Soup to Nuts: Affordable Tools for Building and Maintaining Labs

Jason Wagner
University of Rochester
Hoyt Hall
Rochester, New York 14627
1 585-275-0517
jason.wagner@rochester.edu

ABSTRACT

Limited IT funds are a fact of life at most institutions. You may be surprised by how much you can do with what you have though. Using new products in conjunction with tried and true existing technologies you can take steps to maintain both your bottom line and your sanity at the same time.

Obtaining a competitive price for your computing hardware is the easy part. We're going to go beyond that and work on building a "champagne" lab on a "beer" budget.

What components go into building a lab that can wow your customers without driving you crazy you ask?

•Deployment Tools: Ghost and ASR

•Software Security: DriveShield, MacShield, KeyServer

•Maintenance: PC-Rdist, Group Policy

•Facility Security: Web Cameras, Access Control Readers

•Printing: Pharos

•Affordable tech laden lecterns: touch panels and processors and multimedia projection

All of the above components have been used at the U of R to create successful and affordable labs. You can use some or all depending on what you need, and many institutions already have parts of these solutions in place. Knowing what's out there and how to bring it all together is the challenge.

Categories and Subject Descriptors

K.3.1 [**Computer Uses in Education**]: Computer assisted instruction

K.6.5 [**Security and Protection**]: Invasive software, Physical security, Unauthorized access

General Terms: Management, Measurement, Performance, Design, Reliability, Security.

Keywords

Computer Labs, Computer Classrooms, Classroom Technology, Imaging, Deployment, Security, Management, Printing

1. INTRODUCTION

The University of Rochester is a private research university located in Rochester, New York. With 4,500 undergraduates, 4,000 graduate students, 1,000 faculty members and 13,000 employees spread across six academic divisions including a teaching hospital, the University is a very diverse and dynamic environment. Information technology at the University is spearheaded by a central IT organization, Information Technology Services (ITS), under the direction of the CIO. Academic Technology Services (ATS), a division of ITS, leads technology support and innovation for the College of Arts and Science, the primary undergraduate division of the University. Classroom Technology Services, a pillar of ATS, is charged with supporting 168 non-enhanced classroom spaces, 14 auditoriums and lecture halls, as well as 7 computer labs and classrooms. For non-enhanced facilities, our group supports deliverable technologies such as portable XGA projectors and the like. For computing facilities, we support the end user, all the way from the desktop, to the server and across the network. Supporting and designing enhanced and technology filled spaces for learning is the strength of both our vocation, and our avocation.

Transforming a group of computers into a functional classroom for students and faculty can be a daunting task. The most expensive investment in the equation is you, and your time. You can spend your time and money wisely though and be successful, or you can spin your wheels and spend your days fighting fires.

2. TOOLS YOU CAN USE

Software Deployment: Having been successful in the past using Pyzzo's PC-Rdist, we were dismayed to climb the mountain that Windows XP seemed to present for deployment with PC-Rdist. Instead, we returned to our old friend Norton Ghost, but with a new ally, the DVD-R. Rather than hammer your network or carry around 10 CD's, our images can fit on 1-2 DVD-R's. Create a "master" machine with all of the software and settings you like and seal it with Sysprep. Capture the image on your DVD burner and you're off and imaging in no time. As for Macintosh, we use a similar process with Apple Software Restore and an external FireWire drive. We long for the days when RevRdist and PC-

Rdist made this easier and are eagerly searching for their replacements.

Security: So now that you've imaged your machines how do you keep them they way you left them? One school of thought is the use lock down policies that prevent users from installing anything or using the machine to its full potential. At the other end of the spectrum, there are administrators who leave themselves, and their equipment wide open to any type of use and frequently, abuse. What if there was a way that you could offer the user the appearance of a wide open computer, where they could do whatever they wanted, only to have the machine restore itself on a reboot? This ability exists in a cross platform software package called Driveshield (or Macshield on that platform) made by Centurion Technologies. Using a partitioned hard drive, the user's changes are effectively wiped out on a restart, and any data they saved to the machine is moved to an accessible temp directory. Desktop shortcuts like, "My Documents" are re-mapped from C:\ which is protected to D:\ which is not shielded. So how do we keep the other partition clean if it isn't shielded? That's where our old friend PC-rdist comes in again. While it didn't play well with the XP registry, it works fine for clearing files. So anything moved from C:\ to D:\ is wiped out after 48 hours. Should the files be of a special type like .exe, .mp3, .vbs, etc, they are deleted immediately by PC-rdist, which is called by a login script. There is also a very handy server side to Driveshield, the "Network Control and License Manager", or NCLM. Using scripting and the server side of the NCLM, you can manage your machines from anywhere in the world via TCP/IP.

Software security is provided by Sassafras KeyServer, a veteran of SIGUCCS past presentations. We have loved and used their product for more than 10 years. If you are looking to justify your software expenditures, track usage, and secure your software at the same time, this is the ticket for you. The latest releases offer a wealth of data that has allowed us to demonstrate just how much our hardware and software is used with firm scientific numbers.

Given the frequency of Windows updates, we are planning to implement an SUS based Group Policy which will keep all of our PC's up to date with the latest patches. This is very high on our to-do list.

Anti-virus protection is provided by a University wide site license for TrendMicro Office Scan. This self-updating software, combined with Driveshield has made our labs and classrooms nearly virus free.

Printing: Another headache common to labs and classrooms is student printing. The sheer volume of printouts, left unchecked, can drain both your budget and your time. At UR, we have adopted the Pharos pay for printing system. Students are given $10.00 in a printing account tied to their student ID. When a student prints a job, it is sent to a queue on a release station, where the student uses their ID to select, pay for, and release their print job. This system has led to drastic reductions in printing in our public facilities. Our largest student lab's printing volume dropped from 40 boxes of paper per month to an average of 18, a reduction of more than 50%. Black and white print outs are priced at $.08 per side, $.14 for duplex, and $.50 for color images. Once a student has used up their initial $10.00 in printing funds, they can use a web interface to add money to their printing account, charged to their term bill. Visitors who need to print are able to purchase copying/printing cards from wall mounted stations. A staff of students was established to deal with jams and other service related issues. We do not offer refunds, except in the rarest of cases, but do reprint jobs for free as needed.

Classroom Equipment: We have been fortunate to adopt a modular approach to several of our computer classrooms. Using lecterns made by Smart technologies, which use a self-contained video/audio switcher and speakers, as well as shelf space for a host of a/v equipment. The lecterns have enough room to store the PC, a VCR, and a DVD player. We have also upgraded our models to include a Crestron MP2E digital audio/video control system and touch panels. A grant program exists for the lecterns, reducing the cost significantly. While we use the lectern with a ceiling mounted projector, it is possible to make the projector an integral part of the lectern, thus permitting delivery of the entire unit in an otherwise non-enhanced classroom. We have standardized on Sharp digital projectors in all of our classroom facilities. This makes bulb inventory easy to maintain. The SMART lecterns were built in a fashion over a period of two budget cycles. We purchased the lecterns themselves in one year, and added the DVD, VCR, and touch panel capability the next year.

Facility Security: So how do you protect all of the equipment and time you've invested in your classroom? We use a two tiered approach. We have discovered a wonderful Linux powered web based video camera system made by Stardot technologies of California. We use two cameras in each room. One captures the "face shot" as someone enters the room, while another camera rests in a corner of the room and monitors the overall activity using a wide angle lens. The cameras are positioned and secured such that they may not be tampered with without capturing the image of the vandal on one or both cameras. The cameras record by IP to servers located across the campus. The feeds are visible to as many or as few people as you like, and may be exported in a media player friendly format for use by authorities in prosecuting offenses. For part two, nearly all of our computer lab doors use a Lenel card reader system. Using a student's ID card, the very same used for printing, the student swipes their card and is permitted or denied access based on the availability of the room. Their swipe is recorded in a database maintained by UR Security. If we detect anything amiss in the lab, we check the video first, and can then request the door swipe records for identification purposes and cross-referencing.

Physical security of the machines is attained by cables and locks from Secure-It. For purposes of our sanity, all locks are keyed alike. We have also identified a new locking mechanism from Flex Guard to secure our flat panel displays using the Secure-It cabling already in place.

3. WHAT'S NEXT

Software Deployment: We are actively looking to restore the "push" model of operation that we had using Rdist technologies. Some candidates identified thus far are Altiris, and NetOctopus by Netopia. Advances in Group Policy and SUS should permit the rapid deployment of security patches and MS Windows updates. The timetable for selecting and implementing these ideas is the summer of 2004.

Security: We expect to continue and advance the use of Driveshield and Macshield into more avenues of our operations. The use of the Network Control License Manager will be increased as our scripting skills evolve to automate even more processes during off-hours. Additional scripting on Macintosh will be used to cleanse the temporary drive akin to what PC-Rdist does for us now. The reporting tools in the newer versions of KeyServer continue to impress us. As we produce additional and new types of KeyServer data, sorting now not just by application use, but by computer use, specific application use by seat, facility, and additional similar permutations. Using this data we can track patterns of usage of applications, computers, and facilities.

Printing: After an introductory implementation of the "first $10.00 of printing free" the administration will be dropping this subsidy. We may also rescind the financial benefits of duplexing by charging $.08 per impression, regardless of duplex or simplex printing. These changes are intended to balance the books of the printing system implementation, which did involve significant capital investment in equipment. Color printing will most likely be offered in additional locations as a value added service.

Classroom Equipment: We expect to increase the use of SMART equipment and lecterns. Being both compact, affordable, and mobile, these lecterns have been an excellent solution for UR. Having infrastructure in place now, the presence of both wired and wireless touch panels and control systems will increase. We will also be taking advantage of advanced features of the affordable Crestron MP2E processor. Using Crestron "E-Control" we will be able to assign an IP address to the video/audio processor and manage its switching over the web. In the past, staff would have to be dispatched to individual rooms to troubleshoot in-class audio or video switching problems (E.g. my laptop won't display with the projector). Using the combination of webcams and E-control we can both see into the classroom, a well as seeing the interface the instructor is using to control the switching remotely.

Facility Security: We have recently placed in service a Stardot Express 6 server which takes the place of a time lapse VCR which recorded the feeds from six ADT closed circuit security cameras. The Express 6 is IP based, and converts the camera feeds to a web viewable MPEG stream. This stream is recorded to our server's hard drives using digital video recording (DVR). The success of Stardot products at UR has seen us increase from 1 camera to more than 20 in two years. There have been no thefts of equipment from any camera equipped room thus far.

4. THE TAKE HOME MESSAGE

The moral of the story for us has been to adopt proven, affordable, modular technologies. Rome wasn't built in a day, and neither were our classrooms. The products and processes you see here were assembled over the course of at least three years. Some champs like KeyServer go back more than a decade, but there always seem to be folks for whom it's new. Remember to include your faculty in your design and selection process. If you can design a room with their input that they love to use, you'll gain a fan, and an advocate for instructional technology.