Leveraging Statewide Virtualization And Emerging Technologies To Improve Education

April 23, 2012
Internet2 Spring Member Meeting

Ann Zimmerman, OARnet
Matthew Honigford, VMware Consultant for OARnet
Prasad Calyam, Ph.D., Ohio Supercomputer Center/OARnet
David Pike, The Ohio State University
Ohio Board of Regents creates OARnet.

1987

Acquire dark fiber to create a highly scalable, fiber-optic infrastructure.

November
2004

Today
2012

1,850 miles of network backbone.

Future

Expand through grant partnerships; increase capacity to 100 Gbps.
Details: VMware Purchasing Agreement

• Pilot/Phase 1 – Sept. 29, 2008 to Sept. 28, 2011
• Phase 2 - Sept. 29, 2011 to Sept. 28, 2013
  – Signed by Ohio Board of Regents and The Ohio State University
• Commits $6 million in sales
  – $3.2M state/local governments
  – $2.3M higher education
  – $750,000 ODE/MCOECN (K-12)
• Features full suite of VMware products that includes:
  – All Ohio four-year and two-year campuses
  – K-12 schools
  – State and local governments
  – Related health care communities
Phase II Savings for Ohioans

**Pricing**
- 63% discount on list prices for software
- 35% discount on list prices for maintenance

**Direct Savings Expected: $25.4M**
- Significant cost reductions in physical IT hardware (servers, desktops) budgets
- Significant reduction in operational and maintenance costs

**Indirect Savings Expected: $155.5M**
- Positive environmental “Green IT” impact, because of lower use of energy and space
OARnet Impact to VMware

• Created the foundational template for leveraging statewide consolidated purchasing agreements
• Provided licensing to organizations with tight budget constraints
• Consistent thought leadership and sharing with peers
• Provides valuable feedback on products and services
Expanding Education Use Cases for VDI

### Classrooms & Training Labs, Task Workers
- Rapidly provision new desktops
- Ensure consistent user experience across sessions
- Improve security with centralized control and management
- Reduce cost of managing the desktop environment

### Faculty/Student Owned IT
- Deploy and manage a desktop image on employee or student owned assets
- Centrally control desktops and data
- Separation between campus/personal desktop

### Remote Campuses/ Distance Learning
- Deliver desktops across a variety of locations
- Centralize management of desktop environment
- Reduce cost associated with supporting a diverse student populations

### Libraries and Kiosks
- Full support for kiosk mode
- Provision one pristine image for universal usage
- Predicatable user experience
- Low management overhead for IT
Virtual Desktop Pilot Project Overview

• Initiated by Ohio Board of Regents-CIO Advisory Council
  – Extends our ongoing VMLab efforts
  – http://vmlab.oar.net

• Goal: Pilot a “virtual desktop cloud” infrastructure that provides faculty and students with remote access to lab software using thin-clients over the Internet

• Tested open-source VCL and commercial VDI solutions

• Expected outcomes for universities
  – Assessment of user experience
  – Analyze cost savings because of shared resources
Motivations for Virtual Classroom Labs

Access to expensive, computational software such as SPSS and Matlab is a logistical and licensing challenge.

Students
Need pervasive access to software, and have trouble obtaining a license and installing the software correctly on home computers.

Faculty
Want to manage lab exercises, assignments and exams; use e-mail to send and receive large files; limited in ability to access and assist students’ with work.

CIOs
Want to use federated shared infrastructure resources that would simplify classroom lab computing for faculty and students, and reduce costs for universities.
VDPilot Testbed Setup

Architecture enables anywhere, anytime computing
Virtual Desktop Pilot Project Overview

- Each user given access to a VCL and VDI virtual desktop to compare “going” to a lab versus remote login
- Phase I user testing: Sept. 22 - Dec. 8, 2011
- VDPilot Website – [http://vdpilot.oar.net](http://vdpilot.oar.net)
Registered Users

- 36 total registered users
- 11 participating institutions

Ohio Supercomputer Center

Ohio Technology Consortium Member
User Workflow

1. User registers at VDPilot website and requests VCL/VDI virtual desktops
2. User receives an email from OARnet with virtual desktop login information, testing instructions and link to a survey
3. Testing instructions guide user through subjective and objective testing of virtual desktop user experience
4. After testing ends, user fills out a survey on VDPilot website
   - Connection details (wired/wireless, client OS)
   - Subjective opinion scores
   - Other feedback
Subjective Testing Methodology

• Participants evaluate user experience for the following test applications
  – Excel
  – SPSS
  – Matlab
  – Windows Media Player
  – Internet Explorer
Virtual Computing Lab Pilot Report Results

### Preference Comparison Based on OS and Connection

- **None Specified (Wired)**: 50%
- **None Specified (Wireless)**: 8%
- **Mac OS X (Wired)**: 25%
- **Windows XP (Wired)**: 17%
- **Windows XP (Wireless)**: 17%
- **Windows 7 (Wired)**: 25%
- **Windows 7 (Wireless)**: 8%

### Pie Chart

- **Either**: 50%
- **Virtual Better**: 22%
- **Home Better**: 25%
- **No Response**: 12%

14
Virtual Computing Lab Pilot Report Results
Results: User Feedback

I liked the fact that VCL is open source; the VCL setup seems like it could be a decent substitute for my home machine.

I would prefer VDI if the desktop was persistent so I could continue working on the same desktop from anywhere.

The testing process went well, documentation was easy to follow, and only took me 20 minutes.

It was a bit slower (virtual compared to physical desktop), but it would be great for students to have access to programs from houses and dorm rooms, since downloading it to laptops proves to be a challenge...

Word works better than I expected; I think it (VCL) is a better fit for us than VMware View. I believe it would allow for the use of physical systems in labs that are locked after hours. Thanks for setting this up.
Lessons Learned

- Well-provisioned networks key for usability
- “Open” versus “Proprietary” solution trade-offs
- Licensing challenges
- Economic viability
- Dire need exists in education community
Next Steps

• Discuss with application vendors regarding licensing
• Increase the number of participant institutions
• Add federated authentication for virtual desktop access
• Re-run pilot with a distributed data center architecture
Questions?

Ann Zimmerman  
OARnet  
annz@oar.net

Prasad Calyam, Ph.D.  
OARnet/Ohio Supercomputer Center  
pocalyam@oar.net

David Pike  
The Ohio State University  
pike.58@osu.edu

Matthew Honigford  
VMware  
mhonigford@vmware.com

David Pike  
The Ohio State University  
pike.58@osu.edu

Matthew Honigford  
VMware  
mhonigford@vmware.com

David Pike  
The Ohio State University  
pike.58@osu.edu

Matthew Honigford  
VMware  
mhonigford@vmware.com

1224 Kinnear Road  
Columbus, OH 43212  
Phone: 614.292.9191  
Service Desk: 1.800.627.6420

www.oar.net  
@oarnet  
www.facebook.com/oarnet