

Industry: Banking

Organization: Sallie Mae

Description:

Sallie Mae is one of the nation's largest financial services companies, providing funds for education loans, account servicing to borrowers, and operational support services for federally funded insured student and parent loans.

Business Problem:

As the Sallie Mae Web and Intranet sites grew, the development team became painfully aware that they lacked a reliable way of testing software quality, validating content, and detecting broken links. With sophisticated financial calculators and other tools on the site, as well as a constant demand for new internal and external applications, the team realized they needed a better testing process.

Rational Solution:

Rational TeamTest and consulting assistance from Rational partner, Noblestar Systems

Key Benefits:

- Testing time reduced from two weeks to four hours
- Improved software quality and far less maintenance
- Ability to pinpoint and correct performance bottlenecks that likely would have gone undetected with manual testing
- Y2K testing with full compliance proof for auditors

Automated Software Testing with Rational TeamTest Helps Sallie Mae Grow its Web Site and Intranet

When the SLM Holding Corporation, commonly referred to as Sallie Mae, launched its Web site, it mushroomed almost overnight to include Sallie Mae core pages, interactive services, several satellite sites and a network of vendor links.

The phenomenal growth of the Web site is directly linked to the increased demand for student loans which, in turn, has been driven by higher education costs that continue to rise faster than the inflation rate. As a result, over half of today's full-time college students depend on some form of borrowing, a big jump from the 35 percent who were looking for loans a decade ago.

Sallie Mae, based in Reston, VA, is one of the nation's largest financial services companies, providing funds for education loans, account servicing to borrowers and operational support services for federally insured student and parent loans. Sallie Mae offers a variety of financial services to all segments of the higher education credit delivery system including lenders, schools, and students.

Sallie Mae acts primarily as a wholesale provider of credit and a servicer of student loans. It works with a variety of clients including over 900 financial and educational institutions and state agencies. Six regional loan servicing centers process student loans for approximately five million borrowers. The Web site is part of the company's core marketing strategy to provide lenders, schools, students and families with simple, flexible and cost-effective products and services.

Building a Working Site

Making sure that the fast-growing site is free of errors and broken links, and is easy to access and use is a major effort involving Sallie Mae's IT department. At first, it wasn't easy.

"As soon as we went live in the marketplace with the Sallie Mae Web site, its growth just took off," recalls Carol Withers, Director of Internet Testing Quality Management. "It obviously met a growing demand for instant access to loan information on the part of students, their parents, schools, lenders and guarantors — everyone involved in the student loan process.

"The lack of a defined hierarchy quickly became a challenge for QA. This, combined with the fact that the site grew as more and more departments within Sallie Mae wanted to post their information, made for a very complex Web operation. We constantly checked the site link by link to ensure all links were operating correctly or if the addition of new links had caused problems elsewhere on the site. It took one person two weeks to perform the entire test — which seemed like forever."

Oliver Jones, Director of Product Management at Rational Software, a Cupertino, CA-based company which supplies a variety of products that automate the component-based development of software, explained that the Sallie Mae site, as large and complex as it is, is typical of most Web sites.

Looking Out for the User

"One of QA's main roles is to look out for the user's interests," says Sallie Mae's Susan Thompson. "We evaluate the usability of the product — is it consistent throughout the site, does it make sense from a user perspective, does it look and feel good?"

"Where it once took two weeks to thoroughly check the site, one analyst using Rational TeamTest can now do the whole job in four hours"

"With this in mind, we test every project from day one," she continues. "We use Rational SiteCheck to look at the site's links, its design, and its interaction with our mainframe and client/server infrastructure. This includes both UNIX and NT-based servers."

"When we test the Sallie Mae World Wide Web site and the company intranet, the Rational testing software provides us with a bonus that is very important to our future," Thompson adds. "It provides proof of Year 2000 compliance — something that has become mandatory. The software also creates an audit trail to prove Y2K compliance to auditors."

Importantly, the Y2K features provide a consistent test methodology, an efficient, dependable test framework for future testing efforts. Included is the automated comparison of results from pre- and post-Y2K runs. The Rational Y2K-quality automation suite also provides integrated defect tracking and can execute scripts across various platforms. It supports Windows-based mainframe emulator applications.

"We're not only checking existing products for compliance — every new product is tested as well," Thompson says. "With Rational it's very easy to do."

Sallie Mae's commitment to rigorously test the Web site and the intranet is reflected in the growth of the QA staff devoted to these projects — a year ago there were only three people

working full time on these services. Today the Internet/intranet testing team has more than doubled and, as additional applications are added, the staff will increase.

More Growth, More Testing

"With Noblestar's on-site mentoring and training program we've learned to use several key Rational testing tools very effectively," Withers adds. "The software has helped us save a tremendous amount of time, but best of all, it's allowed us to increase the value of the product we're delivering to our users. With Rational software quality automation products, we can test far more thoroughly than we could before, helping to create better quality software, requiring less maintenance. This gives us the time necessary to incorporate the changing needs of our users and our company."

"Most sites," says Jones, "are made up of plain pages written in HTML with some active content — forms, calculators, etc. — created in Java and/or ActiveX. About 20 percent of the pages account for 80 percent of the site's complexity. Like most sites, the Sallie Mae main and satellite sites change frequently. It's a Web truism that when you change something in one location, you have probably broken something somewhere else."

Following the typical pattern, the Sallie Mae sites software — its forms, calculators, and CGIs, grow far faster than anyone had anticipated. "It's very difficult to be ready for that day

when you log a million hits in one hour," notes Jones. "But that day comes a lot sooner than you think." "Your successful Web site," he observes wryly, "can become a nightmare."

From Manual to Automated

Sallie Mae found the help it needed to move its Web site testing forward in the form of Noblestar Systems, a Falls Church, Virginia-based technical services firm specializing in design, development and deploying results-oriented client-server-based IT solutions, assisting clients with achieving the competitive advantage in their marketplace. With a strong history of client/server success and a proven track record of integrating emerging Web and business intelligence technology, Sallie Mae made the right decision when choosing an IT business partner.

"We were first brought in to help with the manual testing of a client/server project. We recommended the implementation of automated testing, using Rational TeamTest to automate the testing process. Due to the success of this project other groups within Sallie Mae began requesting our assistance," says one of Noblestar's consulting managers, Elyn Lalimer. Automating the testing of their Web site was next in line. "Because of our experience with automated testing and our technical knowledge of the Rational tools, we were able to use TeamTest to test the Sallie Mae Internet and intranet sites. We used advanced scripting techniques and the software's test cases to create reusable, maintainable test suites to validate content and consistency of the sites."

"Rational TeamTest includes a set of comprehensive software products which, among other things, automatically test browser-based applications. As soon as the testing team saw TeamTest's capabilities, they abandoned manual testing and never looked back. Where it once took two weeks to thoroughly check the site, one analyst using TeamTest can now do the whole job in four hours."

"Previously," adds Withers, "we were only able to do maintenance checks on the site — it was impossible to conduct regression testing of all the pages and links. Also, the Web site has some very sophisticated calculators that students and their parents use to estimate education costs. To test the calculators, we had to work for hours using an Excel spreadsheet or a hand held calculator."

"By teaching the advanced scripting techniques to the testing team, this difficult testing effort is now automated," says

Lalimer. "Now, during the four hours, we can regression test the entire site and uncover any problems that have cropped up as a result of the latest site revisions. The scripts are reusable, saving us a lot of time and effort in subsequent tests," adds Withers.

Advanced Scripting

Rational's quality automation software has been designed specifically to meet the quality assurance challenges posed by fast growing, complicated sites. Sallie Mae, for example, has been using Rational SiteCheck, a part of TeamTest, to check the entire Web site content with every update. The software detects active content, "recalling" any user interaction, and mapping all actively linked pages. During regression testing, when SiteCheck re-scans the site, it uses the "remembered" input while automatically tracing all other links — even when they change — without requiring any new user input.

SiteCheck goes beyond just structural testing. Through its advanced scripting capabilities, the automated scripts let Sallie Mae check the actual content of its Web pages for consistency and accuracy.

SiteCheck also has the capability to test sites containing a variety of security measures including password protected areas: sites using encryption measures specified by the Secure Socket Layer (SSL) protocol; and sites accessed through proxy servers. This is accomplished using Rational LoadTest.

Introducing the Intranet

Having earned its Internet spurs with the successful introduction of the Web site, Sallie Mae's IT organization next tackled the even more complicated task of developing an extensive company-wide intranet.

"Whenever IT develops a major new application, the Quality Assurance team is part of the effort from the very beginning," says Withers. "This makes all the difference in creating clean code and finding and fixing bugs early on in the process. In addition, our QA team looks at the applications from the standpoint of the user and advises the developers on GUIs and other user functionality. This is the case with the Web site and also with the Sallie Mae intranet."

From the beginning, the intranet posed its own set of challenges. The initial site consisted of the corporate directory and employee HR benefits.



About Rational Software Corporation:

Rational Software Corporation (NASDAQ: RATL), the e-development company, helps organizations develop and deploy software for e-business, e-infrastructure, and e-devices through a combination of tools, services, and software engineering best practices. Rational's e-development solution helps organizations overcome the e-software paradox by accelerating time to market while improving quality. Rational's integrated solution simplifies the process of acquiring, deploying, and supporting a comprehensive e-software development platform, reducing total cost of ownership. Founded in 1981, Rational, one of the world's largest Internet software companies, had revenues of \$411.8 million for its fiscal year that ended in March 1999, and employs more than 2,000 people around the world.

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Sallie Mae's Susan Thompson Remembers It Well

"As the intranet site matured and more users were accessing the site, Sallie Mae began to experience performance issues," she says. "Neither the networking team nor those of us in Quality Assurance were able to determine the root cause. Noblestar recommended Rational LoadTest. This enabled Sallie Mae to test the server under operating conditions with the ability to simulate 250+ concurrent virtual users."

Rational LoadTest provides an easy and powerful method of ensuring that client/server and HTTP Web server applications are ready to handle business-critical applications before they are fully deployed to the user community.

The Sallie Mae intranet continues to be a major and complex development effort. Users have the ability to access the site from all over the country, seven days a week, twenty-four hours a day. Volume and usage are totally unpredictable, making it imperative that any major problems be identified and fixed early in the process.

Although performance issues were an immediate and dramatic indication of a problem somewhere in the system, Sallie Mae recognized that their Web site and intranet were subject to all the problems associated with deploying a relatively new and rapidly changing technology. Some failures could be catastrophic, others could be subtle — for example, slow or incorrect responses, or unnoticed errors creeping into the system. In other cases subtle changes to server configurations could introduce new traffic patterns and network loads which may cause problems.

Rational LoadTest uncovers these and other server problems by imposing a heavy load on the server through "virtual users," a concept which requires less hardware to get the desired results. Using another component of Rational TeamTest — Rational Robot — the conversations between the browser client and the HTTP Web server are recorded and multiple instances of the conversation can then be played back from a single machine simulating the load of hundreds of concurrent users.

In Sallie Mae's case, Quality Assurance used LoadTest to simulate the daily online activities of 250+ concurrent users. As the testing progressed, network operations and QA worked as a team to determine the cause of the performance problems.

"As we ran the tests, Rational LoadTest kept uncovering problems," Thompson recalls. "It was like peeling back the layers of an onion — we were able to keep drilling down, testing level after level. We finally found the source of the problems which involved a complex set of relationships between the directory database, the server, and the overall system configuration. I don't think we could have found the answer using manual testing techniques — or, if we did, it might have taken us months. Using the automated testing solution, and working as a team, we were able to solve the problem in a lot less time."

Coping with Success

The Sallie Mae intranet has been a success beyond anyone's wildest dreams. With the server problem solved to everyone's satisfaction, department after department within the organization is clamoring for space on the intranet.

Human Resources became the first intranet sponsor, putting up pages that contained employee information, organizational structure and other data, eliminating bushels of routine paperwork and making it easier for employees to get their jobs done. For instance, using a PIN number, employees can access confidential personnel information about themselves, review their company health and dental plans, and update vital data such as phone numbers in case of emergency.

More paper and bulky three-ring binders were eliminated when the standards and procedures for the IT division made their appearance on the intranet. Now, changes are recorded on the master document that is accessible to everyone. "This enables us to work from the same page," Thompson says.

The training department was next to jump on the intranet bandwagon, posting the complete schedules for its many computer-based training classes. Servicing soon followed, adding administrative functions on the intranet for help desk personnel who must maintain the security for Sallie Mae's Self Service sites.

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