From VTs to iMacs:
Moving public computing access into the 21st century

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ABSTRACT
In a Collegiate setting, technology must be functional, effective, and highly visible. In the fall of 1999 the CIS department at Bowdoin College saw the need for a greater number of publicly available computers. A "Technology Kiosk" was needed where members of the community could have walkup access to e-mail, the Internet and other applications in an easily accessible non-lab setting. The existing stations represented a mixture of VT Terminals and older Macintosh computers. The proposed upgrade of systems allowed not only for hardware replacement but also rethinking the entire paradigm. Cutting edge technology such as thin client and wireless could be considered, and the design of Kiosk spaces themselves could be reworked in the process.

There were a number of factors that need to be considered in this Kiosk, including cost, security, speed, manageability and ease of use. This paper will follow the decision process from start to finish and discuss how each of the factors were analyzed and weighed in our decisions concerning platform, location and software suite. Our decision to implement iMacs running OS 9 Limited user security functions will be discussed in depth as well as the various other competing platforms and technologies.

This paper is designed for anyone who has to design or implement public computing solutions in the academic environment.

Keywords
IMac, Video Terminal, Kiosk, Thin Client, Public Computing, Security

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1. BACKGROUND
Bowdoin College has several high traffic areas that are key locations for information access. In the past these were the common areas that typically had a campus telephone. Many years ago video terminals were put in place in these areas to provide walk up access to mainframe systems, primarily for email access.

When it became clear that an upgrade of the existing technology was needed we identified the following areas that required either upgrades or new installations of the chosen solution.

Existing public terminals areas

- Student Union (Café, Grill, Convenience Store, Mail boxes and mail room, Gym)
- Moulton Union (Student Records, Career Planning)
- Some dormitories

Areas to expand public computing into:

- Druckenmiller Hall (new science center)
- Searles Hall (new math, computer science, and physics building)
- All dormitories large enough warrant expense

Over the past four years each incoming group of students have represented another class arriving on campus with increasing numbers of personal computers. Now virtually every student brings their own computer loaded with either Windows or the Mac OS. We know they are not bringing video terminals to hook up in their dorm rooms, so the old VT access to email and other applications increasingly foreign to each arriving class.

With AOL, HotMail, free Yahoo, Excite and other email accounts the GUI and web browser are the primary method for accessing information. In response to this need Bowdoin College implemented a new web based email interface in 1998. The new kiosk solution would be based upon supporting this interface.

2. REQUIREMENTS

Public computing needs to be several things:

- Discreet in footprint, profile, and visual impact.
- Accessible
- Secure
- Stable
- User friendly

With these considerations we knew we had to work within some existing limitations. For instance, the old VTs were installed on workbench height, shallow depth tables or wall-mounted shelves. This arrangement limited space but kept the stations discreet, and out of the way while maintaining accessibility in high traffic areas. We required the chosen solution to have a similar footprint to the old VTs for the reasons stated above.

Our next question became where to locate VT replacements. We used three ways to analyze the need:

- Examine existing buildings and volume of traffic
- Ask the community (an informal survey of students and faculty was performed)
- Where are the current VTs located?

Security concerns cross boundaries between software and hardware. Physical security is a primary factor due to the possibility of theft and damage. Unauthorized access to campus resources and system stability are concerns for the software on the computer.

Uptime, uptime, uptime! As always we desire crash proof, hack proof, user proof platforms.

How many choices? At the outset of the project we decided to limit the stations to web and telnet access in most locations with other software added if appropriate for the location. With fewer choices the casual and the expert user both have immediate access to the computer station's designed purpose. When a user walks up to the terminal we want the user to automatically know which applications are available and how to access them without needing to dig through any particular OS imposed hierarchy.

3. THE DECISION PROCESS

The decision process for this project began with the needs listed in section two. These needs began to drive an application decision. A limited software choice on the new kiosk stations was a key decision. Limiting the stations to just a few key applications keeps the traffic flowing and the lines short. The college chose Netscape for web browsing and email access to IMAP accounts in 1998. Netscape Communicator is the choice for individual's desktops, but for the kiosk we chose the stand-alone Netscape browser since we have web enabled email. By using Netscape's stand alone browser we would never have the concern of user profiles proliferating the hard drives or implementing roaming Netscape profiles.

We wanted the kiosks to provide access to a telnet session for those people who feel more comfortable with the quick and easy character cell email readers Elm and PINE. We have standardized on a telnet application on both Macintosh and Windows, our major platforms.

A user friendly, stable and secure OS platform is key in a public computing station. The choices for us were Macintosh OS 9, Windows9x, and perhaps Linux. We weighed the pros and cons of each:

Mac OS 9 Pros

- Local and remote management
- Excellent security features
- Easy implementation of above features in existing infrastructure

Mac OS 9 Cons

- Greater ownership of Windows platform among student population
- No protected memory

Windows 9x Pros

- Greater ownership among students
- Greater hardware variety

Windows 9x Cons

- Poor built in remote management
- Poor built in security
- No protected memory

Linux Pros

- Protected memory
- Low system requirements
- Excellent security possibilities

Linux Cons

- Difficult management of security
- Lack of platform familiarity
- No existing college wide standard exists for Linux

The operating system choice was decided against the pros/cons and available resources. Kiosk management both local and remote was a key factor in our decision. Ease of use is always a top consideration for public computing stations as well as security. The OS decision process is summarized below:

Linux provides great security opportunities but at the same time greater potential security risks. Remote management, while possible with a virtual network client (VNC), is not nearly as robust as solutions on other platforms that we already own or use. Although Linux is crash resistant with protected memory, the user interface is still too foreign and inconsistent for our users. These factors dropped Linux from our list of choices.

Windows 95 is a significant platform on our campus and benefits user familiarity. Ease of use is not an issue because of the high degree of familiarity with the platform. We liked the fact that we had several choices in hardware design, however, there were none that seemed to offer a significant advantage in the design of a public computing station. Finally, we eliminated Windows because the Macintosh OS provides both better management capabilities and easier user security options.

We chose **Macintosh OS 9** because the community is familiar with it and finds it easy enough to use. Though Windows has good security and management functions it cannot be described as easy or simple management. We also have existing solutions that provide robust remote management and security for the Mac OS.

One downside of choosing the Mac OS is that our choice of hardware was limited. We did not consider this a limitation since the iMac presents itself as an ideal platform for a public computer station. It is a clean all in one design with few cables, it has a small footprint, securing the machine is easy with security cables, and the performance is excellent for its price point. We chose the entry level iMac because we did not need the DV capability offered in other models.

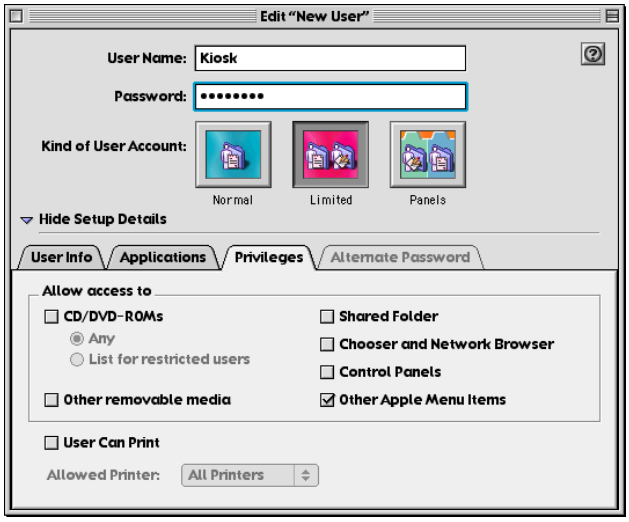
4. METHODS OF IMPLEMENTATION

After making our OS and hardware choices many pieces of our implementation were in place. A few pieces remained to be designed for the kiosk station. These include:

- How would we image the computers?
- How would we limit access?
- What level of security would these require?
- Would we want to and how would we remotely manage?
- How would the kiosk screen present choices to a user?

We have been using a product called Assimilator to image our Macintosh computers. This allows us to set up new computers identically and to refresh computers automatically on a daily basis. The refresh compares the current computer's hard drive to a hard drive image stored on a server and corrects anything that may be different on the local machine. This solution has been great for our regular labs. It is easier to manage than RevR-dist and simpler to implement. We have not had time to look at Macintosh Manager that has been updated with Mac OS X Server.

Mac OS 9 shipped with a basic implementation of multiple users. While basic in comparison to Unix or Windows 2000 multiple user support OS 9 has simple and powerful restrictive qualities. There are three types of users on Mac OS 9: Normal, Limited, and Panels. Panels, the most restrictive, introduce a full screen tabbed window environment that we felt would be unfamiliar to the end user. A Normal user is given full access to all settings on the computer, sort of like having root access. A Limited user on the other hand lets the Administrator set plenty of restrictions while maintaining the traditional Macintosh interface.

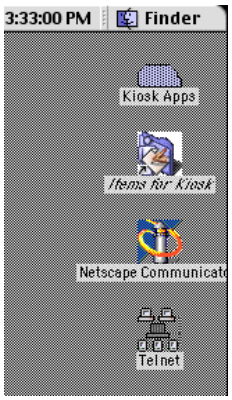


We chose to restrict access to CD-ROMS, all printers, network file server browsing, and the Control Panels. The limited user by default can only write documents in its own folder, cannot modify the System Folder, and cannot drag any applications to the trash. If users do download items from the web they are simply wiped away by the next Assimilation.

Apple Network Assistant allows us to remotely manage all public Macintosh computers. This implementation is similar to Timbuktu in allowing us to completely control the computer in a window from our desktop. We can add or remove software, manually delete items, change settings on several machines at once, and reboot machines if needed.

The user interface challenge was to show the user what applications were installed and how to access them. There are several possible states the computer could be in when a user first approaches the kiosk. Here is a summary of various states we chose to control.

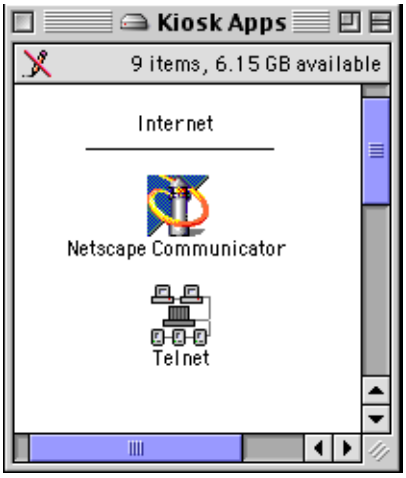
1. If a user walks up to the computer and there are no windows open the desktop gives a clue about what to do next (we assume people will double click):



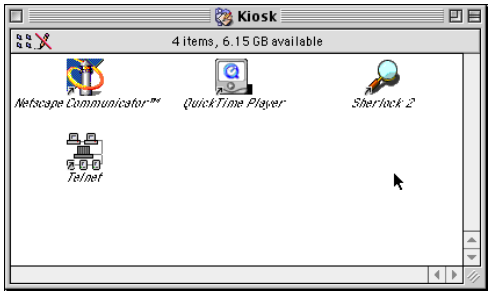
The desktop icons are not actually shortcuts/aliases to the applications, but rather, they are document files for the associated application. We did this because not all users are familiar with the

right hand process menu on the Macintosh OS and we cannot rely upon the Application Switcher menu to be up on the screen without complex scripting which would introduce too many chances for failure. If these files were aliases/shortcuts and an application was open but hidden with no open windows, a double click would simply bring the application forward. To Windows users this is sometimes confusing since there is no window that appears. Making these application documents helps all users bring the application forward with a new window opening at the same time that we can control depending on current campus activities.

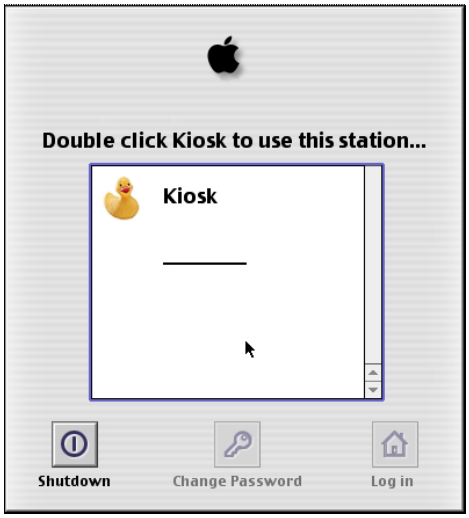
2. If the user double clicks the hard drive, named "Kiosk Apps" they are presented with another view of the application choices (also application documents instead of aliases):



3. The user setting of "Limited" automatically creates a folder on the desktop called "Items for <username>" whose view we also chose to control. We could not find a way to remove this folder so we decided to control the contents.



4. Finally, if a machine is logged out of the Kiosk account or recently booted up then the user sees a slightly modified login screen (courtesy of ResEdit). The solid line below the word Kiosk is actually the administrator's account, which is password protected. The administrator account allows us local access to the machine if needed.



We hope these controlled views will guide all users to a successful utilization of our Kiosk stations.

5. SUMMARY

After rolling out the new iMac kiosk stations approximately one year ago we have found the solution to be very successful. The platform is stable, secure, and easy to use. The machines are rarely rebooted. We have had excellent feedback from students and faculty and there are always lines at the stations. There have been multiple requests for similar kiosks in new locations.

In the future we will consider a type of thin client solution as the technology matures. The college is currently investigating wireless solutions that would increase the possibilities for public information kiosks without the need for new Ethernet ports.

6. ACKNOWLEDGMENTS

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