

## Rational PerformanceStudio Helps KPN Telecom Ensure a High-Performance Web-based GIS Solution

The telecommunications industry is changing rapidly, resulting in tough competition and an ever-increasing scope of services offered to customers. Managing the many business challenges of a telecommunications company requires a good understanding of the underlying network infrastructure and all the various components.

No one understands this issue better than Royal Dutch Telecom (KPN), the largest telecommunications company in the Netherlands. Several years ago, KPN Telecom launched a project to digitize all its cable TV, Internet, phone, and other network location information. The goal was to give network planners and maintenance personnel an efficient way to view KPN Telecom's underground network infrastructure. This capability would reduce design and repair costs as well as enhance customers service.

The problem was that KPN Telecom's traditional, analog system was slow, expensive, laborious and unreliable. In addition, the master image archive had several satellite archives, which further slowed performance and caused data management problems.

KPN Telecom ultimately partnered with GIS solutions leader, Intergraph and integrator E-Norm to digitize KPN Telecom's more than 240,000 wiring location images and to develop an application, known as SCAN (short for SCANNING AANSLUIPNET), to retrieve those images from anywhere in the Netherlands.

### SCAN: HOLLAND'S FIRST WEB-BASED GIS

SCAN is an intranet-based geographic information system (GIS) that digitally stores and retrieves

KPN Telecom's network component images and maps them to exact geographical locations for planning, design, and maintenance purposes.

The SCAN project went live in January of 1998 and was in full production by June of 1998, making KPN Telecom the first Dutch company to digitize its geographic archive on this scale and in such a short period of time. The digitized images of KPN Telecom's network are stored centrally in Groningen, Netherlands, on Oracle databases, running on 13 Intergraph ISMP 660 servers, five of which are web servers.

Today, SCAN provides 3,000 KPN Telecom employees in 65 different offices with a unified view into the entire underground network infrastructure. Before SCAN was implemented, KPN Telecom relied on hard copy maps housed in 13 locations across Holland. Now to get important network information requires only seconds, whereas before it took days.

Using a standard web browser, network planners, designers, and maintenance personnel throughout the Netherlands can view all the cable lines for planning, installation, and repair purposes. All location data can be retrieved by file name, address, or postal code and street address. This allows planners to select a region and get

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back a map image for a specific address in order to identify the precise location of underground telephone cables.

Designers can also collect information about the existing infrastructure in order to make decisions about making enhancements. In addition, field repair people can use the data when they need to extend or split a cable line.

### The Need for High Performance

Not long after implementing SCAN, KPN Telecom recognized its exceptional value as a key application to reduce costs and improve operational efficiency.

However, as a strategic application, SCAN gave KPN Telecom a new set of challenges. First, the number of SCAN users would undoubtedly grow. Second, the application would continually evolve and require updates on an ongoing basis.

The expected high growth of concurrent users and increased application functionality meant timely system performance was critical. For example, if planners or maintenance personnel querying the system have to wait, the entire cable installation and maintenance process is delayed.

The delays would only get worse as more and more users are added to the system. And with plans to add substantial numbers of users across Holland, the potential for a system meltdown loomed high.

Beyond productivity, performance is important from another aspect. When a non-KPN Telecom organization needs to dig a hole, for example, to install lighting or cabling, they typically call KPN Telecom to get the specific location of the KPN Telecom cable to avoid damage. KPN Telecom needs to be able to respond to the request within three days, because if any damage occurs after the three days, KPN Telecom is liable for the damage.

In addition, with substantial anticipated new modifications and enhancements to the SCAN application, KPN Telecom had no idea how each new update would impact the production environment.

"We knew every new software update to the application could introduce performance problems to the system," said Jelte Kampen, SCAN project manager at KPN Telecom. "But we couldn't quantify or predict performance issues. That's why we began to look for a load testing solution."

According to Kampen, load testing was the only way to know when you are ready to introduce new software releases to potentially hundreds or thousands of concurrent users.

### The Search for a Solution

In searching for a load test solution, KPN Telecom focused on a set of defined requirements. First, KPN Telecom needed the flexibility to scale the number of users over a defined range in order to characterize the application's performance.

In addition, KPN Telecom needed a solution that could accurately emulate a real-world production environment. In other words, they wanted to measure system response exactly as users would experience it under various system loads.

Finally, KPN Telecom needed a solution that could be implemented quickly and was easy to use. This required a product that minimized ramp-up time and that would not burden users with extensive training and a steep learning curve.

### KPN Telecom Selects Rational PerformanceStudio

KPN Telecom evaluated several load testing tools before selecting Rational PerformanceStudio, Rational's performance testing solution that allows development organizations to accurately test applications under production load prior to deployment.

According to Kampen, several factors led them to Rational PerformanceStudio.

"After evaluating other solutions, it was obvious that Rational PerformanceStudio was the only solution that fit



The SCAN web application, which displays 240,000 wiring diagrams and other geospatial data across all of The Netherlands.



all of our predefined criteria, including realistic user emulation, flexible configuration capabilities, and unsurpassed ease-of-use," says Kampen. "Besides its robust functional features, Rational PerformanceStudio was incredibly easy to set up and easy to use versus other load test tools."

Another consideration that led KPN Telecom to select Rational was its service and support. "Rational's on-site support and service is excellent, which is key for a European company working with a software vendor based in the U.S.," explains Kampen.

### Predictable Performance

When KPN Telecom first started using Rational PerformanceStudio, the initial objective was to determine the performance characteristics of SCAN. As Kampen explains, "Before even testing any new releases to the SCAN system, we wanted to see what kind of linear performance degradation the system would experience as more and more users are added to the system. Plus, we wanted to gain insight into the limits of the system. In other words, what is the maximum load the application can handle?"

With Rational PerformanceStudio, KPN Telecom was able to easily put SCAN through the paces in a controlled environment. KPN Telecom gradually added users in order to characterize the application's performance under load.

KPN Telecom saved the test scripts and results, which provided them with a baseline for comparing new versions

of SCAN and for predicting performance when introducing new software updates to the production environment.

### Answering the Question: Are We Ready to Release?

With a performance baseline established, KPN Telecom was then able to focus on expanding SCAN's functionality while ensuring high performance quality.

"Rational PerformanceStudio gives us the confidence to know when we are ready to release a new software version to production," says Kampen. One example Kampen points to is when KPN Telecom finished development on the second version of SCAN, which contained a lot of completely new enhancements. "This was a major new release that not only introduced several new features, but would be running on a new web server. We had no idea of how the new enhancements would affect performance," says Kampen.

Using Rational PerformanceStudio to test the new release, developers experienced severe performance degradation with only two or three users. Rational PerformanceStudio's analysis tools allowed KPN Telecom developers to quickly pinpoint the problem within the database.



"The Rational PerformanceStudio tools made it possible to bring out the problem in a controlled environment and to help identify the cause," says Kampen. "Had we released the software to production without this tool, we would have shut down the entire system."

### **Breakthrough Features for Real-World Performance Testing**

Kampen points to a number of key features that he finds particularly useful within Rational PerformanceStudio. "The overall advantage is that PerformanceStudio enables us to measure response times exactly as the users will experience them."

To achieve this, Rational PerformanceStudio allows testers to vary the number of virtual and GUI inputs at the same time, enabling developers to analyze and forecast what levels of performance users will see from the application under different system loads. Rational PerformanceStudio accomplishes this by representing desktop clients as "GUI users," which are actually remotely-controlled PCs that perform the exact tasks as a user would. At the same time, server load is driven by "virtual users," which are software processes that emulate the population of users to create realistic load on the server.

"This is a particularly important feature, especially when you have Web environments where it's difficult to predict the number of users that will be on the system at the same time," says Kampen. "And with a system like SCAN where over 50,000 images are accessed every day and more than 2,500 diagram updates occur daily, it's crucial to get a good grasp of the system's performance."

Another way the application helped KPN Telecom emulate real-world conditions is through a feature called data pooling. "If the application simply retrieves the same record or the same drawing, you are merely exercising the system's caching mechanism, and are not getting a real approximation of how the application will perform in the real-world," explains Kampen.

"Rational PerformanceStudio's data pooling feature lets us force the application to retrieve different drawings and images for each query, thereby making the test realistic."

According to Kampen, Rational PerformanceStudio's ease of creating scripts is another extremely useful feature. "Not only are the test scripts easy to create, they are also very simple to edit for your purposes. Which means you can easily introduce variables that will provide results that provide additional insight into the performance characteristics of the application."

### **Staying at the Forefront**

KPN Telecom plans to continue to make full use of Rational PerformanceStudio.

"As an organization with a strong reputation of consistent quality, and innovation, KPN Telecom has to continually focus on efficiency and its customers," says Kampen. "And Rational PerformanceStudio will help us ensure the highest possible performance for strategic applications such as SCAN."

Kampen concludes, "We're pleased with the results so far, and we look forward to leveraging Rational PerformanceStudio to keep us on the leading edge."

### **Rational Software Corporation**

**Corporate Headquarters**  
18880 Homestead Road  
Cupertino, CA 95014

**Toll-free:** 800-728-1212

**Tel:** 408-863-9900

**Fax:** 408-863-4120

**E-mail:** [info@rational.com](mailto:info@rational.com)

**Web:** [www.rational.com](http://www.rational.com)

### **International Locations:**

[www.rational.com/corpinfo/worldwide/locations.jtmpl](http://www.rational.com/corpinfo/worldwide/locations.jtmpl)

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