



iBorrow

laptop borrowing scheme

iBorrow Technical Report (Client Environment)

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1 Introduction

The aim of this report is to document the technical issues the iBorrow project encountered when setting up the iBorrow client environment.

2 Client environment

The client technical team were given the task of sourcing a suitable mobile client that was robust enough for the student environment and able to provide a full suite of academic applications (including the internet) by using wifi (EduRoam), and thin-client technology.

The aim was to make the client as 'thin' as possible so that only a minimum operating system resided on the laptop unit. All application software was driven by the data centre.

3 Technical issues

The main technical issues are summarized below:

3.1 iBorrow client hardware

The original intention was to use true thin-client technology in the laptop, whereby an operating system is held within solid state technology and has no moving parts. In November 2008, we contacted four potential suppliers: Wyse, HP, Devon and NEC.

Of these four, only two (HP and NEC) managed to deliver a unit: HP 6720t and the NEC TCM270. Even these were not widely available and were sourced with great difficulty.

The NEC unit was of such poor build quality we had to send it back. The HP unit highlighted the following:

- Battery life - can be eight hours if a high grade battery was used
- Build – robust, specifically built as thin client notebook PC
- Heavy - over five kilos
- RDP 6.1 - no: requires XPe SP2
- Unable to upgrade - requires 1GB RAMDrive but HP provide only 64Mb
- Requires specialist server for software upgrades (Altiris).

The difficulty in sourcing the unit and upgrading the software without an alternative infrastructure made this an unpromising choice. The price of £500 plus meant it was an expensive choice. We decided to look at the range of netbooks running the Atom N270 processor, which were cheap (under £300), promised six hours battery life and one (ASUS 1000) came with a solid state disk drive (SSD).

3.2 Client operating system

CCCU is a Vista environment, and we wished to maintain this level of investment with the iBorrow scheme. This would not have been possible with the HP6720t (which came with XPe) and although we trialled Vista on the Atom chipset, it ran very slowly and was deemed unusable. Furthermore, getting this OS onto an 8GB partition was impossible and had to use the slower 32GB partion of the ASUS 1000. Vista was abandoned.

Standard XP also proved awkward in this environment, until we discovered an offshoot called Windows Fundamentals for Legacy PCs (WinFLP). We were able to optimize this

installation to be the leanest possible (it does not include IE for example) and place it on to a 8GB SSD.

Using the 8GB SSD was a big advantage to this project. If students were going to use the iBorrow laptops, they had to be robust and SSD technology meant that the disk drive was not a weak link.

3.3 Desktop environment

Students expect applications to be delivered in a fast and reliable manner. Using Microsoft's RDP 6.1 client within WinFLP (SP3) we had the gateway to using Terminal Server 2008 for the complete desktop. Using Server 2008 was important as this service gives better media and USB performance and has a Vista compatible interface.

The complete desktop was therefore provided from the data centre Terminal Server 2008. The client software was just a cut down OS which the user never actually interacted with. The laptops had an automatic login. This login (called `student') which ran a CCCU programmed shell to launch RDP and connect to iborrow-ts.canterbury.ac.uk.

3.4 Terminal services configuration

Six servers were configured: VMWare quad core with 16GB RAM.

Students' first interaction with the system was to log a terminal server session using their standard Windows AD account.

The RDP client was configured to accept external drives plugged in during the session.

However, the main configuration attribute was App-V. Just as we wanted the thin client to have a minimum application install, we did for Terminal Servers. The aim was to sequence all applications for this project to lower the maintenance costs and to have more than one application available (for instance Word).

The one App-V draw back was the use of 32 bit technology which, at the time of this project, was all that was available, 64 bit being in beta.

The terminal servers were load-balanced on processor activity. They were pooled using iborrow-ts.canterbury.ac.uk.

3.5 WiFi configuration

An early decision following from the development of the ASUS 1000, was that we were in a position to configure the unit OS, so that the user would have no interaction concerning the WiFi network connection.

By providing group policies that enable automatic enrolment to our domain through certification, and by launching local scripts (from an automatic local logon session) we could start an RDP session to our terminal server farm. Therefore, the first interactive screen the user saw was the login screen to a terminal server, ready for their domain account.

The main problem was the time it took for the auto-enrolment to finish. The automatic shell script was trying to connect well in advance of the certification being complete and was timing out.

Some timing `delays` in the script (along with some screen information to the user) meant that we usually gained a connection in under two minutes and often more quickly than that if the laptop was in sleep mode.

3.6 Client configuration

Maintenance of 200 laptops is not a light task and trying to maintain them through a WiFi connection makes the task harder still. Daily maintenance of these laptops concerned the collection of any stray units and returning them to the recharge trolley, where they would be plugged in to a PSU, lid closed (so no WiFi connection as this is sleep mode) and no copper connection.

If the units had been configured for WSUS and Anti Viral updates, the user could potentially have had a long time to wait before a useable desktop appeared as these would download on boot up. There was a high risk of the user abandoning the session as a result. So we decided that the units should be maintenance free, the local Xp OS would provide an RDP session and nothing else.

XP fundamentals (SP3) was installed with the minimum requirements. We excluded IE and, after much consideration, excluded anti-virus software on the laptop. As there was no interface for the user to the laptop, we considered this appropriate, the one area of concern being USB devices. As RDP was allowing local USB devices to be seen on a TS session, we considered that the anti-virus of the TS should suffice.

The one area we did not consider enough was the default sleep mode settings on battery charge. We went for a standard 10 minutes, but it became apparent that this was far too low, resulting in students losing connection while using the laptops. We changed the time to one hour.

3.7 App-V configuration/development

We purchased the necessary software assurance licenses for App-V over Terminal Services. The App-V environment was set up on VMware ESX following a UKC model:

Server 1: 1 x dual core 4GB RAM 40GB storage server 2008 enterprise 32 bit with SQL 2005

Server 2: 1 x dual core 4GB RAM 40GB storage server 2008 enterprise 32 bit with IIS

Server 3: 1 x dual core 4GB RAM 200GB storage server 2008 enterprise 32 bit (AppV content file share)

Server 4: 1 x dual core 4GB RAM 200GB storage server 2008 enterprise 32 bit (AppV management server)

Development of sequenced applications was done on a Core i7 workstation with 12GB RAM installed with VMware ESX. This environment was most efficient at being able to provide a virtualised server environment, enabling templates and snapshots for easy and quick development.

3.8 Client accounts

The students mandatory AD account was used. This was heavily redirected so that nearly all account files were stored on the users' network storage area, making the actual loading of a profile as efficient as possible. As a result there was no need for a separation of TS profiles from normal lab profiles.

3.9 Testing

As the building was not due for completion long before the laptops were made available a full testing environment was not possible. However, a temporary zone was erected in our workshop enabling PKI with WinFLP to connect to a Windows Radius server, and hence enable RDP to the terminal server.

WinFLP worked well and connection was within acceptable standards.

It became clear that there were certain client issues that needed to be resolved:

- 1) users were unaware of battery status at log on
- 2) shutting the lid of the laptop did not close a session.

CCCU programmed these events using Visual Basic. Battery charge could then be displayed on the login screen. XP does not allow for lid closure to shut down the PC (as it does in Vista), only a hibernation mode. As CCCU had already developed a service for workstation shutdown after 20 minutes of logged out inactivity, the code was adapted into logging off a user when detecting a change of state to hibernation mode with lid closure.

4 Summary

When the laptops started being used, it became clear that our original spec of 50 user sessions per TS was highly over optimistic. The best we could hope for is 25 sessions per server, and scale the number of servers accordingly. We started with three (constantly on 100% cpu usage) and doubled it. Providing a full desktop with internet is a large resource for the data centre.

AppV proved to be a more scalable solution and performed well. The University is looking into expanding this facility beyond iBorrow.

Future developments of the scheme could include looking into RDP7 (Windows 7) on the ASUS 1000. Beta trials showed good results on this Atom chipset.

We could also look into VDI to provide a more scalable and robust desktop, especially now that HyperV is officially launched.