configurations proven to deliver solid performance under heavy loads.

Blackboard recently took its benchmark kit to the Dell Solutions Innovation Center to benchmark and optimize Blackboard Learn with a supporting Oracle 11GR1 database. One of the primary goals of the benchmark was to support 50,000 concurrent users with response time ranging between one and five seconds. Performance issues arose when the concurrent workload reached roughly 36,000 concurrent users. The Blackboard Performance Engineering team, with the support of a Quest Software Solutions engineer, was able to determine that a small number of requests were responsible for the performance degradation. Since Blackboard had the lab for only two weeks, wasting time chasing down false leads was not acceptable. They needed a tool to provide the deep diagnostics to identify the root causes of the problem quickly, without introducing extra load into the system.

The Quest Solution

About a year earlier, Blackboard performed similar testing of its online learning system under SQL Server, and found Quest's Foglight® and Quest's Foglight® Performance Analysis for SQL Server to be extremely useful. They turned again to Quest, this time to Foglight and Foglight® Performance Analysis for Oracle.

Foglight provides a correlated, 360-degree view of applications from end user to database and from service levels to infrastructure, so organizations can quickly identify the root cause of performance issues and fix them quickly.

Foglight Performance Analysis for Oracle complements Foglight by providing workload analysis and performance tuning. Thanks to Quest's advanced StealthCollect technology, Performance Analysis offers high-frequency in-memory collection that provides deep analysis at a fraction of the overhead imposed by tracing or SQL-based collection methods. Performance Analysis also

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— Stephen Feldman,
Senior Director, Performance Engineering
and Architecture
Blackboard

OVERVIEW

Headquarters

Washington, DC

Services

Education technology

Critical Needs

To identify and resolve application performance problems quickly

Solution

Foglight and Foglight Performance Analysis for Oracle

Results

- Reduced the time needed to identify and resolve application performance issues from days to hours and even minutes
- Doubled throughput by 50 percent with the same hardware and configuration

CASE STUDY

includes built-in analytics and business intelligence—it's like having an automated in-house Oracle expert review workload data and produce custom reports to guide DBAs toward maximizing performance.

Together, Foglight and Foglight Performance Analysis provide unprecedented visibility into applications—exactly the visibility Blackboard needed to complete its load testing and tuning of Blackboard Learn.

The Bottom Line

Foglight and Foglight Performance Analysis enabled Blackboard to quickly solve the immediate problem of poor application performance under load early in its Oracle testing. Because Foglight can capture not only the Java requests being submitted to the database, but also the SQL, Blackboard was able to single out the long-running requests and determine that the problem was a particular bind variable associated with certain administrative tasks.

"We spent a day trying to track down the problem on our own," explained Stephen Feldman, senior director, Performance Engineering and Architecture at Blackboard. "Once we installed Foglight, we identified the root cause quickly, and were able to move on with our load testing on schedule."

Foglight continued to deliver value throughout the load testing and tuning. As IT staffers ran each load test, they used Foglight to identify worst-performing SQL. Staffers then made appropriate changes, such as tweaking JVM settings or adding an index, and then reran the test. Foglight was able to quickly show them what to change and helped them quantify the impact of the change in later tests.

"Foglight gives us unparalleled visibility into our applications—the visibility we need to find the cause of each performance issue we encounter," said Feldman. "And it does not introduce any appreciable overhead to confuse our performance test results."

Blackboard found the QuickCompare feature of Foglight Performance Analysis particularly helpful. By providing customized comparisons of any aspect of an instance or application workload to baseline data, the compare utility offers DBAs a shortcut in identifying the root causes of performance deviations. "We used the comparison feature of Performance Analysis frequently to compare our test results against our baseline," said Nakisa Shafiee, Senior Software Performance Engineer at Blackboard. "For example, at one point during our testing we noticed five SQL statements were consuming 80 percent of the available CPU on our database as we increased our load levels from a few thousand to about 36,000 concurrent users. We were quickly able to see that some small changes to our schema, such as adding a few indexes and redefining a few existing indexes, addressed our problem without a single code change. We used the compare feature to compare test results pre-change versus post-change to determine whether the index changes had a positive effect."

With the help of the Foglight products, Blackboard was able to achieve its goal of 50,000 concurrent sessions in its two-week testing and tuning window. Not only was the goal achieved, but the optimization efforts were also fruitful enough to assist with doubling the concurrency goal to more than 100,000 concurrent users. "We not only met our benchmark goals, but doubled the results with a small, yet impactful set of optimizations. We couldn't have done it without the Quest Foglight solutions," said Feldman.

About Blackboard Inc.

Founded in 1997, Blackboard Inc. is a global leader in education technology. Blackboard's solutions enable thousands of educational institutions and professional, corporate and government organizations to extend teaching and learning online, facilitate campus commerce and security, and communicate more effectively with their communities. For more information, visit www.blackboard.com.

About Quest Software, Inc.

Now more than ever, organizations need to work smart and improve efficiency. Quest Software creates and supports smart systems management products—helping our customers solve everyday IT challenges faster and easier. Visit www.quest.com for more information.



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