

Industry:
Hardware/Software

Organization:
VerticalNet

Description:
VerticalNet is an enterprise software provider that helps businesses fully leverage the Internet to achieve excellence in their internal and external business processes.

Business Problem:
VerticalNet had an immediate need to establish an effective quality assurance solution. They wanted easy-to-use tools they could deploy quickly and a comprehensive testing solution for the long term.

Rational Solution:
Rational ClearQuest, Rational Unified Process, Rational RequisitePro, Rational Suite TestStudio

Key Benefits:
Reduced duration of some tests from several days with 6-8 people down to several hours by one person

Quickly established a quality assurance program, and gradually expanded it over time

Easily assessed the impact of changing project requirements on test schedules and test cases

Optimized their testing process by monitoring it, identifying strengths and weaknesses, and planning improvements

Accelerated their RAS (Reliability, Availability, and Stability) testing life cycle

Rational and VerticalNet

VerticalNet Relies on Rational Suite TestStudio to Ensure Reliability, Scalability and Performance

Since its founding in 1995, VerticalNet has been focused on one goal — enabling companies to collaborate and conduct business with one another over the Internet.

Customers rely on VerticalNet to provide enterprise software that helps them fully leverage the Internet and improve their internal and external business processes. In turn, the VerticalNet team relies on Rational Suite TestStudio to make sure the software they deliver is reliable, scalable and able to handle the user loads expected of it.

As important as software quality is to VerticalNet and their customers, time-to-market remains an equally important factor in their success. With Rational Suite TestStudio, VerticalNet has been able to complete more testing in shorter time frames with fewer testers by applying re-usable test scripts and automated regression testing. Matthew Hildenbrand is the Director of Quality Assurance at VerticalNet. "In the past, when we set up servers and we needed to make sure our software was installed correctly and working properly, it used to take six to eight people several days if we did it manually. With automated scripts in Rational Suite TestStudio, it can be done in several hours by one person — which is a huge time savings and cost savings for us," Hildenbrand explains. That savings is then multiplied as the VerticalNet team re-uses the same suite of scripts on different platforms and servers.

An Immediate Need

Hildenbrand had been with VerticalNet for about six months before he was chosen to oversee the creation of VerticalNet's entire quality assurance (QA) organization. His first objectives were fairly straightforward. First, Hildenbrand wanted to establish the new QA team as quickly as possible; and second, he wanted to be able to expand and evolve the capabilities of his organization over time, with-

out having to start over with different tools. Rational Suite TestStudio was the perfect fit because it allowed Hildenbrand to implement his solution piece by piece, according to his schedule, and build upon it over time.

"When I came here, we had a rather immediate need to get something up and running. Even though the need was immediate, we still did some pretty extensive shopping. We looked at a lot of companies. One of the reasons I went with Rational was that I could get something off the ground quickly and still be able to use it down the road. We got our defect tracking system up within a couple of weeks and we are still benefiting from the system that we built. There are a number of tools in Rational Suite TestStudio, but you don't have to use them all right away. You can bring new components into your methodology without losing all the work you did already. Getting something up quick, getting the program started, and being able to expand on what we had via the integration of the tools, was very important to us," Hildenbrand remembers.

First Things First

Like every member of the Rational Suite family, Rational Suite TestStudio includes the Team Unifying Platform, a foundation of tools and processes designed to improve team communication and collaboration throughout the development life cycle. Instead of jumping right in with the testing tools, the VerticalNet team started off using two tools from this Team Unifying Platform — Rational RequisitePro and Rational ClearQuest. Rational RequisitePro is a powerful requirements management solution that ensures everyone on the team shares a common vision of requirements throughout the project. While Rational ClearQuest, a flexible defect and change-tracking tool, provides Hildenbrand and his team with up-to-the-minute views on the status of their projects.

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Hildenbrand recounts his team's initial project using these tools, "Our first major deliverable was a project with development on two coasts; that was going on while I was building the QA organization. The first two things we got off the ground were requirements management with Rational RequisitePro and defect tracking with Rational ClearQuest. When our testing group received the requirements documentation we pulled it into Rational RequisitePro and then we started to build our test suites off of those requirements. I believe it is important to have both traceability and test coverage metrics. In our group, we create test plans and test cases and set up traceability based on the requirements in RequisitePro on our own so that we can do our job. I also use RequisitePro for reporting to executive management. I can use it to generate reports on requirements coverage instead of searching through long Word documents. We get a lot of benefit from it."

Hildenbrand notes that one of the biggest benefits of using Rational RequisitePro is a better understanding of the impact that requirement changes will have on a project. "The ability to instantly see the overall affect when a requirement changes is very important. For example, when we have traceability and a hierarchy established -- within requirements, within test cases and between requirements and test cases -- and a requirement is modified within the Rational RequisitePro database, we can look at a view that instantly shows us the other requirements and test cases that may be affected by that requirement change. This allows us to plan for the change appropriately, by adjusting the schedule or, in some cases, warning the project managers that changing that requirement means they need to take a second look at other related requirements." Hildenbrand adds, "Rational RequisitePro also gives us the ability to track pass/fail statistics for test cases and run reports on those statistics. That saves us time because we don't have to develop and maintain another database to track that data."

Like Rational RequisitePro, Rational ClearQuest improves communication both within functional groups and across the entire development team. For VerticalNet, Rational ClearQuest provides a mechanism for linking their development and QA processes via a common interface and shared access to proj-

ect metrics. Hildenbrand notes, "We use Rational ClearQuest to view everything from basic project status -- where things are in a particular day -- to trend analysis over time. For example, we can monitor the number of issues that are getting fixed versus the number of issues that are getting found and use that to find gaps in our process. If things aren't being unit tested properly, we'll see very high counts. With ClearQuest, we'll look at the trend charts and bar graphs over time to pull out historical data and see where we need to improve. For us, the ability to monitor the QA process, identify strengths and weaknesses in it and plan for optimization is an important benefit of Rational ClearQuest."

Rational ClearQuest is used throughout VerticalNet, not just by testers. "Rational ClearQuest is rolled out globally right now -- even our team in Jerusalem is using it. We also use the Web interface, which enables some of our customers to use it with restricted access. Our implementation includes some valuable elements, like associating issues with components, versions and configurations." According to Hildenbrand, the ability to access project data with multiple views in Rational ClearQuest, and to customize those views based on individual user needs is one of the key advantages of Rational Suite TestStudio.

Testing Reliability, Availability and Stability

With Rational RequisitePro and Rational ClearQuest in place, Hildenbrand and his team turned their attention to their primary goal and the main reason they selected Rational Suite TestStudio -- testing their software. Rational Suite TestStudio includes tools for testing every dimension of software quality, including reliability, functionality and performance. The VerticalNet team has found a myriad of uses for Rational Robot, Rational's industry-leading tool for creating and maintaining robust functional test scripts. Hildenbrand describes a typical testing effort using Rational Robot, "My organization is divided into three skill sets. First there is the manual effort, which is usually the project lead. He or she is the external face of QA for the project and is responsible for the master documentation and the execution of manual tests. In addition to project leads, I have people that work in GUI automation with Rational Robot or in performance testing. The

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Robot team works with the manual engineers. They look at all the use cases of the application and prioritize them based upon which use cases should have automated tests for our RAS testing – that is Reliability, Availability, and Stability. The Robot team will then use Robot to script the major use cases of an application."

The engineers at VerticalNet take full advantage of Robot's flexible and powerful scripting language to build sets of reusable, multi-platform test scripts. Hildenbrand continues, "They're very much into the coding part of Robot, with their own development methodology and script repositories. They cover all the major use cases and then we run hundreds or thousands of iterations to see how the application stands up over time in a certain environment under different loads."

One Tool; Many, Many Uses

Using Rational ClearQuest and Rational Robot, VerticalNet has established a process for replacing manual tests with automated tests to save time and free up valuable testing resources. "Once a manual engineer finds an issue, he or she will enter the steps to reproduce the problem into Rational ClearQuest. The Robot engineers then create a script that reproduces those steps. That frees up the manual engineer to work on additional test cases. Once we have it scripted we can go back and do an automated regression test every time there's a new build. That's a real time benefit."

Hildenbrand continues, "Rational Robot is a multi-purpose tool for us. We use it for regression testing. We use it to certify new environments. We use it to speed up the lifecycle for defect validation. We also use it to automate test data setup. For example, sometimes we need to install an application on a set of servers. When there has to be a certain amount of test data in the system and in order for us to verify that application, we will use Robot to script the creation of that test data. Then after we install the new software on the system, we'll run the scripts and they will populate it with the data we need. After that, if we have automated test scripts for that system, we'll run them too."

With software security becoming a key concern for many organizations, VerticalNet has developed automated Rational Robot tests to

verify the security of the applications they build. "Some of our security testing is manual, but Rational Robot is very useful if we have an application that has security built into it and there are certain types of users that belong to specific groups, like most B2B applications. If, for example, you're an administrator for one of these applications you should be able to see A, B, and C, and do X, Y, and Z. Our teams will develop Robot scripts that can test that in a short period of time. The scripts will login as different users and verify access to certain areas of the application and capabilities within those areas based upon the login. It has been another big time-saver."

VerticalNet's testers also save time by using Rational Robot's datapools to create more flexible test scripts. Datapools are used to specify specific sets or ranges of data that Robot will use when playing back scripts. Hildenbrand reports that this capability greatly speeds up "negative testing" – verifying that the application under test correctly rejects or ignores invalid input. "If we have an application that has a form – and in that form certain fields should accept specific types of data, ignore other types and throw error messages with other types – it is much easier to automate that kind of testing with Rational Robot. So our engineers develop scripts that they can customize depending on the application that they are looking at. For example, every time they see a text box on a form that is supposed to be alphanumeric, the scripts will confirm the alphanumeric values works, then they will test min/max values, and then throw in symbols and things like that. Negative testing goes much quicker by using Rational Robot, and a datapool that automatically populates the form, than doing it manually," notes Hildenbrand.

Tracking Down Intermittent Bugs

Experienced testers and developers know that the most frustrating and insidious bugs are the ones that happen only sporadically. Because they are so difficult to reproduce, they can be almost impossible to nail down. Hildenbrand's team, however, uses Rational Robot to ferret out intermittent bugs by running a script against an application thousands of times until the problem appears, and automatically capturing the data needed to diagnose the problem.

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Hildenbrand explains, "Just recently, we had an application that we were breaking out into multiple tiers. There was a proxy piece that ran on a Web tier and we were having problems with it. It was kind of a random anomaly. We used Rational Robot to run hundreds of iterations and capture a few of those anomalies. We captured the information we needed and sent it off to the vendor to figure out what was going on. Obviously, you can't do that kind of testing manually. You can't have somebody sit there and do something a thousand times. In order to reproduce it, we had to execute certain steps about 500 times to get it to happen twice. With Rational Robot, we can have somebody take half an hour to develop a script, run it against an environment, and capture data for troubleshooting. We ultimately found out it was a dropped connection problem with some of our vendor's software. Those kinds of things are really going to help us as we go forward."

Performance Testing

In e-commerce, knowing that your application works is not enough. You need to know that your application works and continues to work under realistic workloads. You also need to know how many users your application will support before it starts to break down. VerticalNet depends on Rational Suite TestStudio to stress test their systems and gather valuable performance metrics as they apply real-world loads to their applications.

"We use Rational Suite TestStudio extensively for capacity planning and architecture testing – some pretty significant functions. With enterprise software, we'll often have an application that can run in different types of configurations – an all in one tier, or three tier with redundancy, for example," Hildenbrand continues. "Our engineers will develop test suites using TestStudio and they'll benchmark an application in its simplest configuration. Then with each additional configuration they will run their test suite and compare numbers to benchmark numbers. They'll monitor performance and compare server statistics and the hardware specs of the servers itself. This tells us how much these applications can handle in a certain period of time and in a given environment."

VerticalNet's performance testing methodology mirrors their functional testing strategy. "It's the

same technique," Hildenbrand says. "The testers work with the project leads to prioritize the use cases. They'll have five or ten use cases per application – depending on how big the application is – that they will script and put in their test suite. We have a whole methodology that starts with five virtual users in lock step. We do this when we're in a beta phase to make sure that the application is relatively stable. Then as the software progresses, we have programs to ramp up the users pretty significantly. When we did a full migration of our production center to a new location, there was a lot of capacity planning involved. We did a lot of scalability testing and we used Rational Suite TestStudio to run tests of up to 8,000 simultaneous users before the applications would start to degrade. There's no real way to compare that against any kind of manual testing effort because there just wouldn't be any way to do it. Unless you have issues with five, maybe ten users or less, there is no way to reproduce problems like that manually."

During performance tests, Rational Suite TestStudio captures a wide range of diagnostic information to help testers pinpoint performance issues once they are found. Hildenbrand reports, "We found memory leaks. We found database issues. Pretty much anything you could find with the performance tool, we found every time. We would drill down and be able to map the problem to a particular DLL or component so we knew who the culprit was."

VerticalNet testers also use Rational Suite TestStudio to stress test components that have no user interfaces. "If we have a component that has an XML API, there's usually a presentation layer above it. We'll simulate the presentation layer by using an ASP or a JSP application that submits XML to one particular tier on the application and use Rational Suite TestStudio to run a load against it," explains Hildenbrand.

The result is not only higher quality software, but lower costs as well. "There's a cost savings because we have the lab environments here. It's much more expensive to go outside. Before we had our lab built here we used an outside lab that was \$4,000 a day plus staff. We're going to make that back easily by doing it here ourselves – most likely in one year or less," Hildenbrand reports.

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Developing a More Efficient Strategy

The VerticalNet team has benefited from a number of training courses offered by Rational University including courses on requirements management with use cases, Rational ClearQuest basics and Rational Requisite Pro. In addition, they had the help of Rational consultants whenever they were needed. "We had consultants from Rational come in when we wanted to head in a different direction. They knew us from the ground up and they knew what our test automation team was doing. We also used consultants to help us get Rational RequisitePro and Rational ClearQuest off the ground quickly," notes Hildenbrand.

More Rational Tools, Now and in the Future

VerticalNet is currently using or has plans to use a number of other tools and resources from Rational Suite TestStudio and other Rational Suite products. Parts of VerticalNet's development process are based on the Rational Unified Process (RUP). RUP is an online resource of software development best practices, included as part of the Team Unifying Platform. "We have taken parts of the Rational Unified Process, parts of other processes, and common sense strategies and created something that works for us," Hildenbrand continues.

"We also have development teams in several locations — Pennsylvania, Jerusalem, Orlando, San Francisco, and Palo Alto. Some of them are from recent acquisitions, and they're using a number of different version control tools. We are in the middle of an effort to migrate everybody to Rational ClearCase. It will be rolled out enterprise-wide and I plan on using the integration between Rational ClearCase and Rational ClearQuest — Unified Change Management — to associate builds with specific issues," says Hildenbrand. Rational ClearCase and Rational ClearQuest, ranked the market-leading Software Configuration Management (SCM) solution by IDC, support Unified Change Management, a best-practices approach to managing change and controlling workflow.

Clear Benefits

Hildenbrand believes VerticalNet has realized several clear benefits from the use of Rational Suite TestStudio, including faster test cycles, more accurate performance data, lowered test costs, and improved quality. "I don't think we could have accomplished what we did with another tool suite. We've had some pretty solid success with Rational Suite TestStudio. We rely on it on a daily basis." Hildenbrand concludes. Coming from an expert on reliability, that is really saying something.

About Rational Software Corporation:

Rational Software provides a platform for software development that speeds time-to-market while improving software quality. This integrated, full-lifecycle solution combines software engineering best practices, market-leading tools, and professional services. 90 of the Fortune 100 and 49 of the Fortune e-50 build software with the Rational solution. This open platform is extended by hundreds of partners providing more than 500 complementary products and services. IDC has recognized Rational as the revenue leader in multiple application development and deployment markets for four years in a row. Founded in 1981, Rational, one of the world's largest software companies, had revenues of \$815 million in its fiscal year ended March, 2001 and employs more than 3,700 people around the world. Rational is a component of the Nasdaq-100 Index®.

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