

Highlights

Company

Lucent Technologies

Business Challenge

Replace terminal interface to mainframe running switch testing software with a more robust, easy-to-learn and graphical user interface

Solutions

Java application dubbed JUICE, downloadable via the Lucent intranet, manages multiple user sessions and mainframe resources

Hardware/Software

- Sun Ultra workstations
- JDK 1.1.7 and Java 2 platforms
- JFC/Swing GUI components and Java Help API
- Freeware Java Telnet library
- Inprise's JBuilder IDE for screen prototyping
- InstallAnywhere from ZeroG Software

Key Business Results

- More productive test environment
- Graphical display of test monitoring and setup
- Easier to create & modify a test configuration
- Weeks saved by faster training

Future Benefits

- Updates to JUICE to be automatically downloaded from Web servers
- Synergy with port of EES test environment off Amdahl mainframes onto Sun workstations and servers

Lucent Technologies

JAVA TECHNOLOGY IS LEVERAGED TO CREATE INTUITIVE GUI FOR ROBUST BIG SWITCH TEST ENVIRONMENT

INTRODUCTION

Based in Murray Hill, N.J., Lucent Technologies is a leading supplier of communications systems and advanced products and technologies. In fiscal 1998, the company posted revenues of over \$30 billion and currently employs more than 130,000 people worldwide. In the expanding global communications market, expected to total \$575 billion in 2000, Lucent is uniquely positioned to succeed by virtue of its history as an innovator. The company's scientists have been awarded over 800 patents during the last year alone.

In the spring of 1997, Lucent launched an initiative to build a modern, graphical front-end, known as JUICE (Java User Interface for Common EES), used in its Execution Environment System (EES) for testing its industry leading switch, the 5ESS*-2000 Switch. The '5E' is a universal, high performance switch that provides voice and data switching for local calls, long-distance calls, Internet access, wireless personal communications services, advanced intelligent network services, and interactive video and multimedia. For the past several years, the 5E has reigned supreme with its established leadership position for quality and reliability. The 5E has been named by Telephony magazine as the most reliable of all digital switches, several times more reliable than its nearest competition.

To build JUICE Lucent tapped Strategic Technology Resources (STR), a Sun Authorized Java Center in Chicago. The JUICE application, written entirely using Sun Microsystems' Java development platform and developed on Sun workstations, controls a robust testing environment that itself runs on several Amdahl mainframes. In contrast to its predecessor - a character-based test environment interface with command line invocation of individual tests, JUICE offers a user-friendly GUI for Lucent's hundreds of test engineers.

The JUICE application illustrates how Java technology is helping to simplify the user interface to a complex testing environment for the telecommunications industry while supporting platform portability and enhancing ease of maintenance.

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BACKGROUND

Lucent's 5E switch is the standard industry workhorse, combining hardware and specialized software that ensure millions of calls get connected each day. It is a custom switch that is configurable based on user requirements.

When new services are introduced such as call waiting, voice mail or toll free 800 service, software engineers at Lucent in the Switching and Access Solutions group write the specialized code that implements these new features within the 5E. Lucent's software engineers then test the new features using the EES environment, which provides a much faster and less expensive alternative to physical lab based testing. The current EES environment runs on Amdahl mainframes under the Unix-variant operating system called UTS.

“The Java platform presented several unique advantages for building the new front end on this particular system... We were able to use Java technology to add value in an extremely intimidating technical environment.”

*– Larry Podmolik, CTO,
Strategic Technology
Resources*

ONE MORE ADDED TWIST

Over the past decade, two different branches of the EES test environment were developed and maintained, one for international and one for U.S.-only switches. The original release of EES was designed to run on AT&T 730 terminals. Over time, U.S. users migrated to 730 terminal emulators running on Sun workstations. By contrast, the international version of EES was modified to support X-terminal emulation and provided a slightly different set of features. As the code bases diverged, the cost to maintain both versions increased.

In the past few years, software engineers have asked that features from the U.S. version be implemented in the international version, and vice versa. Thus management concluded the two interfaces for EES should be unified into a common code base, reducing mainframe costs and enabling the software to eventually be ported to another platform (e.g. Solaris).

THE JAVA PLATFORM FITS THE BILL

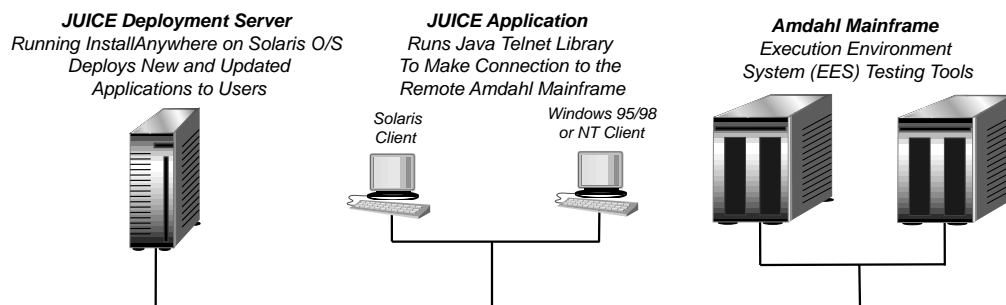
“The Java development platform presented several unique advantages for building the new front end on this particular system,” said Larry Podmolik, chief technology officer at STR. Since the 5E code is highly complex, and evolved over a long period of time, the JUICE developers used a variety of techniques to interoperate with legacy applications, minimizing changes to the existing systems. “We were able to use Java technology to add value in an extremely intimidating technical environment,” noted Podmolik.

DEVELOPMENT EFFORT

The visual interface for JUICE was carefully modeled by the STR developers to promote intuitive operation and ease of use. The Amdahl-based EES software was treated as a black box by the JUICE developers. “Creating a user experience that's as straightforward as possible is what's important,” said Jim Loverde, lead developer at STR. The team used Inprise's JBuilder IDE to prototype certain screen designs, migrating to a custom application framework based on Sun's JFC/Swing components for the production application. They also used the Java Help API to integrate detailed online documentation describing major JUICE features and functions. Development was done using Sun Ultra workstations and Sun's Java Development Kit (JDK) version 1.1.7 which later migrated to the Java 2 platform.

DEPLOYMENT

For most Solaris clients, JUICE is installed on a shared network drive by administrators, and runs like any other shared application (e.g. Netscape). On other platforms, JUICE is configured via an installation applet created with ZeroG Software's InstallAnywhere product. InstallAnywhere is a signed applet that installs the application code and VM to the local machine's hard drive. Thereafter, the JUICE application runs just like any other client application. A critical component of the software architecture is a 100% Java telnet library that is used by the JUICE application to communicate with legacy applications running on the Amdahl mainframes. The telnet interface allows many user interactions with the mainframes to be "scripted," automating repetitive tasks and allowing users to execute more sessions in parallel.



Lucent Technologies' JUICE **Java User Interface for Common EES**

An average of 150-200 testers may be active on any given day. When JUICE is started, it establishes an initial connection directly to the Amdahl mainframes. After entering their login and password, the user is logged into the Amdahl with the environment initialized to the user's customized configuration and the tools started appropriately.

JUICE is able to receive real-time updates on what processes are running on the Amdahl at any given time. Software engineers can receive graphical updates on the progress of each of their particular test processes with just a few clicks of the mouse.

RESULTS

JUICE provides a unified view within its desktop control panel of over 30 individual tools in the EES test emulation environment. JUICE is easier to navigate, provides better context for the test environment, and is more highly automated than the character-mode interface. For example, graphical representations indicate what processes are running and which have halted due to a debugger breakpoint. If a tester is in character mode and a process halts, the tester must check the state of the session manually in order to detect it. With JUICE, a tester will be automatically provided with a visual representation of when processes are halted.

JUICE also enhances the testing process by automating the checking of dependencies. Test components must be run in a specific order. If one segment is not running, the downstream segment that depends on it could produce inaccurate results - unbeknownst to the tester. JUICE ensures that dependencies are checked and invokes all the components that are required in the appropriate test sequence.

JUICE saves weeks of time in training new testers. "Learning JUICE is significantly faster than learning the command line interface," said Loverde. Lucent initially plans to support both the command line and the graphical user interface environments. As the company's large base of testers gradually migrates to JUICE, it is expected to become the standard user interface for the EES testing environment.

FUTURE

Development of JUICE began in the spring of 1998. Now the first version is feature complete and is in the final test and debug phase. JUICE was delivered with its merged code base (U.S. & international) in the first quarter of 1999.

Lucent is now investigating porting the EES test environment off the Amdahl mainframes and onto Sun workstations and servers. Analysis indicates that a large percentage of the testers were actually running a small subset of the test suite, capable of being handled by a series of Ultra 10 workstations. For the remaining set of tests that would require more processing power, more powerful Sun servers would be deployed. The migration effort is ongoing.

Lucent Technologies

Lucent Technologies, headquartered in Murray Hill, NJ, designs, builds and delivers a wide range of public and private networks, communications systems and software, data networking systems, business telephone systems and microelectronic components. Bell Labs is the research and development arm of the company. For more information about Lucent Technologies, visit the company's Web site at <http://www.lucent.com>.

Strategic Technology Resources (STR)

As an innovative consulting firm and a Sun Authorized Java Center, STR partners with its clients to deliver practical business solutions in fields such as telecommunications, finance and supply chain management. With years of experience in object, web and Java technologies, STR understands how to create next-generation systems while reducing risk and preserving investments in existing resources. STR is dedicated to providing superior planning, implementation and training services that give its clients a competitive edge and a clear path for growth. For more information about STR and its services, please visit the company's web site at <http://www.str.com>.

Sun Microsystems

Since its inception in 1982, a singular vision, "The Network Is The Computer," has propelled Sun Microsystems, Inc. (NASDAQ: SUNW), to its position as a leading provider of high-quality hardware, software, and services for establishing enterprise-wide intranets and expanding the power of the Internet. With more than \$9.5 billion in annual revenues, Sun can be found in more than 150 countries and on the World Wide Web at <http://www.sun.com>.

"We expect JUICE to increase the productivity of our experienced testers and also simplify the training of new users. We have had an excellent experience working with STR and Sun's Authorized Java Center program in building this application."

– Sandy Kipp
Lucent Technologies
Technical Manager

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