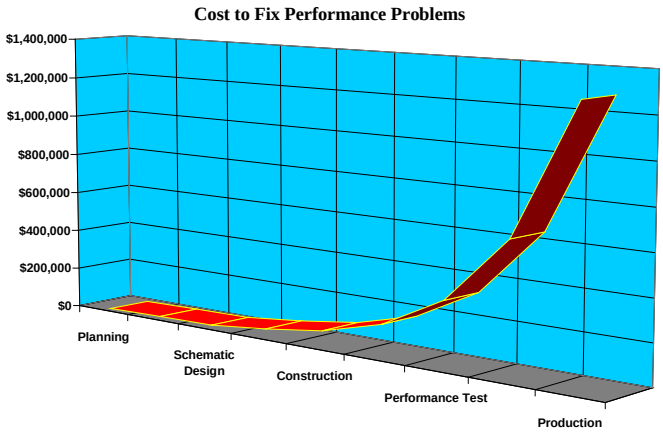
Load Testing and Simulation Modeling

Introduction

Load testing tools are widely used to verify the performance of Information Technology (IT) systems. However, load testing tools alone cannot assure that IT systems will meet their performance requirements because they only examine **existing** systems. It takes simulation modeling to identify how to grow the system to meet future needs and prevent performance failures.

This paper examines load testing and explains how customers benefit from combining the use of load testing with simulation modeling to assure the performance of IT systems.



Load Testing

Load testing is a technique used to stress test existing eBusiness systems. The main purpose of load testing is to observe system behavior under expected user loading. Load testing tools create virtual users—agents that mimic real client applications, imitating the business processes performed by *real* users.

For example, if a customer wants to know whether a thousand users could "simultaneously" purchase products on its Web site, it would run a load-test for 1000 customers conducting product-purchasing transactions. The load test would also include some measurement of the performance of the servers and networks during the tests.

Load tests can be costly and time consuming. Scripts describing the virtual user actions and data entry need to be constructed and carefully tested. This takes time and effort by qualified IT personnel or a project-specific outside consultant hired for the duration of the test. Test hardware and software must be installed. Problems found during the testing are usually costly to fix (see graph) and will inevitably delay system delivery dates.

The results obtained from load testing are only as good as the load testing program and user scripts themselves. Details such as Web browser settings are often not taken into consideration by load testing programs. Web browsers for example, can request that the dates on cached objects be checked every time a Web page is displayed. This can *significantly* affect the performance of a Web server that is being load tested.

A load test can give an IT system a "clean bill of health" or it can indicate that the system needs improvement. **However, it cannot explain how to improve the performance or how to change the system to meet future demands.**

What is Simulation Modeling?

Simulation modeling is a proven method for simulating the performance of **ANY** IT system. This technology, in use in a growing number of Fortune 500 corporations, is able to quickly and accurately model ALL hardware, networks and software within a customer's enterprise. This provides the ability to simulate current and future configurations to determine the impact of any system change on end user response times and system throughput.

Added value of simulation modeling

Load testing and simulation modeling are complementary technologies. Together, they offer a performance management solution whose whole is greater than the sum of its parts. Load testing is a natural lead-in to simulation. Load testing will tell you how well an ***existing*** system meets its performance expectations but it takes simulation to tell you how you should grow the system to meet ***future*** needs.

The most common benefits of using both technologies together are:

1. Significant cost savings by not paying the licensing fees for increasing load test concurrent users.

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2. Ability to extrapolate load testing data points with 90% - 95% confidence!
3. Ability to investigate architectural options in minutes!
4. Ability to identify primary, secondary, and tertiary bottlenecks.
5. Determines the impact on end user response time and system throughput in fixing bottlenecks.

For example, a customer could use load testing to tell if their existing Web site could handle expected traffic. Performance measurement with load testing could generate specific performance information about individual computers in the network.[1] The customer could then use a simulation model to assist his or her understanding of the bottlenecks on the current system and to predict the performance of future configurations and future software design.

Using a simulation model, a customer can predict and prevent performance problems. Customers can also explore alternative performance solutions. Since simulation modeling allows clients to get answers to unlimited performance based "what if" questions, clients can test future user workload changes, and predict the impact of new technologies.

Conclusions

Load testing can provide a customer some confidence that an *existing* system will perform well under a carefully scripted increasing load. However, load testing in combination with a simulation model can predict performance not only for future loads, but also for future software designs and future hardware configurations (even hardware not yet invented). Analysis of the simulation results by HyPerformix performance consultants can also provide customers with an understanding of the performance bottlenecks and a description of the key performance characteristics of the system.

About HyPerformix

HyPerformix is a performance engineering and solutions company that predicts and solves eBusiness performance problems for Global 2000 organizations that are betting their business on the performance of electronic transactions. HyPerformix is one of the only companies that can simulate, and thereby predict, what will happen across an entire eBusiness-computing environment with a high degree of certainty. The Company's unique formula for success combines best-of-breed performance engineering expertise, unparalleled predictive simulation modeling technology, and a performance engineering methodology that is both proven and time-tested.

Contact Information

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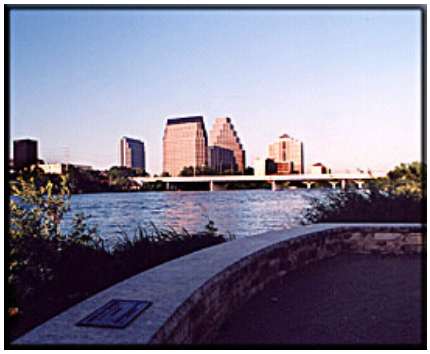

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[1] The performance information about individual computers in the network would have to be obtained using performance monitors (like NT's perfmon or a UNIX getstat). These performance monitors are usually not part of the load testing technology itself. Aside from the obvious immediate use of this information in understanding the capacity of a current Web site, it is useful for input to simulation models.