



# Newport Group, Inc.

IT Trends Research and Reporting

## MAKING E-BUSINESS WORK

### Early Adoption and Frequent Use of Load Testing Tools Combat Web Application Scalability Surprises

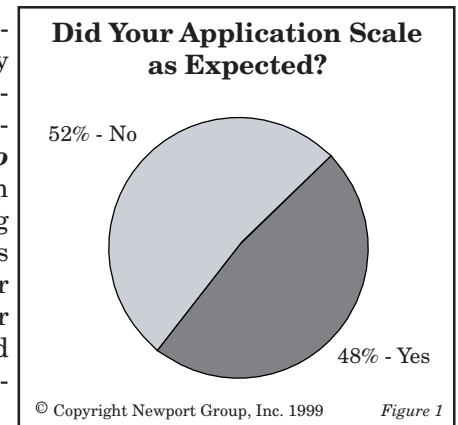
Corporate America is running to catch the e-business train. The number of those climbing aboard the e-business express to transact business electronically continues to rise daily – often exponentially. E-business opens the door to new business opportunities and, more significantly, accelerated revenue streams. Yet, in the race to stake claim to the rewards e-business can generate, on-line activity has been known to derail web systems by pushing them to their limits and beyond – fast. In fact, recent Newport Group research reveals that **better than half of web based applications failed to scale as expected.** (See Figure 1, “Did Your Application Scale as Expected”)

This research note will highlight key findings that make clear the need for organizations to protect themselves against a wired universe filled with uncertainties and unpredictability. Deploying successful e-business applications demands that IT departments systematically plan, build, test and continuously monitor those applications and provide higher levels of support in order to sustain heavy loads and minimize business risk. Otherwise, the train leaves the station without them.

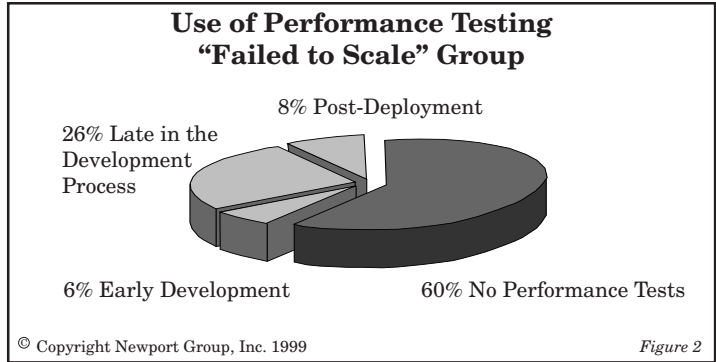
### FACING THE SCALABILITY SURPRISE

Even in the face of breakthrough success, companies touting high profile web applications are not immune to scalability problems. As a result many e-business leaders have received swift and pervasive coverage in the press that highlight their e-business blunders. All have experienced costly downtime and/or slowtime instances and unpredicted traffic volume spikes that resulted in the inability to provide critical services. A recent Newport Group study of web application scalability reveals that the average number of concurrent business users that web applications are designed and developed to support is 3,700. However, participants went on to report that when applications were set for deployment, they only handled 2,650 users, on average. This equates to the average web application handling only 72% of the concurrent traffic volume originally planned.

Recognizing application scalability as a critical challenge in need of continuous management for e-business initiatives, Newport Group set out to quantify the problem. Better than half, or 52% of those attempting to build reliable, transaction-based web environments report that their application “**failed to scale**” according to original specifications. From these results, there are key findings when drawing comparisons between the group of study participants that failed to scale (52%) and those that met their scalability expectations (48%). Key findings center on the early adoption and systematic use of automated load testing tools, budget and time overruns and setting realistic scalability expectations.



Let's first consider the study participants that reported scalability problems; 52% of the study population. Six out of ten, or 60% of these participants reported that no load or performance tests had been conducted prior to deployment of the application. Of those that did report use of a load testing tool, more than three quarters did not use the tool until late in the development stage, with 15% reporting the purchase and utilization of a load testing tool post deployment. (See Figure 2, "Performance Testing Approach")



Unfortunately, the late purchase of a tool, although a benefit for future projects, tends to only work as a reactive Band-Aid approach to a suffering application anxious for deployment. IT groups employing this reactive approach will find themselves creating a lot of extra work for themselves as they backtrack to define, develop and execute appropriate tests for their application. Often this approach unearths unexpected application problems, causes frustration for those trying to learn a new load testing tool under a very restricted time frame and overall does not derive the full value from the load testing tool. Lastly, this approach causes allotted time and budget costs to expand significantly.

As it relates to our study, the "fail to scale" group of participants experienced higher time and cost overruns, 23.5 days and \$67,083 respectively, in comparison to their "scaled as expected" counterparts. (See Chart, "Time and Cost Overrun Comparisons") For example, a large systems integration and consulting firm had been chartered to help build an on-line e-commerce application. The application allows applicants to submit resumes and lets employers search for potential employees. Testers opted to utilize homegrown load test solutions, which produced overly optimistic results. Based on those results, the site was launched through an aggressive marketing campaign, which generated a lot of traffic on the site. Unfortunately, the site was unable to handle the load without the system crashing. In response, commercial load testing tools were adopted to pinpoint the application problem. The tools isolated specific problems in the application server infrastructure and determined a need for additional hardware. Ultimately a successful re-deployment was achieved.

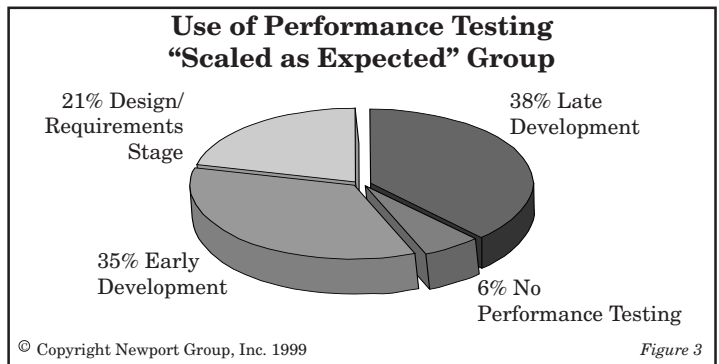
In addition, the "fail to scale" group had a tendency to set their scalability expectations significantly higher than both the scalable group and the population as a whole. Specifically concentrating on the organizations that reported a scalability problem, we find that on average this group

planned for their web applications to handle 4,300 concurrent users. However, when it was time for deployment, their applications only handled 2,164, or about half of expectations.

## AVOIDING SCALABILITY SURPRISES

In contrast, consider the 48% of study participants who reported that applications did scale to meet expectations. The first significant finding is that the use of load testing tools is on the rise. Nearly 7 out of 10 (a full 69%) of these study participants reported a reliance on either a proprietary or commercial load testing tool to test their web application prior to pushing it live. State Street Bank in Boston took such action. State Street offers a 401K management service to large corporations who wish to provide their employees with direct access to their 401K accounts. In order to ensure that customers would never experience excessive wait time, State Street performed extensive load testing on the application prior to deployment. For State Street, the load tests allowed them to meet their goals and eliminate any negative scalability surprises.

Also important is that 56% of this group reported adopting automated load testing tools either in the design/requirements stage (21%) or very early in the development process (35%). Overall, this group was more conservative with their scalability expectations than the "fail to scale" group, designing their web applications to handle 3,400 concurrent users. (See Figure 3, "Performance Testing Approach")



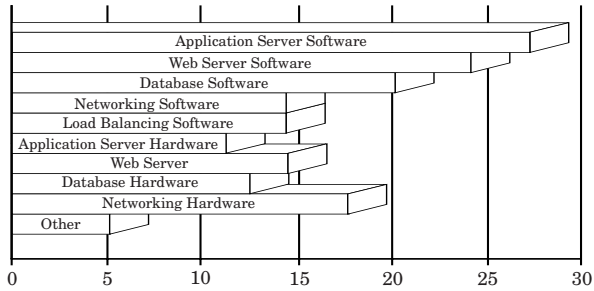
## MORE BUDGET, MORE TIME

In general, all survey participants experienced time and cost overruns relating to the development of web applications. However, those that were hit with a scalability surprise report significantly higher time and cost overruns. As it relates to time and cost overruns incurred for this study, the following applies:

### Time and Cost Overrun Comparisons

	Time Overrun	Cost Overrun
<b>Overall Study Population</b>	38 days over schedule	\$59,401
<b>"Failed to Scale" Group (52%)</b>	46 days over schedule	\$115,083
<b>"Scaled as Expected" Group (48%)</b>	22.5 days over schedule	\$48,000

## Infrastructure Changes Necessary to Accommodate Scalability



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Figure 4

Understanding there is a scalability problem is one issue, documenting how people take corrective action helps to narrow the scope for problem resolution. The most common infrastructure components changed to resolve issues relating to scalability are application server software, web server software and database software. (See Figure 4, "Infrastructure Changes Necessary to Accommodate Scalability")

The most popular type of web application currently deployed for study participants is utilized for business to consumer commerce. (See Figure 5, "Purpose for Web-Enabled Application") To build these applications, 41% of survey participants report that they do not utilize commercial tools for web application development, but instead use HTML, XML, CGI, Java and JavaScript to develop web applications. Twenty nine percent rely on Microsoft technologies such as Active Server Pages, FrontPage, Explorer and ISAPI, 22% use Internet-enabled 3/4GL tools such as NetDynamics, WebObjects, ColdFusion and Broadvision, with the remaining few building applications with interactive multimedia tools (3%) or workgroup editors (5%).

## TESTING THE LIMITS

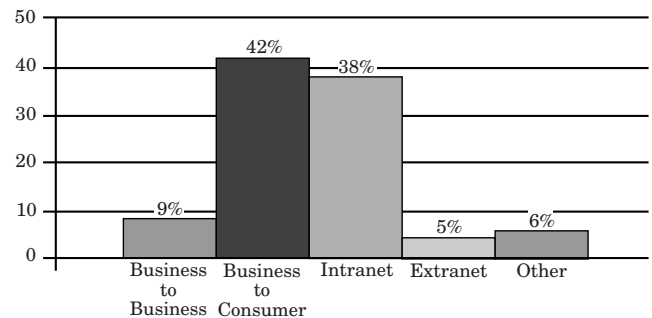
In the final analysis, it is the opinion of the Newport Group that companies who incorporate the following into their plans to build transaction-based web applications will achieve best results.

1. Set conservative goals with the intent to expand them out in a systematic fashion;
2. Integrate load testing into the development process of web applications early and often; and
3. Set a load capacity threshold for growth which is continuously monitored.

Building web applications is still for the most part in its infancy. Technologies have surely matured, but they still have a way to go. Building web systems – keeping in mind browser types, HTML, XML, JavaScript, Java applets, Microsoft Active Server Pages, ActiveX controls, communication protocols, operating systems, back-end databases and legacy applications combined with differing hardware platforms and network structures – is layered, integrated and complex. In short, there are numerous points of fail-

ure for a continuously available web application. So, in the harried race to adopt e-business it is important to consider long-term goals but plan well for short-term incremental achievements. Secondly, always test the limits of any e-business application prior to going live. Remember that as much as major successes are publicly cheered, major failures are just as publicly jeered. Third, set a load capacity threshold for application growth and continuously monitor it. For example, when application transaction volume gets to approximately 70% of its handling capacity, it is time to start executing plans to add more room. This is why utilizing load testing tools to know the limits of the application is so important for e-business applications. Once the limits are known, continuous monitoring proves to be a proactive approach towards ensuring correct handling of daily transaction volumes so volume spikes don't bring down the house.

## Purpose of Web Applications



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Figure 5

Countrywide Home Loans, an independent residential mortgage lender and servicer, is one organization that managed to take these preventative steps as they moved business-critical applications to the web. In order to ensure that their new infrastructure would support the nearly 1000 applications set for deployment within a two year time period, Countrywide recognized the need to validate the scalability of their overall system architecture early on – even before the first application was built. As a result of being proactive about testing, Countrywide has established a solid test bed and iteratively tests to measure the effect of all application modifications on overall performance. Their diligent test practices and frequent use of load testing tools continues to allow Countrywide to meet high performance standards.

## THE BOTTOM LINE

The extended reach of e-business is revolutionizing the way businesses interact with customers, suppliers, business partners and employees. In short, e-business has proven itself a viable business model poised for substantial growth. The pool of vendors stepping up to supply tools and solutions targeted for e-business is widening and budget line items are expanding to make way for purchasing the tools that make e-business work. The early successes of such companies as Charles Schwab, Amazon.com, E\*Trade, and others have encouraged Corporate America to follow the money.

(more...)

Yet according to recent research, web application scalability is a stumbling block. Although it is true that technology advances have come a long way to achieve the realities possible with e-business, there is a need, now more than ever, to apply stringent testing practices to these far-reaching business applications. Utilizing an automated load testing tool is far more cost-effective when faced with testing the unpredictable limits of an e-business application. This is especially so for those working against an e-business clock to achieve deployment. Simulating varying types of transactions from vast amounts of business users is essential for understanding the limits of the application, planning for growth and reducing business risk. As it relates to recent Newport Group research in web application scalability, 66% of those utilizing load testing tools report that the tools aided in uncovering scalability issues prior to going live. Moreover, nearly three quarters or 74% of all study participants conclude that the return on investment for automated load testing of web applications was high. This underscores the importance of the need for companies to apply strategies and tools that work to safeguard against current and future scalability surprises. Perhaps this can be best summed up by the remarks from one study participant who stated: *“Always define and specify procedures and methodologies to address scalability when designing and building any application by making load testing a requirement. Load testing is the backbone of a successful and problem-minimized application development project.”*

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## ABOUT THE RESEARCH STUDY

Newport Group conducted research to address web application scalability during February and March of 1999. Surveys were distributed to web developers and/or IT managers overseeing web application initiatives via mail, fax, and email as well as personal phone interviews. Approximately 4.3% or 172 individuals responded. Those that did not qualify were eliminated due to incomplete surveys or insufficient information, leaving 117 individuals from which to draw conclusions. As it relates to company size, (38%) were under 200 million, while (11%) were between 200 and 500 million, (15%) were between 500 million and 1.5 billion and (36%) were over 1.5 billion. The industry specifics were as follows: Financial and Insurance (24%), Manufacturing (16%), Government (9%), Retail (15%), Utilities and Transport (12%), Healthcare (5%), Education (6%) and other (13%). The “other” industries included a mix of consulting, telecommunications, and technology.

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### **About Newport Group**

*Newport Group is an independent information technology research firm. Founded in 1997, Newport Group was created with the intent and interest to provide detailed research services to major corporations and software vendors that share a vital interest in information technology. Drawing on years of IT research experience, Newport Group concentrates on selective IT research topics and trends. The benefits of this exclusive research approach are passed on to the client base with demonstrated expertise and insight.*

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