Can virtual desktops replace traditional computer labs? A project underway at multiple Ohio institutions is looking to determine just that.

What's it's found so far--among other things--is that most end users consider the experience comparable to--or even better than--their "home" computing experience. The latest findings of the project were presented at an academic cloud event put on by IBM in North Carolina's Research Triangle Park.

"VDPilot" was initiated by a group of college and university CIOs in Ohio that turned to OARnet, the Ohio Academic Resources Network, which runs an ongoing VMLab testbed. Funding for the broader effort came from the National Science Foundation as well as VMware, Dell, and IBM.

Desktop virtualization technology has come a long way since the days when the products were doing not much more than "screen scraping" and sending back input signals from the keyboard or mouse. Now, the user expects a rich experience that involves extensive delivery of video and audio and interaction with other high-end, resource-hungry software. Commercial and open source developers have addressed that appetite by developing more sophisticated products that encode data in more intelligent ways and use multiple channels for different kinds of user activities and content delivery.

The Pilot: Sorting Out Shared Infrastructure
According to Prasad Calyam, a member of the project team and a senior systems developer and engineer at Ohio State University, this kind of scientific study has never been done before. A primary motivation for examining the use of virtual desktops is to consider the technology as a replacement for the traditional computer lab.

"These buildings essentially have a limited number of seats. Also, those machines are not always upgraded. So you have students trying to go to the physical buildings and waiting in queues. When they want to work on homework that [requires] specialized software like Matlab or SPSS, they can't always run it on their laptops. So it's hard for students to access these applications," said Calyam.

He added that providing access to pricey software such as MathWorks Matlab and IBM SPSS has always been a logistical and licensing challenge for professors who want to train their students with "industry-standard" software. University CIOs are interested, he said, because the use of virtualization may be able to reduce the footprint of physical computing sites and offset some of the costs.

The idea of the VDPilot project is to sort out the issues involved in using shared infrastructure, Calyam explained. OARnet implemented a virtual desktop cloud infrastructure that provides faculty and
students with remote access to lab software using thin clients over the Internet.

In the initial phase of the test, which ran from September to December 2011, volunteers were asked to compare the experience of doing specific tasks on Excel, Matlab, SPSS, Windows Media Player, and Internet Explorer from a computer in a physical lab versus using a remote client.

OARnet set up two virtual desktop environments, one using VMware View and the other using open source Apache Virtual Computing Lab (VCL). Both environments shared a file server and Active Directory for user authentication. The user environment for the virtual desktop in both cases varied; however, most users ran Windows 7 while on a wired network.

After doing a fixed set of tasks, participants filled out a short survey exploring their preferences. Half of them found the virtual desktop user experience to be comparable to their home computer experience. Seventeen percent said they couldn't tell the difference between home and virtual. Eight percent found the virtual platform better. Only 25 percent preferred the home computer experience.

Those users who worked on the VMware platform were consistently happier with the performance of each of the applications they tried overall than those on the Apache platform; however, both groups found their experiences more than satisfactory.

**Expanding the Research: The Issue of Licensing**
The next step in the pilot will be "objective tests," in which participants will run either an Apache or VMware program consisting of multiple pre-programmed tests. The results of those will be analyzed by OARnet to determine how network conditions affect user experience.

In future phases, the project team will examine additional virtual desktop-oriented challenges, including software licensing, how smaller schools with fewer resources of staff and funding can exploit virtual desktop technology, and the use of federated authentication.

"One of the biggest challenges in the classroom lab is licensing," Calyam said. "All of these vendors who build these very sophisticated industry-standard [programs] don't want to give away their licenses in virtual environments. [During the first phase of the pilot], some vendors said they wouldn't support the software in a virtual environment. Some said they needed a very precise list of who was using it, when they were using it. They were very concerned about the duration of the pilot. So one of the biggest topics as we go forward is to discuss with vendors how they see the future of licenses in virtual environments."

Calyam is also hoping to gain wider participation of colleges and universities in Ohio. "Most of the institutions that participated were fluent in virtualization. But the people who really need virtual desktops are those who can't afford to hire staff or don't have the money to set them up," he said.

He also anticipates investigating the use of federated authentication for virtual desktop access. Sorting that out would enable institutions to share the expense of setting up a centralized cloud service to deliver virtual desktops, whether it were to be hosted by OARnet or a third-party company or run on a distributed data center architecture.

Larger schools, including Ohio State, are already beginning to experiment with virtual desktops, Calyam said. "Maybe in the next year or two, we might see a more concerted effort to consolidate all of these individual pilots into something that's more statewide. But I would say at this point there is progress and there is interest from many organizations."
About the Author

Dian Schaffhauser is a writer who covers technology and business for a number of publications. Contact her at dian@dischaffhauser.com.

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