Industry:
Hardware/Software

Organization:
ThinAirApps, Inc.

Description:
ThinAirApps develops applications and software tools to enable real-time data access for all wireless devices. The company was founded in 1999 with one goal in mind: to make people's lives better in a mobile society. ThinAirApps offers products that allow businesses to navigate the wireless market effectively. The company's multi-device, open platform approach enables wireless access to any type of data, securely, and in real-time.

Business Problem:
Faced with a complex testing challenge, ThinAirApps was devoting valuable time and development resources; they needed a powerful, automated testing solution for wireless software.

Rational Solution:
Rational Rose
Rational Suite TestStudio

Key Benefits:
Increased test coverage by up to 800%

Improved quality while shortening the development life cycle by 75%

Automated manual testing operation for wireless software, allowing developers to focus on building applications, not testing them

Ensured software would scale to thousands of users and improved system performance with effective load testing

Shortened the design phase and built in quality early with visual modeling

Simplified complex and tedious wireless testing tasks by evolving comprehensive test suites

Rational and ThinAirApps

ThinAirApps uses Rational Suite TestStudio to Simplify Complex Wireless Testing

Developing software for wireless devices is a complex undertaking. Testing it can be even harder. The developers, testers, and product managers at ThinAirApps in New York probably know that better than anyone. ThinAirApps was founded in 1999 with one goal in mind: to make people's lives better in a mobile society. To achieve this goal, ThinAirApps develops applications and software tools to enable real-time data access for all wireless devices. In this very competitive market, ensuring the highest possible quality is just as important as delivering applications quickly. With Rational Suite® TestStudio®, ThinAirApps has been able to develop and test high-quality wireless applications in less time — shaving up to 75 percent off a typical development lifecycle.

Rational Suite TestStudio is a fully integrated set of automated tools for testing the reliability, functionality, and performance of virtually any kind of software. ThinAirApps was spending too much time manually testing their wireless applications — and even diverting valuable development resources to the testing effort. They quickly realized that Rational Suite TestStudio was just what they needed to automate the testing process and enable their developers to focus on building great software.

Evan Simeone, a Senior Product Manager, has been with ThinAirApps for almost two years. Simeone started out as a Senior Developer, and is now responsible for the entire life cycle of product development, from collecting requirements, working with the engineering team to come up with a design and specification, to shipping the product and ensuring ThinAirApps' high quality standards. Simeone reports that although ensuring the quality of wireless applications can be a difficult job, Rational Suite TestStudio is more than up to the challenge. "Testing wireless software is as complex as testing any other kind of software, multiplied by a hundred different permutations. Because of the number of platforms and devices we have to support, we were faced with a situation where we had hundreds of different test configurations that needed to be checked for each functional test – and we had no practical way of doing that and still ship on time. We were devoting engineers to the testing effort – taking them out of the development team and putting them into the QA team. This was a problem for us, because resources are tight and a developer's time is extremely valuable. We needed to find a way where we could leverage the skills of our QA team to do more of the testing in an automated fashion. We found that Rational Suite offered the perfect solution. In fact, it wasn't even a question of how much longer it would have taken to ship the product. Without Rational Suite TestStudio, it was a question of if we could ship the product at all."

A Challenge and an Opportunity

ThinAirApps develops the infrastructure for wireless enterprise applications – everything needed to connect a wireless device to an enterprise network, including its data and applications. Any enterprise that supports a mobile workforce will eventually encounter the problems that ThinAirApps' software addresses. Simeone explains that ThinAirApps does not rely on browser technology, opting for a more comprehensive approach, "Our solution includes software that runs on both the devices and on the server. We focus on smart-client applications. As opposed to wireless browser applications that just send WML or compact HTML, we've created components that can be used to build applications or customize applications on the device. This gives us a number of advantages. For example, it lets users run our applications even when there is no wireless coverage available, because data can be cached on the device. We offer application level APIs, sometimes called data access level APIs. We both build applications that use them, and we expose those APIs to other developers."

Rational and ThinAirApps

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This multi-device, open platform approach enables secure, wireless access to any type of data in real-time. And since ThinAirApps keeps up with the latest in wireless technologies, the platform continues to grow all the time, supporting the latest devices and protocols as they come to market. "This is where it gets complicated, and the place where testing is really important to us," Simeone notes. "It turns out that just about every device you can buy has some different way of connecting to the network wirelessly. That makes it very complicated to develop components that run on all of these devices, but that is what we've done. For instance, a typical example is a wireless Palm™ device. First of all, it can be running one of many versions of the Palm OS. Plus, on Palm devices there are two standard networking libraries, and they each have their idiosyncrasies. If you bought a third-party modem, you may even have a different implementation of one of these libraries. Also, depending on what service provider you have for your wireless device, there may be a wireless gateway that converts the wireless signals into Internet protocols, and those sometimes have funny or idiosyncratic behavior. There are a lot of variables, which makes it very tricky."

Simeone continues, "This has presented us with a challenge and an opportunity. The challenge is that it is difficult to develop wireless applications that are going to work on all the devices that are out there. For us, though, it is an opportunity because we have a lot of experience in this area, and we have been able to build components that work on a wide variety of different devices, with their network layers, and gateways and services providers, and so on — and make them all the work the same. To do that, we need to do a lot of testing. And the only way we can get it all done is to automate it with Rational Suite TestStudio."

Developers Develop, and Testers Test

ThinAirApps is actually in two highly competitive markets. In addition to competing with other wireless software makers in a business sense, they compete with these same companies for a very limited resource – experienced wireless developers. "The fact is that if you want a VB developer or a Java developer you can usually go out and find them," Simeone notes. "But if you want a guy that knows networking on Palm OS – that's not so easy. You'll either have to train somebody or spend a lot of money to get them." Either way, having developers work through hundreds of manual tests is an inefficient use of their time.

This inefficiency was a major factor in ThinAirApps' decision to use Rational Suite TestStudio. Simeone continues, "Early on, we focused on unit testing — which is still very valuable to us — and developer testing. Eventually that phase took over too much of the development schedule. We were devoting a large number of engineers to the testing process because so many of the tasks required skills that most testers don't have. Much of the software we're building is very technical — C API's, networks, etc. It is not straightforward to test either manually or using automated tests. Before Rational Suite TestStudio, our QA team needed a lot of help from the development team and a lot more developer involvement. Now they have the tools that they need to fully exercise a system without having to hold a device in their hand for 12 hours. They can perform a wide array of tests on a wide array of functionality independently. By using Rational Suite TestStudio we are able to let the engineers focus on development and at the same time empower the QA team to automate their tasks. With manual testing, each round of QA could take a week or more, even in the early stages of development. Now that we're using Rational Suite TestStudio, we've automated it, it's repeatable, and we can go through the entire round of testing in a day or less. Rational Suite TestStudio has shaved more than a month of time off of several recent projects and allowed us to not only ship them earlier but with higher quality."

Rational Suite TestStudio also increased the confidence that ThinAirApps has in its releases, because it enables them to test much more functionality on a consistent basis than they could before. "One problem we ran into is that the manual testing process we were using was so cumbersome and time consuming that we weren't really able to cover the whole feature set in our testing for every release. We were testing maybe 10 to 20 percent of the functionality. Now that we've been able to automate the process with Rational Suite TestStudio, that percentage is much higher – in the 70 or 80 percent range with every iteration. Having all that added cover-

age and being able to ensure that a high percentage of our feature set is being exercised makes releasing wireless software a lot less of a gamble, and we feel a lot better about the products that we release. Plus, we can get our products out faster, and stay ahead of the competition."

Functional Testing without a GUI

Many testers are familiar with using Rational Suite TestStudio for GUI-driven functional testing, in which test scripts are used to drive the user interface of an application and validate results. But how does ThinAirApps perform functional tests on wireless devices like cell phones and hand-held PDAs? They leverage Rational Suite TestStudio's ability to do "on-the-wire" recording. Essentially, a tester will manually step through a test sequence using a wireless device while Rational Suite TestStudio records the network traffic between the device and the server. Later, the tester can have Rational Suite TestStudio playback the recorded conversation and verify both the protocol and the responses from the server to ensure that the software on both the device and the server is functioning correctly. Using this approach ThinAirApps has accumulated a vast repository of test scripts for hundreds of combinations of devices, modems, gateways and applications.

Simeone explains, "What we needed to do was test many features from many different devices. Manual testing was not an easily repeatable process; trying to find new bugs or verify that bugs had been fixed was extremely difficult. With Rational Suite TestStudio we record test cases as a user inputs data. For example we start with a Palm VII, we record the traffic, then we use a Palm V and record the traffic, and see what happens with different gateways and different combinations. We build up suites of tests for each test case for each device and each combination: Palm V with this modem, Palm V with that modem, Palm VII with this network layer, Palm VII with that network layer, and so on. The nice thing is that as we've been building these suites up, we can just keep using them."

He continues, "We have used the suites for regression testing. Other times we're just testing APIs and components and in those cases we'll make a test harness application with a bunch of buttons and test fields, and use that to see what the network traffic is and record it with Rational Suite TestStudio. In some cases we want to make sure the network traffic is the same from device A to device B, other times its more important just to ensure that the result that comes back is the same. In fact, sometimes we just use Rational Suite TestStudio to look at the network traffic after we record it. Another huge part of it is making sure that the server supports all of these different devices, so we'll play them back against the server and use it for server testing. We'll use Rational Suite TestStudio to impersonate an enterprise that has Palm V's with modems A, B, and C; a Palm VII, a DoCoMo device from Japan, and we'll test them against the server to ensure the functionality is there, and that they all work together. One of the biggest advantages of Rational Suite TestStudio for us is the repeatability of it. Now we can put out a build, run through a cycle of automated tests, and know that the baseline functionality is where we need it to be. Plus Rational Suite TestStudio gives us an integrated platform for managing tests, executing them, looking up previous test results and generating reports on the number of outstanding issues."

Rational Suite TestStudio's ability to record and playback network traffic has proved valuable in other ways as well. For example, the testers at ThinAirApps have to ensure that ThinAirApps' software will work with wireless devices used in Japan and Europe. Usually the testers do not have direct access to the devices themselves; and in these cases, on-the-wire recording is crucial. Simone notes, "Often, devices in Europe or Asia communicate through their own gateways and networks over there. We have no way of testing them without going to Japan or wherever they may be. What we have done on these occasions, is ask one of our Japanese partners to manually run through tests on a device while we record it here. Their cell phone or other device talks to a local gateway that goes onto the Internet, and we record the Internet traffic hitting our server with Rational Suite TestStudio. From that we can build a suite of test cases for DoCoMo phones, for example. And that's invaluable, because without that you cannot ensure quality in foreign deliveries, which is a big part of the wireless market. We are able to record the traffic from devices making

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requests from Japan, from Europe, from all over the world, and build these into our testing suite. Then, from our office in New York, we can impersonate all these devices with Rational Suite TestStudio virtual testers, and ensure that our software will work correctly with all of them."

Peace of Mind from Performance Testing

For ThinAirApps, ensuring that their software can handle realistic user loads is key to the success of their releases and their business. In the wireless industry, the number of possible users for any application underscores the need for scalability. As Simeone observes, "The scalability demands that we're running into are pretty extreme. It's one thing to support internal users, another to support people at home, but now that every user with a phone can access enterprise applications, demands on scalability are really great. With Rational Suite TestStudio, we've been able to use virtual testers to ensure the scalability and performance of our server products. Rational Suite TestStudio's load testing capabilities gives us two important advantages. The first is ensuring our basic scalability: Is this release going to stand up to reasonable loads of simultaneous users using different clients? The second is proving to our customers that our software will perform under a specific user load. We've had requests from customers to verify and demonstrate our testing processes. They say 'We want a document that shows us this software is going to support thousands of users at once.' They aren't interested in us saying 'We hired a thousand monkeys and it all seemed to work.' They want to see a real testing tool with formal results in a variety of configurations. Rational Suite TestStudio made that whole process practical and a lot simpler for us. Rational is well-known and that made our customers a lot more comfortable accepting the results because they knew we had a real testing tool, we were using real testing technology, and not some fly-by-night software that nobody ever heard of."

Load testing with Rational Suite TestStudio not only confirmed that ThinAirApps software could easily support thousands of users, but also helped improve performance over time.

Simeone adds, "We perform tests where we apply a load with all sorts of different devices at the same time, because we always want to make sure that just because one device works it doesn't stop another device from working. We haven't run into many contention problems or performance issues. But it doesn't make any sense to say, 'We didn't find any problems, so it wasn't worth it.' It gives you peace of mind, and its one more thing you can cross off your list. Our performance has improved consistently over time, and I do attribute that to performance testing with Rational Suite TestStudio. We've found little things here and there that have done a lot to improve performance. For example, we found out that some of our components were bottlenecks because they were less efficient than others. Being able to throw a load of thousands of users at our server when we need to has been a big help. With Rational Suite TestStudio we are improving server performance all the time."

Complex Problems Are Perfect for Rational Rose

While Rational Suite TestStudio filled the immediate need for automated testing at ThinAirApps, the development team soon realized that the complex nature of wireless software demanded advanced development tools as well. Simeone remembers, "After having a lot of success with Rational Suite TestStudio we started looking at automating the rest of the development life cycle. We were faced with the problem of developing an extremely complex application and application framework." Quickly, the developers at ThinAirApps adopted Rational Rose®, the world's leading tool for model-driven development. Rational Rose uses the Unified Modeling Language (UML), which Rational pioneered, to visualize, specify and construct software systems. "We had a number of engineers who were familiar with Rational Rose and we have been training the rest of the team on using UML to design high quality object-oriented software. We've seen a lot of success in shortening the design phase and improving quality early on. From the very beginning we build quality into the design using Rational Rose and UML to ensure that our foundation is rock solid," Simeone says.

In addition to Rational Suite TestStudio, Rational Rose has become a big part of ThinAirApps' development process. Simeone reports, "Our use of UML in general and Rational Rose in particular has increased consistently since I've been here. Our engineering team uses it for everything. They'll find a way to use Rose for just about anything – whether it was designed for it or not. With Rational Rose, we've been able to speed up the design process and design higher quality components. And, although Rational Suite TestStudio has more power, flexibility and capabilities than we've needed so far, I expect we'll begin using more and more Rational tools over the next year or so because we have seen the benefits and there is just no reason not to."

So Many Benefits, So Little Time

Given the fiercely competitive market that ThinAirApps operates in, any new tool is measured first and foremost by its ability to help them deliver software in less time. According to Simeone, Rational Suite TestStudio has dramatically improved their ability to do just that, "Last year we had two major releases. Since we've started using Rational Suite TestStudio, not only can we ensure quality and repeat our testing process easily, we can release more often. We're probably going have six releases this year. That's been a great increase for us. Right now we're already more than a full release ahead of where we would be if we were still using manual testing."

For Simeone, listing the top benefits of Rational Suite TestStudio can be done without hesitation, "It gave us the ability to reproduce complex test cases, with many permutations based on a wide variety of devices, wireless service providers, networks and gateways. That is the biggest benefit it terms of a technical delivery. In terms of its impact – it has given a lot more power to our QA team. It has let them get their jobs started earlier, and finished earlier. With Rational Suite TestStudio our QA team is a lot happier, more independent and more successful because now they have the tools in their hands that they need to do their job and to ensure a quality product. The corollary to that is it has let our developers focus more on developing, and less on the QA effort. Also, Rational Suite TestStudio has helped us benchmark performance for our customers who need accurate and reliable performance data with a reproducible and well-known test plan from a major testing tool."

Ultimately, Simeone believes that many companies will soon be faced with the same problems that ThinAirApps has already faced — and solved. He concludes "We had a system so complex in it's testing requirements that every development cycle and iterative step of the process was taking longer and longer. We started to suspect that not only was it going to take too long to ship but we might not be able to ship a high quality product at all. As enterprises start rolling out more and more wireless applications, they're going to run into these same kinds of problems — where the testing process gets more complex as the number of platforms expands. The ability to ship a product depends on repeatable, automated testing. So, for us the benefit of Rational Suite TestStudio is not just measured in dollars, it's measured in the ability to ship a successful product."

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About Rational Software Corporation:

Rational Software provides a software development platform that improves the speed, quality, and predictability of software projects. This integrated, full life-cycle solution combines software engineering best practices, market-leading tools, and professional services. Ninety-six of the Fortune 100 rely on Rational tools and services to build better software, faster. This open platform is extended by partners who provide more than 500 complementary products and services. Founded in 1981, Rational is one of the world's largest software companies, with revenues of $796.7 million in its twelve months ended September 30, 2001, and over 3,800 employees worldwide. Rational is a component of the Nasdaq-100 Index®. Additional information is available on the Internet at www.rational.com.

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