

# Liberating Lab Computing: Building a Stable yet Flexible Computing Environment for Students and Faculty

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## ABSTRACT

Indiana State University has found a way in its 25+ computing facilities to combine the need for a central stable lab image and small support staff with the academic needs of flexible software choices. This paper is unique in that it combines the diverse perspectives of central information technology with those of an academic unit. Through combining *Reborn Card* hardware technology and *Ghost* imaging software, Indiana State University has created a powerful computing environment that produces a win-win situation giving students a consistent look and feel across colleges and schools yet accommodating enough to meet the specific needs of faculty in disparate disciplines without adding additional personnel or breaking the technology support budget.

## Categories and Subject Descriptors

K.6.4 [System Management]: *Centralization/decentralization, Quality assurance*

**General Terms:** Management, Performance, Reliability, Security, Standardization.

**Keywords:** Public Labs, Departmental Labs, Classrooms, Workstation, Maintenance, Windows 2000, Windows XP, Ghost, Reborn Cards, Symantec

## 1. INTRODUCTION

Indiana State University (ISU) is a doctoral granting public institution with a student population of 12,000. Until recently lab computing was fragmented into public labs, open departmental labs, and smaller application specific clusters throughout campus. This created an environment in which students were presented

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*SIGUCCS'03*, September 21–24, 2003, San Antonio, Texas, USA.  
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with multiple computing environments from operating systems, desktop look and feel, and software choices. Faculty and students were frustrated with learning different login routines, icon placement, and software availability within the labs on campus.

This is not a localized phenomenon. By its very nature colleges and universities are complex organizations with unclear goals, competing priorities, expanding missions, and challenges in leadership in an environment where IT has limited authority. These complexities impact personnel responsible for lab management to provide a stable computing environment that is flexible to accommodate the unique and divergent needs of academic units.

Within the context of ISU, the number and type of student accessible labs is numerous. Table 1 displays the number of public labs. Table 2 is a sample of specialized labs and clusters within just one academic building. It is important to note that the 479 public lab computers are supported by a single full-time individual with the assistance of four part-time student workers. The 87 computers within the School of Education are supported by a graduate assistant under the direction of a full-time staff member.

**Table 1. Public Computing Lab on the ISU campus**

Location	Seats	Academic Function
SCC 100	56	Open 24/7 Lab
SCC 106	52	Computer Classroom
SCC 126 / 127	36	Computer Classroom
Science 134	41	Computer Classroom
Arena C65	22	Computer Classroom
Nursing 209	29	Computer Classroom
Fine Arts 112	21	Computer Classroom
SB 307 / 308	50	Computer Classroom
SE 107	37	Computer Classroom
SE 120	21	Computer Classroom
Tech 212	53	Computer Classroom
Root 017	24	Computer Classroom
Cromwell	37	Computer Classroom

**Table 2: Sample of Departmental Labs and Clusters in the School of Education**

Location	Seats	Academic Function
SE 106	24	Portfolio Development
SE 119	23	Faculty / Staff Training
SE 414	6	Communications Disorders
SE 614	6	School Psychology Testing
SE 1320	22	Statistics
SE 1510	6	School Counseling

This complexity in management is further exasperated in the Schools of Business and Technology by the faculty requirement that students have full access to the Windows operating system. This complicated the ability to manage the labs with group policy and other lock down tools that are available with such products as Microsoft SMS, Novell ZENworks, Faronics Deepfreeze, Citadel WinShield Secure PC and Centurion Guard.

This paper will describe the process and current tools used at ISU to manage its public and departmental labs using *Reborn Card* hardware technology and *Ghost* imaging software. Using these tools ISU has created a powerful computing environment that produces a win-win situation giving students a consistent look and feel across colleges and schools yet accommodating enough to meet the specific needs of faculty in disparate disciplines.

## 2. STANDARDIZATION

The Office of Information Technology (OIT) at ISU had been interested in creating standardized computing environment for faculty, staff, and students for the past eight years. Two advisory committees (Information Technology Advisory Committee (ITAC) and Microlabs) have been working with OIT to help bring order to hardware purchases, software selection, and support on campus.

Three events in the summer of 2000 helped bring focus to standardizing hardware and software for student access. First, ITAC approved the institutions implementation of the Microsoft Campus Agreement. This agreement provided university owned machines with an entire suite of Microsoft products. The student portion of this agreement was added the following summer granting students the ability to have the software on personally own computers. This agreement also moved faculty members away from a multitude of productivity software packages that were in use across the campus. Second, ITAC approved a minimum hardware requirement for computer purchases and strongly suggested the purchase of computers from two vendors. In three years the number of computers on campus has greatly increase yet the types of computers has decreased, creating a manageable support environment. Finally, Microlabs, the committee responsible for advising OIT on the public computers labs, broadened its mission to look at support of the numerous departmental and specialty labs on campus. The common thread in all these events was creating a common environment for students in all labs settings.

## 2.1 Software Standardization

By the summer of 2003 several packages had been selected for inclusion on student accessed computers. The following products are installed on all university owned computers: *Word*, *Excel*, *PowerPoint*, *Access*, *Publisher*, *FrontPage*, *Internet Explorer*, *Netscape Navigator*, *Adobe Acrobat Reader* and *McAfee Anti-Virus*. In addition, all computers login to the ISU networking using the Novell client. Several specialty applications with limited licenses were made available on student accessed machines through *Key Server* (a license management server). These packages include *Adobe Photoshop*, *Pagemaker*, and *Pagemill*, and several statistical applications including, *SPSS*, *Mini-Tab*, and *SAS*.

## 2.2 Hardware Standardization

With the university buying machines in bulk from a single vendor this process has significantly reduced the overall cost of new machine purchases. In addition, a rotation process for both public and departmental labs has been created to move older machines from high demand and performance labs to lower usage labs. This process has also reduced support costs in the labs. Creating an environment in which technical support personnel only need to support a few models. By the summer of 2003 the labs at ISU only contained four models. In addition, with the reduced number of models ISU has been able to negotiate a better maintenance contract for hardware repairs.

## 3. TOOLS

Six years ago the first coordinated effort was put in place to support the public labs on campus through the use of PC-Rdist. PC-Rdist is designed to synchronize the files and registry data for each computer on the network with a master image located on a file server. The program will update a variety of Windows OS machines. PC-Rdist incrementally updates the files that have changed. [1] In addition, Phoenix ImageCast was used to rollout new images.

This initial effort was a good start, but being a software solution was slow in restoring machines to its original state. Also, a few students began to by-pass PC-Rdist not allowing the machine to perform maintenance after each user's session. As a result reimaging machines became a daily routine. In addition, the technical knowledge required to support PC-Rdist use in the departmental labs as well as the time commitment to setup the initial PC-Rdist images was not available in the academic units.

In the summer of 2002 a new solution needed to be found to create a computing environment for students that had a consistent look and feel across colleges and schools yet met the specific needs of faculty. This solution was obtained by combining the hardware of Lenten's *Reborn Card* and the software of Symantec's *Ghost*.

### 3.1 Lenten *Reborn Card*

The Lenten *Reborn Card* is a hardware solution for maintaining the machine image. The card will allow users to have administrator rights to the operating system on the machine without fear of malicious and unintended destruction of the machine's image. Upon restart of the machine the card will revert

all changes made by the user back to the original setting. In addition, this restore process is nearly instantaneous and will be invoked whether the machine has been properly shutdown or not. The card is relatively small and only takes up one PCI slot. Figure 1 is a photo of a Reborn Card.



Figure 1 Reborn Card

The other benefit of the *Reborn Card* is the ease of administration of the image. After the image is created student workers without extensive technical knowledge can manage the computer's image. Installation is also a snap. With little training as Figure 2 presents, the installation process has an express or custom option for installations supporting both novice and expert users.

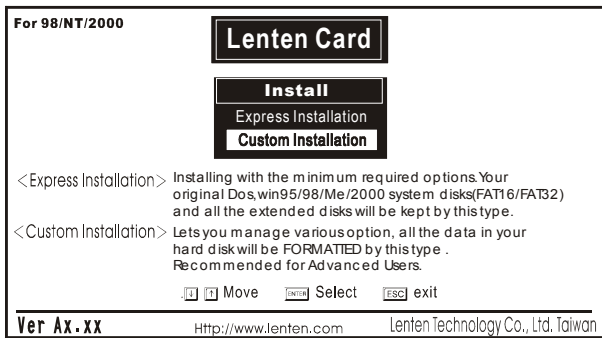


Figure 2: Initial Installation Screen [2]

Another attribute of the *Reborn Card* is the ability to manage multiple partitions and operating system on a machine. This hardware can replace software partition management solutions (e.g. System Commander). Figure 3 shows the partition management screen within the *Reborn Card* administration screen.

The ease of administration makes this solution practical for departmental support staff to easily update and maintain the image. Within the context of this paper the School of Education's labs are primarily supported by a single graduate student once the master image has been created.

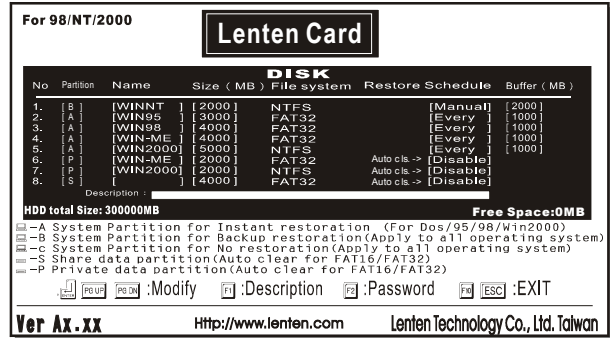


Figure 3: Partition Management [2]

### 3.2 Symantec Ghost

After the master image was created a product was needed to push it out to all the lab machines. Initially ImageCast was used for this purpose. However, the unpredictable performance of the product, given some of ISU's network infrastructure issues, forced ISU to look at other solutions. Ultimately, Symantec *Ghost* was chosen because of its consistency in performance.

Using the two products together, a centralized common image can be modified by departments to meet the needs of faculty and students. The Symantec *Ghost* was used to push out the image to lab machines and the *Reborn Card* was used for the daily maintenance of the lab machines. In addition, the Reborn Card allows a single machine to update an entire lab using SNCOPY (Serverless Network Copy) by pushing the updated computer image out to the lab machines. The menu screen was set to display for only 1 second and menu hotkeys disabled to prevent users from tampering with the settings. This forces the machine to run only in User mode and any changes made will automatically be changed back once it is rebooted.

A recent survey in the fall of 2002, students' satisfaction was high when asked about the quality of computer labs on the ISU campus. In the survey of 147 students the ISU labs received a GPA of 3.26. Ninety-Two percent of the students who responded gave the labs a grade of 'A' or 'B'. Seven percent rated the labs as "average", giving them a grade of 'C'. [3]

## 4. OTHER INITIATIVES

Several initiatives have received windfalls from the work that has been done in the labs on campus. The "Media Friendly" or "Smart Classrooms" are now all equipped with the *Reborn Cards*. With over 50 of these rooms on campus maintaining a consistent image was difficult. Using the *Reborn Cards* gives the classroom computer a stable image and the ability to have two partitions. On one partition faculty can install software and modify settings with all changes remaining on the system after reboots, the other partition is a static image that can be modified but will revert back to the original setting upon reboot. Faculty feedback has been very positive about the stability of these classroom computers.

In the student union several computers were setup and dedicated to portal and email access. These kiosks or email stations were equipped with *Reborn Cards*. This provided a stable environment for students to work.

In the summer of 2003, Grant Street Software's *SD Deploy* is now being used to support the ISU Handheld Computing Initiative in which two labs of portable handheld computers were purchased for classroom instruction. *SD Deploy* is a hardware solution that allows the support personnel to use a Secure Digital (SD) Card to configure Palm handheld computers. When the handheld computers are returned from being used in a classroom the support personnel just insert the card and let *SD Deploy* copy the new configuration to the Palms. There is no need for a Desktop or HotSync cradle to reset handheld computers. [4]

Leveraging Novell *ZENWorks* on campus computers is another initiative being explored. Technical support on the ISU campus is working on students and faculty having roaming profiles so desktop information can be moved to any machine on campus. This in combination with the Reborn Cards will provide a stable yet customized desktop for users. This will be tested in the fall of 2003.

## 5. CONCLUSION

Until recently lab computing was fragmented into public labs, open departmental labs, and smaller application specific clusters

throughout campus. A solution was combining the hardware of Lenten's *Reborn Card* and the software of Symantec's *Ghost*. This combination gave students a consistent look and feel across colleges and schools yet accommodated the specific needs of faculty.

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