

Acton Public Schools

Analysis of Multi-Platform Deployment In Support of Educational Needs

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Acton Public Schools is currently evaluating the need for additional infrastructure to replace the current inventory of 450 computers over the next 4 years. In the course of this evaluation, questions concerning the use of Apple Mac OS X versus Microsoft Windows have arisen. Specifically, this report is looking at what infrastructure would be needed to support these 450 computers and what impact to IT and teaching staff the added technology may have.

The existing 450 computers currently consist of 22% Windows and 78% Apple Mac. The initial deployment will include 125 computers for teachers; the needs for the remaining computers will be determined during the first year of implementation. An attached document shows the breakdown of current K-12 inventory.

In order to produce this report, a group of personnel met with a consultant in order to create some baseline assumptions agreed on by all. This group consisted of representatives from IT, Technology Integration, Elementary Principals, and the Central Office. This report is very specific to Acton and Acton-Boxborough's existing infrastructure, staff, and processes and should not be taken in any generalized context.

The baseline assumptions are as follows:

1. Acton and Acton-Boxborough Schools are already a multi-platform environment. Computers running Windows, Apple Mac OS 9, and Apple Mac OS X are running at all levels of the district, including the High School Graphic Arts department.
2. The IT Staff already supports all of these systems, though at varying levels of service.
3. Some infrastructure to support the Apple Mac OS X systems has already been purchased and is providing a minimal level of services compared to those provided to Windows systems.
4. Any solution should build on the existing infrastructure and talents of the IT staff with as little impact to already established processes as possible.
5. Any solution should also contain the best capabilities and ease of use to allow the teaching staff to provide the highest possible learning experience to the students and maximize limited class time.
6. Having multiple platforms does require added effort for deploying additional software and policies. The IT staff members currently spend most of their time working with Windows systems and thus are more proficient in the support of them. With the right tools and training, the highly capable technology staff can become proficient in both in order to minimize the added effort.
7. Any cost analysis should take into consideration the needs over the next few years. Even if only 125 computers are initially being purchased, the cost for 450 computers should therefore also be discussed.
8. The client hardware was chosen based on the most cost-effective model that had minimum capabilities (Core 2 Duo processor, DVD R/W, Wireless A/G, and 80gb HD). The Apple laptop had a base configuration that exceeded some of these requirements.

The actual costs need to be looked at in a variety of categories based on the areas of infrastructure and people they pertain to. These categories are discussed below. Where possible, actual dollar amounts have been specified. However, some “soft” costs can only be talked about in terms of percentages or estimated days of time. A final cost analysis is provided at the end of this document.

Centralized Authentication Services and Policy Management

Centralized Authentication Services allows the district to provide a username and password to each student and faculty member. That credential would be the same for all network services the individual would want to access, including computer login, e-mail access, intranet websites, and wireless computing. With a decentralized approach, the various network services might use a different username and password for each person causing them to have to remember which credential to use with which service.

Policy Management allows sets of configuration information to be pushed down to each workstation based on its role or the person logging in. A change to the policy could be made on a central server and would automatically take affect across the district. As an example, one policy might state that any computer in the graphic arts lab should be given access to a specific color printer. Another policy might state that when a student logs into a computer, it automatically connects to a network resource that allows them to hand-in homework or retrieve assignments from a teacher’s class-specific repository.

In Acton and Acton-Boxborough, the servers required to do both centralized authentication services and policy management already exist to support both Windows and OS X platforms. However, the Windows services are fully redundant to prevent a server outage from affecting services. The OS X services are not currently redundant and should be to support the number of machines proposed.

To provide redundancy, an additional Apple Xserve should be purchased and configured to support Apple systems. The cost of this server prior to any discounts is approximately \$3,800 plus 2 days (\$1600) of consulting time for setup and configuration.

Network Document Storage Services

Network-based document storage allows a student or faculty member to sit down at any computer in the district and have access to their documents. If a student starts working on a document in a classroom and wishes to finish it later, they would not have to return to the same computer that might now be in use.

In Acton-Boxborough, network document storage already exists for students and teachers through a set of file servers. This storage is currently only being used for word processing, spreadsheets, presentations, and other similarly sized documents. It is not currently set up to support the storage of large multimedia files. The separation of regular documents and multimedia will not change at this time and thus any solution should take that into account. Also, it has been found that the current server supporting APS is not sufficient for the proposed quantity of clients. The purchase of a new server has already been budgeted for and thus will not be included in this document.

The newly purchased server will provide more overall storage for teacher and student documents. This server will be able to better support OS X users with the addition of a third-party

product that adds Apple file services to a Windows server. This product has already been purchased for all other document storage servers in the district and has a cost of \$4,600 for an additional unlimited license and a \$1,500 maintenance fee.

System and Software Deployment

When dealing with large numbers of computers, the normal method of installing operating systems and applications on each piece of hardware can be time consuming. To solve that, technology exists which allows the IT staff to build a computer system once and then copy it to all of the other purchased machines. Advanced “enterprise level” versions of this technology also allow the ability to install additional software packages to a targeted set of computers. For example, if Adobe Photoshop were purchased for 10 computers in the district, the IT staff could copy the base software to the system and then layer Photoshop on top of that automatically. As new licenses of Photoshop were purchased, additional computers could be added to the targeted list. The IT staff member would not need to visit each computer to deploy the software allowing significant cost savings.

In Acton and Acton-Boxborough, such a technology has already been purchased years ago for the Windows computers. It is licensed on a per-computer basis and IT staff members have been trained on its use. Additional licenses would need to be purchased to support additional windows computers. The current price paid is \$6.45 per computer based on having at least 1000 licenses in the district.

An equivalent system was not purchased for the OS X computers because the number of units has thus far been fairly small. Instead, various “free” and low-cost software packages have been used to provide some, but not all, of the same capabilities. The largest drawbacks of the current low-cost system have been its lack of automation and integration between the various pieces.

With the purchase of a larger number of Apple systems, the IT Staff prefers a more scalable solution. A few products exist on the market and a more in depth evaluation needs to be done to determine the best for use here, but that is out of the scope of this document. Instead, we can provide a cost basis for budgeting purposes by looking at two of the better-known products. JAMF Software’s Casper suite is \$14.40 per computer for the initial product and \$14.40 for further years of support and upgrades if needed. LANrev’s Client Management suite is \$30 per computer for the initial product and \$4.50 for further years of support and upgrades if needed. Both companies provide installation and training services for approximately \$5,000 plus travel and expenses (~\$1,000).

Virus Protection

Virus and other malicious software protection are well known in the Windows world. While the need for virus protection has been less prevalent in OS X thus far, that will most likely change in the future. Any solution should provide for protection for either platform.

In Acton and Acton-Boxborough, the Sophos Endpoint Security and Control platform has been deployed. It protects all platforms in use including Windows, OS 9, and OS X. The software provides an easy client deployment method through its console for Windows systems. However, it does not provide an automated client install to Apple systems, requiring a separate solution such as the one mentioned above for System and Software Deployment. The cost of Sophos is per-computer and there is no difference in price between Windows and OS X computers.

System and Software Update Services

Both Microsoft and Apple provide regular security updates and bug fixes to their products including operating systems, productivity suites, and server tools. Ensuring that district computers are kept in sync with these updates is critical in stopping the flow of viruses, worms, and other malicious software. While software such as Sophos will get rid of a worm once it gets on a computer, these patches help close the holes that the virus writers use to infect systems.

In Acton and Acton-Boxborough, a Windows Software Update Server exists and fully monitors the Windows clients in the district. Apple has a similar Update Server that should be deployed as well. Apple's solution is not as automated as the Microsoft solution and requires the above System and Software Deployment tools mentioned above. The update software and installation costs are included with the Apple Xserve recommended for purchase already.

Training

Any solution deployed is going to require training. Whether Windows or OS X is deployed, the teachers will need to learn a new operating system and new software packages than what they may have used in the past or at home. The IT staff will need to learn new support tools and become more acquainted with a platform they rarely use.

The IT staff training is easier to put a fixed cost on. All of IT is already familiar with the Windows server and support tools that have been in use. Some of the staff members are also familiar with a portion of the OS X server and support tools. While training on Windows systems may not be required right away, the schools will most likely need to deploy the next generation of Microsoft software (Vista, Windows Server 2008) in the next few years.

For this reason, the following is an estimate of training for the IT staff:

- Training on any System and Software Deployment tool (2-3 days) - included in installation costs above
- OS X Client training (3 days on-site + travel) - \$5,500 for 7 people
- OS X Server training (4-5 days) - \$4,200 for 2 people

Any training would, of course, require the IT staff to be unavailable to the district in order to maximize their learning time. The training might be staggered where a portion of the department would be trained at the beginning and the rest are trained at a future session.

The teacher training required on the operating systems and productivity tools is most likely equivalent based on the number of teachers who are familiar with either Windows or OS X already. While it is important for the teaching staff to receive training on the use of any computers and software that is deployed, that cost is not being addressed here.

It is believed that there will be savings using Apple's iLife suite that comes standard with new Apple computers. This suite of tools allows the teachers to create compelling multimedia projects with very little training. CIO Magazine published an article¹ stating that creative professionals using an

¹http://www.cio.com/article/127050/Eight_Financial_Reasons_Why_You_Should_Use_Mac_OS/

Apple computer had a significant higher ROI on what they produced than their Windows counterparts. It is believed that the ease of use may save teachers approximately 15-20% of productivity. Since the Technology Integration department and Principals would like the teachers to spend an average of 1.5 hours a week on multimedia, this could add up to a savings of 2 days of time for each teacher over the course of the year.

Duplication of Effort

The deployment of new software and new policies will need to be done separately for each platform. This is because software packages are platform specific. If a new version of Adobe Flash player is released which supports a new educational website, both the Windows version and OS X version would need to be separately packaged and deployed.

It is hard to predict the amount of software that would be updated throughout the year for each platform or how many policy changes will need to be made to support the district's use of the computers. In addition to days spent in training, the initial year of deployment will also be one of learning for the IT staff as they use an environment that they may not be as familiar with. The initial training will help with that, but there will assuredly be some stumbling along the way just as there might be for someone learning any new skill. While one can argue whether one platform requires less maintenance than the other, it is important that we recognize in any budgeting of people's time that there will be allowance for this. It is believed that during the first year, we should budget for a 1 to 2 weeks of time per FTE.

Client Hardware

The client hardware listed here is based on research already done by the IT staff for the systems they felt best met the district's needs. While it may be possible to get a lower cost laptop from both Apple and Dell, this configuration is able to meet a minimum level of performance and features that will allow use over the 4 years needed. The analysis of purchasing versus leasing of the client computers was already presented in a previous report. Those numbers will be included below in the cost summary section.

<p>Windows Laptop:</p> <ul style="list-style-type: none"> * Dell Latitude D520, Core 2 Duo, 1.66GHz * 15" LCD (1400 x 1050 resolution) * 1 GB RAM * 80GB Hard Drive * Windows XP Professional * 8X DVD +/- RW optical drive * 802.11a/g wireless * 4 year on-site warranty w/accidental damage coverage * Microsoft Office 2007 Standard * 6-outlet surge protector * Carrying case <p>Total: \$1,559</p>	<p>Apple Laptop:</p> <ul style="list-style-type: none"> * MacBook, Core 2 Duo, 2.2GHz * 13.3" LCD (1280 x 800 resolution) * 1 GB RAM * 120GB Hard Drive * Mac OS 10.5 * 8X DVD +/- RW optical drive * 802.11n wireless <li style="padding-left: 20px;">Subtotal: \$1,199 * Mini-DV to VGA Adaptor (\$17) * 4 year on-site warranty (\$329) * Microsoft Office 2008 (\$59) * Carrying case (\$40) <p>Total: \$1,644</p>
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Conclusion

Based on the existing infrastructure and talent, the added dollar costs for deploying a multi-platform solution appear to be incremental. While the productivity is not a figure that can be easily quantified, it is important to take into account along with the deployment costs. In the end, the decision should be based on what fits best with Acton's teaching philosophies and will provide the most educational value to the teachers and students.

Cost Summary

	Year 1 OS X Deployment (125)	Year 1 Windows Deployment (125)	Recurring OS X (Years 2-4)	Recurring Windows (Years 2-4)
Infrastructure Additions				
Apple Xserve	\$3,819.00	\$0.00	\$0.00	\$0.00
Third-Party Apple File Services for Windows System and Software Deployment Suite	\$4,600.00	\$0.00	\$1,500.00	\$0.00
Software Deployment Suite Install + Training	\$1,800.00	\$806.25	\$1,800.00	\$806.25
Server Setup (2 days)	\$6,400.00	\$0.00	\$0.00	\$0.00
Client OS Training (3 days)	\$1,600.00	\$0.00	\$0.00	\$0.00
Server OS Training (4 days)	\$5,500.00	\$0.00	\$0.00	\$0.00
Sub-Total	\$4,200.00	\$0.00	\$0.00	\$0.00
Client Hardware				
Laptops (If Purchased)	\$27,919.00	\$806.25	\$3,300.00	\$806.25
Laptops (If Leased)	\$205,500.00	\$194,875.00	\$0.00	\$0.00
Implementation Costs	\$58,290.08	\$55,276.29	\$58,290.08	\$55,276.29
	\$6,250.00	\$6,250.00	\$0.00	\$0.00
Productivity Differences				
Extra time spent by 125 teachers	0 days	125-250 days	0 days	125-250 days
Extra time spent by 7 IT staff	35-70 days	0 days	35-70 days	0 days
Days of client training for 7 IT staff	21 days	0 days	0 days	0 days
Days of Software Dep. Training for 7 IT staff	14 days	0 days	0 days	0 days
Days of server training for 2 IT staff	8-10 days	0 days	0 days	0 days
Days of server installation by IT staff	5 days	0 days	0 days	0 days
Total Actual Infrastructure Costs (Purchased)	\$27,919.00	\$806.25	\$3,300.00	\$806.25
Total Actual Client Costs (Purchased)	\$211,750.00	\$201,125.00	\$0.00	\$0.00
Total Actual Client Costs (Leased)	\$64,540.08	\$61,526.29	\$58,290.08	\$55,276.29
Total Productivity Differences	83-120 days	125-250 days	35-70 days	125-250 days