

FIRST LOOKS: INSIDE PC LABS



## Thin Is In

**If you want to deploy a thin-client solution over your company's wide area network, bandwidth matters. We found significant performance differences at slow connection speeds.**

In response to the rising cost of managing distributed desktops, businesses are revisiting a more centralized and managed computing strategy using thin clients.

At PC Magazine Labs, we conducted a study of several thin-client solutions available today using Ziff Davis's i-Bench 1.02. Because i-Bench is Web-based, it lends itself well to cross-platform benchmark testing. We have found varying performances among Windows- and Unix-based solutions under various network conditions.

Although thin-client computing resembles a return to the days of mainframe computing, users can no longer be satisfied with dumb terminals that input and output ASCII text. Users today are accustomed to more sophisticated graphical user interfaces. Delivering raw screen pixels, however, requires bandwidth that most of today's network environments can't afford. To overcome this, thin-client systems use a remote display protocol to relay the display information from the server to the client efficiently.

We evaluated a variety of thin clients under various network conditions. To simulate today's Internet-oriented, business-use

scenario, we used i-Bench's Load Text-Based Pages test, which bombards the display subsystem with rapidly updating screens of text and graphics. In a LAN environment (100 Mbps and 10 Mbps), all of the solutions we tested performed comparably to a personal desktop.

As thin clients become more widespread outside of LAN environments, their performances at slower network bandwidths

must be considered. Some application service providers even offer thin-client service over the Internet via T1, DSL, ISDN, or telephone lines.

As we lowered the bandwidth to a T1-like speed (about 1.5 Mbps), performances began to diverge. Among the Windows-based solutions, Citrix MetaFrame 1.8 for Windows 2000 was the clear winner at lower bandwidths. The noticeable improvement in Windows 2000's Terminal Server over Windows NT TSE is due to the upgrade in Microsoft's Remote Display Protocol.

The Unix-based AT&T VNC registered the fastest speeds at the high and low bandwidths, but it achieved its good result at low bandwidth by skipping screen updates. Unlike the other platforms, VNC is open-source and available free. The Sun Ray 1 system, which was the only thin client tested that supports true-color display, performed well compared with other systems that used fewer color depths. But we couldn't readily configure it for lower bandwidths.

For a more comprehensive report on our thin-client research, visit [www.columbia.edu/~nieh/research/thin](http://www.columbia.edu/~nieh/research/thin).—S. Jae Yang and Jason Nieh

