

Chip PC Thin client proposal

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Detailed Project Description:

We intend to purchase, test, deploy and monitor usage of thin client computing devices. Thin clients work by providing just a display and input interface to a user session running on a server elsewhere. The thin clients we are looking at (Xtreme PC 6500NG devices from Chip PC Technologies) use less than 5% as much power as a traditional desktop computer and can significantly reduce energy costs for campus. Additionally, thin clients typically have no moving parts and due to being just a client to a larger server elsewhere, have a longer life span than a typical desktop computer, estimated to be at least 10 years

instead of the typical 3-5 years of a standard desktop. Once our testing has completed, we will work with anyone on campus willing to swap out some of their standard desktop computers in common areas such as the Illini Union or other student computer labs across campus as applicable to the technology. A purchase of a small quantity of these devices will hopefully serve as a proof of concept and encourage other units to consider thin clients when the time comes to upgrade their current computer systems. Initially, we will work with units supported by Swanlund System Services: administrative units in the Swanlund Administration Building, the Office of Student Financial Aid (FinAid) at Turner Student Services, Office of Admissions and Records (OAR), Principal's Scholars Program (PSP) and the Division of General Studies (DGS, formally LAS General Curriculum.)

We would literally swap out a user's desktop computer and directly connect a thin client in its place. The end user would use the same monitor, keyboard, mouse and speakers whenever possible.

Several years ago, the Engineering Workstation (EWS) lab in the basement of Grainger library had Sun Microsystems thin clients (Sun Ray 1) installed in it. For various reasons this did not work out and we believe the technology has matured to the point where it is worth considering again. We have four thin clients on loan from Chip PC currently and we have seen enough to want to expand usage to actual users in real situations. There are several other units across campus considering or actively testing thin clients for their environments and having more devices available for testing will certainly encourage more participation. CARLI is looking at the newer Sun Microsystems Sun Ray 2 devices and Grainger is currently looking at Dell Optiplex 960FLX thin clients. Computer Science, VetMed and the University of

Illinois Foundation (UIF) are also considering replacing certain systems with thin clients and this project would work with them and hopefully develop a method of sharing centralized servers instead of each unit continuing to run our own service.

Budget & Fund Raising:

Detailed budget

For each individual thin client computer installed, the following are needed:

cost	QTY	description	total cost
\$300	32	Chip PC Xtreme PC 6500NG	\$9600
\$60	32	XG client license	\$1920
\$60	32	XG domain authenticator	\$1920
\$20	32	MSFT Viewers license	\$640
\$10	32	VNC client license	\$320
\$3000	1	Server hardware to run everything	\$3000
\$280	1	Windows 2008 Enterprise license	\$280
\$20	32	Terminal Server CALs	\$640

Total retail cost: \$18320

Since these devices would be replacing normal desktop computers, the costs associated with their maintenance and upkeep are at most the same as the normal desktops and no additional funding is required beyond the initial hardware / license purchase.

Fund Raising

We've spoken with Chip PC Technologies reseller CDW to obtain

discounted prices and Chip PC Technologies has agreed to provide software licenses at no cost for UIUC purchases of Chip PC equipment before December 31, 2008.

This is the budget after the above discounts / deals (but without any SORF considerations.)

orig. cost	discounted cost	QTY	description	total cost
\$300	\$250	32	Chip PC Xtreme PC 6500NG	\$8000
\$60	\$0	32	XG client license	\$0
\$60	\$0	32	XG domain authenticator	\$0
\$20	\$0	32	MSFT Viewers license	\$0
\$10	\$0	32	VNC client license	\$0
\$3000	\$3000	1	Server hardware to run everything	\$3000
\$280	\$280	1	Windows 2008 Enterprise license	\$280
\$20	\$20	32	Terminal Server CALs	\$640

Total cost after discounts: \$11920

The SIGSAC RSO will request funding for some of this project through SORF as there are significant security benefits to running on thin clients and this RSO can help with much of the monitoring and setup and prepare reports for the rest of campus on the feasibility of running thin clients in place of traditional desktop computers. However, SIGSAC did not get a request submitted before the November 5th SORF deadline and will need to request in the Spring instead. Waiting for this additional funding would negate the free software licenses for the Chip PC devices and we would likely be limited to requesting funding through SORF for just the single management server and

Terminal Server CALs. We want to move ahead and try and purchase some quantity of thin clients to take advantage of the free licenses before the end of the calendar year.

Ideally, we would like the entire amount funded, plus some additional (\$80) to cover misc. expenses. So we are requesting **\$12000.00 funding.**

At a minimum, we want funding for a quantity of thin client devices and we can wait and see about the additional server and Terminal Server client access licenses (CALs) in the Spring SORF periods. If funding is not available for all 32 that we would like, the project could continue at 75% (24 units) or 50% (16 units) funding levels. Obviously fewer devices limits the scope of the testing as we would not be able to experiment with as many use cases. The 32 number was chosen to provide the ability to install devices in groups of 3-6 in multiple locations at once across campus and to see if at least 30 people per Terminal Server is feasible. Funding at a lower than 100% level obviously changes the below energy and environmental impact. Having 32 devices is also designed for installation in a single classroom sized computer lab once a few years of initial testing and use case analysis is finished. With a 10 year lifespan, initial planning to have these around for a long time is very important. Units will hopefully end up with hand-me-down thin clients that are still 100% useful instead of old, slow, power hungry desktops as the thin client technology improves and the devices are upgraded to newer ones to take advantage of changing technology.

Or we could go ahead at 150% (48 devices) or 200% (64 devices) funding rates if the committee sees this as an extremely worthwhile project or if there aren't enough project requests for the available funds. If the technology works as well as we expect, we will continue to request additional funding in

future years.

We will attempt to seek funding directly from the various campus units where these thin clients would be installed as they are allocating money for replacement computer hardware, however its hard to push newer technology, especially when budgets are tight and campus units do not see the payback of purchasing new, green technology as they do not currently pay or even see their current electric usage. This project will prove that the technology works before campus units spend their own budgets on the thin client devices.

Timeline

Once funding is approved, we can order, test, and deploy thin clients to willing participates as early as December 2008. There is no real set time when devices need to be deployed, as replacing single desktops at a time as well as entire computer labs is within the scope of the project. (Obviously computer labs may need to wait until the summer though.)

Energy, Environmental, Social and Economic Impact

Energy Efficiency

For the purposes of this request, we make the following assumptions:

- the average desktop computer uses **115 watts** when it is on and 0 when it is off
 - *This is based on observed measurements of a Dell Dimension 4700 powered on*

- the average desktop computer is on about **12 hours per day, 7 days a week.**
 - *This is a low estimate, as many computers around campus are left on **all the time***
- the below calculations should be a considered a minimum savings
 - a single server uses about 375 watts

Since these thin clients are rated at around 3.5 Watts each and there is the single management server for these 32 devices, we estimate about 15 Watts per thin client (load per device + server load divided between 32 devices,) giving a savings of **100 Watts** (115 - 15) for **each computer replaced**. With 32 devices, that is 3200 Watts. More than 32 thin clients can use the same server, so having more devices saves even more energy.

There are lower cooling costs from having a lower power device instead of a full desktop. No metrics are available on this currently for thin clients and part of this project will generate data for future use. This amount could be significant as the heat generated drops significantly.

Environmental Impact

Using our above estimate of 100 Watts saved per device, we can arrive at the following electricity cost savings **per computer**. We use the 12 hour a day and 365 days to obtain 4380 hours that each desktop computer is running per year and at 100 Watt savings (.1 kw,) that means **438 kwh per computer per year** is saved. The thin clients have an estimated 10 year lifespan.

unit cost	saved per year (438 kwh)	saved in 10 years (4380 kwh)
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electric	\$.072/kwh	\$31.54	\$315.40
CO2	1.936 lbs CO2/kwh	848 lbs	8480 lbs
NOx	.00191 lbs NOx/kwh	0.84 lbs	8.4 lbs
SOx	.00635 lbs SOx/kwh	2.78 lbs	27.8 lbs

So for all 32 devices, we are looking at $32 * 438 = 14016$ kwh:

	unit cost	saved per year (14016 kwh)	saved in 10 years (140160 kwh)
electric	\$.072/kwh	\$1009	\$10090
CO2	1.936 lbs CO2/kwh	27135 lbs	271349 lbs
NOx	.00191 lbs NOx/kwh	26.77 lbs	267.70 lbs
SOx	.00635 lbs SOx/kwh	88.00 lbs	890.00 lbs

Thin client devices use less materials to manufacture and have a longer lifespan therefore have less waste than traditional desktops.

I see no obvious negative environmental impacts, as these devices more than off-set the waste from a normal desktop computer that would be used instead. This project will document any negatives encountered though.

Social Impact

Many campus computer users prefer laptops to desktops as it allows them to take their computer home with them. Laptops, while being more portable and typically more energy efficient are significantly more costly than the desktop models they replace. Thin clients with a Terminal Server backend allow remote access (from home or anywhere in the world where there's internet access) to the exact same desktop (software, server shares, printers) they work on while on campus. Bringing

a possible increase in productivity with a reduction in campus costs (power and equipment) along with an increase in convenience (no toting the laptop bag back and forth to work/home). This could extend to students as well if a department was willing to run thin clients, the resources to support access from home / off-campus computers would already be supported potentially eliminating the need for students to have both a laptop and a desktop.

Economic Impact

In addition to being priced at 1/2 to 1/4 the cost of a traditional desktop, the electric power savings alone (ignoring the management server cost) pays for the devices over their 10 year lifespan. And this is a low estimate as most computer are always left on.

Outreach and Education

OAR and FinAid have kiosks in their lobbies that are used by many students. These computers are prime candidates for thin clients and will have very high visibility among the students. We can add informational links to websites on the thin clients themselves as well as put up a poster saving how these devices save energy.

As more and more units throughout campus see the benefits of thin computing, more and more locations will use the technology and students throughout campus will realize the benefits of thin computing. Entire classroom labs could be replaced with thin clients, although there is a significant need to prove that the technology can work before large numbers of labs can be converted. Students are welcome to stop in and use the thin

clients at various public places. In addition to the locations mentioned above, SIGSAC will try to arrange having email kiosks setup in Siebel Center and we will speak with units mentioned earlier in this document as well as the CITES help desk and the Illini Union about replacing their email kiosks with thin clients as well. Again though, until the technology is vetted, not too many places will want to replace their working systems.