



Case Study

Thin client computing keeps paying dividends

The commercial-economic vocational school (Berufsbildende Schule Wirtschaft [BBSW]) in Koblenz, Germany has been using thin clients for more than ten years and, in doing so, has saved a lot of money through their economical operation and long service life. But there's even more good news: The second generation of these efficient end-user devices is able to increase the previous level of savings even further.

Business Solutions from
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Thin client computing keeps paying dividends

To be able to provide their students with the computer resources they need, many educational institutions have to put up with high administrative loads. However, a prime example of how one institution has succeeded in increasing IT efficiency is the BBSW in Koblenz. For more than ten years now, the BBSW has been pursuing an IT strategy that makes great sense, both economically and ecologically: It has, step-by-step, replaced its conventional PCs with energy-efficient thin clients that allow centralized administration.

Broadened Deployment of IT

The educational opportunities provided by BBSW Koblenz range from traditional vocational-trade schools all the way to college-track vocational high schools. The various departments and classes have a total of 370 computer workstations available to them – some in computer labs, some in the classrooms themselves. The BBSW had already decided to introduce thin clients in 1999. Back then, it was considered a successful pioneering project, as IT administrator Ernst Dolkemeier explains: “One of our goals was to double the service life of our computer workstations. We were able to do this with our first IGEL thin clients, which were LX Winestra models (currently UD5 series). As we had expected, they remained in service for ten years. This compared favorably to PCs that we had to replace after a maximum of five years.” Dolkemeier cites other advantages of thin client computing such as the ruggedness of the devices and their inherent ability to thwart attempts of manipulation. “Thin clients don’t have their own hard drives. So, students cannot install and try out unauthorized programs. All of the applications that we provide, such as OpenOffice, Thunderbird e-mail and Internet Explorer, run on what are known as terminal servers, which are only accessed by thin clients.”

The customer:

- Public commercial-economic vocational school with a wide range of departments and educational options
- 370 IT workstations for students, including 100 IGEL Winestra thin clients

Expanding the Thin Client Infrastructure

At first, the BBSW installed the thin clients only in two computer labs, each with 16 IT workstations. After the positive experiences with this setup, three more rooms were equipped with the lean end-user devices. Currently, the BBSW is expanding the thin client approach to include classrooms. “Initially, the associated terminal servers with all the centrally provided programs were located in a room down in the basement,” Dolkemeier recalls. “But we had to move them out of there due to excessive heat buildup.” So, Dolkemeier turned an issue into a positive by installing the servers in same rooms as the thin clients. “In this way, we avoided the high cost of installing and operating an air conditioning system for cooling the servers. At the same time, the teachers in each classroom can easily reboot the servers themselves should that ever become necessary.”

Each terminal server can handle the demands of an average of twenty students. In order to be able to distribute the system load based on the number of users, in addition to the Microsoft® Windows Server™ 2003 operating system, Dolkemeier also runs load balancing software. Furthermore, Dolkemeier keeps the terminal servers performing at the highest possible level by having their hard drives automatically defragmented each night. In addition, each night the system automatically restarts itself to end any unproductive processes that might still be running.

The challenge:

- Modernize the thin client computing environment and find ways to save even more money
- Provide higher graphics performance and allow support for USB data storage sticks
- Ensure efficient management

Modernizing the Thin Clients

Recently, after the first generation of thin clients came to the end of its 10-year life cycle, the BBSW deployed a second generation of devices. Like before, the manufacturer of the new units is the German market leader IGEL Technology; these new units come from its entry-level model series IGEL LX Smart (currently: IGEL UD2). “A new thin client costs just about half the price of a comparable new PC. They take up even less space than the earlier models and have better graphics performance,” Dolkemeier notes, adding that “they also accept USB data storage sticks, which our students need to transport files around.” Dolkemeier points out yet another advantage of



the new thin clients: the standard print-server function that lets locally connected printers be used by other, distributed thin clients to print out documents. But when it comes to costs, Dolkemeier feels that the latest version of IGEL's management software is the most important benefit. The IGEL Universal Management Suite, which comes standard with the devices, permits efficient management and remote administration of all IGEL Universal Desktops as well as units of the previous model series IGEL Smart, Compact, Winestra and Premium.

A Fast Rollout

Unlike PCs, thin clients do not require locally installed software, so all that Ernst Dolkemeier has to do is create device profiles in the management software, and then assign the correct profile to each thin client group by drag-and-drop. Once this preparatory work is done, the only thing left to do is to hook up the thin clients themselves. After the thin clients are switched on, they automatically get their proper setting profiles from the management server based on their IP addresses. "Since we've been using the IGEL Universal Management Suite, our device deployment times have been cut by two thirds," Dolkemeier reports. "In fact, we're going to deploy a total of 100 new thin clients by the middle of 2009. We're replacing 80 of the older models outright and moving the remaining 20 into classrooms to replace the PCs still there. The rollout of the first new thin clients took about two hours for each computer lab, including creating the profiles."

The solution:

- Replacement of PCs with 100 IGEL LX Smart thin clients
- Deploy the IGEL Universal Management Suite
- Expand thin client computing from computer labs into the classrooms themselves

Much Lower Support Load

The planned number of 120 thin clients – used at just about one third of all the computer workstations – means a huge decrease in Dolkemeier's workload. "100 thin clients only require five minutes of support service per week. For 100 PCs, I have to plan for at least 30 minutes. The difference here is primarily due to the IGEL Universal Management Suite, which, in addition to allowing group-based device management, contains practical tools such as the VNC Viewer. This viewer allows me to directly tap into a given thin client session over

the network and view the contents on that user's screen. Compared to conventional PC operating systems, which often require patches and updates, we rarely have to update the thin client firmware. But, whenever it is necessary, we can have it done by the management software automatically and over night, which is a major convenience."

Economical and Environmentally Friendly

The pioneering work at the BBSW has already been copied elsewhere, such as at the City of Koblenz council offices and at several IT service providers. Dolkemeier recommends thin client computing not only for economic reasons but for ecological ones as well. The reasons are shown in a cost/benefit study that compared an IT infrastructure made up of 100 thin clients with a client/server network with a data server and 100 PCs. The study shows that the energy consumption of the thin client environment is less than half that of a PC-based one; the same goes for production of greenhouse gases. Furthermore, thin clients use less resources in production and leave less behind when they are finally disposed of. Additionally, the acquisition costs can be spread out over ten instead of five years. And, when viewed over a ten-year period, the annual costs of the investment are cut in half. Also, because of their rugged construction and centralized management, thin clients require only one sixth of the support costs for a conventional system. Therefore, a look at the bottom line shows that the new approach, replacing 100 PCs with thin clients, is saving the BBSW over 30,000 euro each year. That means that the return on investment (ROI) is achieved in just over 2 years.

Looking toward the Future

In view of these facts, Dolkemeier foresees a big future for thin client computing in schools and municipalities. "We are actively including these results in our course content, especially in the areas of computer science and office management." To be able to get rid of the remaining PCs used for instructional purposes, Dolkemeier is hoping for a rapid expansion of desktop virtualization solutions, with which the BBSW could also offer applications incompatible with terminal servers by means of thin clients. "It looks like we will be able to afford the required server licenses in the coming five years," Dolkemeier presumes. "And since our IGEL thin clients already support this form of application provisioning today, we are already prepared for the future and can assume that our devices will continue to have a service life of ten years."

Fig. 1: Cost/Benefit Analysis for 10 years

Cost in euro for:	Client/Server with PCs	Thin Client Computing	Savings
Acquiring 100 end-user devices incl. software licenses:	40,000	20,000	20,000
Acquiring server hardware incl. software licenses:	2,000	10,000	-8,000
Investment costs for 5 years:	42,000	30,000	12,000
Investment costs for 10 years:	84,000	40,000	44,000
Annual costs (based on 10 years):	8,400	4,000	4,400
Annual energy costs:	2,600	1,100	1,500
Annual support costs:	15,600	2,600	13,000
Total annual costs:	26,600	7,700	18,900
Amortization of hardware costs after:	2,1 years		

Notes:

Service life of thin clients: 10 years; service life of server and PCs: 5 years
 SBC scenario: 100 thin clients à € 200 and 5 terminal servers à € 2,000
 PC scenario: 100 PCs à 400 and 1 file server à € 2,000
 Support costs € 50/hour

Fig. 2: Comparison of the energy consumption of a conventional client/server solution to that of thin client computing

Calculation of energy requirements for 100 PCs:	
100 PCs à 90 W ¹	9,000 watt
x 9 hours/day x 200 days	16,200 kwh
1 file server à 200 W	200 watt
x 24 hours/day x 200 days	960 kwh
Total requirement for 100 PCs	17,160 kwh
Calculation of energy requirements for 100 thin clients:	
100 thin clients (IGEL LX Smart) à 14 W ¹	1,400 watt
x 9 hours/day x 200 days	2,520 kwh
5 terminal servers à 200 W	1,000 watt
x 24 hours/day x 200 days	4,800 kwh
Total requirement for 100 thin clients	7,320 kwh

Annual savings in kWh	9,840 kwh
Annual power savings in euro²:	1,476 euro
Reduction in CO₂ emissions³ per year:	6,199 kg
Percentage reduction in power usage and CO₂ emissions	55 %

- ¹) Average share of share of effective power (Source: Fraunhofer Institute for Environmental, Safety and Energy Technology (UMSICHT) / IGEL Technology: Environmental Comparison of PC and Thin Client Desktop Equipment: http://it.umsicht.fraunhofer.de/TCecology/index_en.html)
- ²) Base electricity rate assumed to be = 0.15 kWh;
- ³) Production of one kWh of the German power mix releases 0.63 kg CO₂

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