

WHITE PAPER

The Tangible Benefits of Blade Clients

Sponsored by: ClearCube

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IDC OPINION

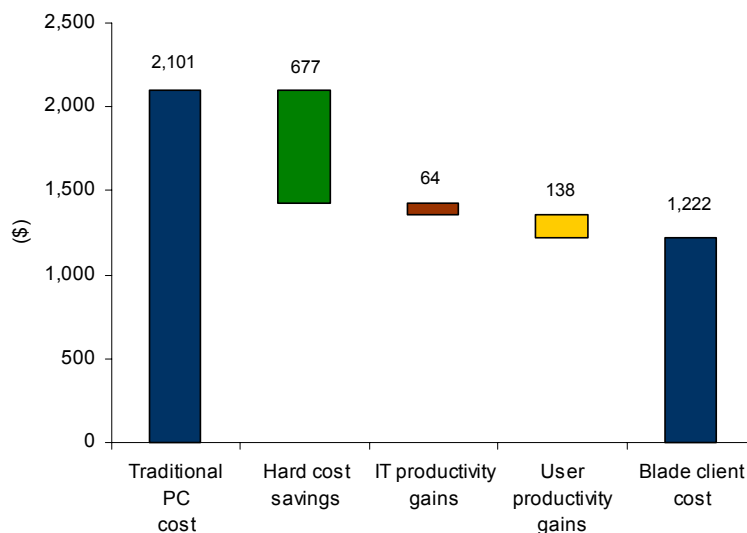
Blade clients — rackmounted boards that contain a full PC, including processor, memory, hard drive, graphics, and operating system — deliver tangible and substantive benefits for certain classes of users, notably high-density large enterprise, security-conscious military, and high-availability departmental or enterprise computing. These benefits take the form of:

- ☑ Greater physical and data security
- ☑ Higher uptime
- ☑ Better worker environment noise and thermal characteristics
- ☑ Reduced operating costs — average savings of users studied exceeded 40%.
Figure 1 illustrates the hard cost savings and productivity gains found in IDC's study of ClearCube users.

Companies with high requirements for serviceability, security, availability, or low-noise environments should consider a blade client solution for at least a part of their client population.

FIGURE 1

Average Annual Cost per User



Note: Hard cost savings include maintenance, facilities, IT staff, and security loss.

Source: IDC, 2005

METHODOLOGY

IDC interviewed 10 customers using blade solutions for their desktop computing at the end of 2004 and asked respondents to quantify the costs and benefits of using ClearCube blade clients in terms of cost savings and productivity increases. The survey also assessed customers' general satisfaction with the blade client solution.

A standard IDC business value interview and modeling methodology was used in gathering and analyzing the survey data.

The companies interviewed range in size from 100 to 1,200 employees, and four companies indicated that 100% of users have used blade clients for one to two years. A profile of the companies included in the study is shown in Table 1.

TABLE 1

Study Profile

Industries	Healthcare, government, services, and financial
Average number of employees	856
Average % of ClearCube users	26
Average number of ClearCube users	493
Average number of IT staff supporting ClearCube users	1.2

Source: IDC, 2005

SITUATION OVERVIEW

Blade clients, a variant of a standard PC, arrived on the market in 2001. Although the industry has several names for them (e.g., blade PCs and PC blades), IDC refers to a full client on a blade as a blade client. By client, we mean an end-user PC, such as a desktop or notebook, that has all the characteristics of a standalone computer (i.e., PC hardware elements, a single-user operating system, and single-user applications such as email, word processing, and spreadsheet). The blade client has all these characteristics, but it is mounted in a rack like a blade server. The blade communicates with the corporate network on the back end and with a lightweight desktop device that connects to a monitor, keyboard, mouse, speakers, and USB devices on the front end. Several blade clients are on the market today, most notably the ClearCube solution and a more recent arrival from Hewlett-Packard (HP). Although the two architectures have some similarities, they differ in important ways. This paper is not intended as a competitive analysis of the two firms' offerings, but rather it seeks to examine the category as a whole.

Blades allow companies to take computers off users' desks, embody them in blades, and centralize the blades in a secure location. The device that sits at each user's desk is either directly connected or dynamically allocated to the blade clients in the datacenter based on each user's specific needs. ClearCube has a management suite that enables a "touchless IT" environment wherein IT managers can remotely manage and control global business PC deployments without making trips to the user desktop.

Blade clients are indeed single-user systems, but that designation bears some examination. Modern operating systems such as Windows XP and Mac OS X allow multiple user accounts on the same PC. This functionality enables more than one user to share the system, but not at the same time. This type of serial sharing is rarely done, but in some corporate environments, notably telephone service pools or help desk applications, workers log off their machines at the end of a shift and new workers sit down and log in under different user names. In an analogous way, blades can be used by more than one person. For example, a worker can finish a shift in the United States, and his or her blade, still located in the central IT area, can be swung over to a shift just starting in Bangalore, India. In addition, ClearCube has software that allows a blade client to be shared simultaneously by up to four users, each of whom is under the impression that he or she has exclusive use of the system. This type of sharing enables the enterprise to significantly reduce the cost of hardware acquisition. Given the flexibility of this usage model, blade architecture does strain the definition of a client PC, but for purposes of our discussion, we will continue to treat these products as clients, using the rough assessment that if it waddles, quacks, and dives like a duck, then it must be a duck.

PC BLADE USERS — ROI ASSESSMENT

ROI Analysis

The customers in this study include hospitals, military installations, a financial institution, and a service company. Their users include professionals such as doctors, nurses, and financial analysts who need reliable information systems, and while they may be mobile, their PCs need not be. The organizations also tend to be highly centralized, so there are clear advantages to installing the clients in a single location.

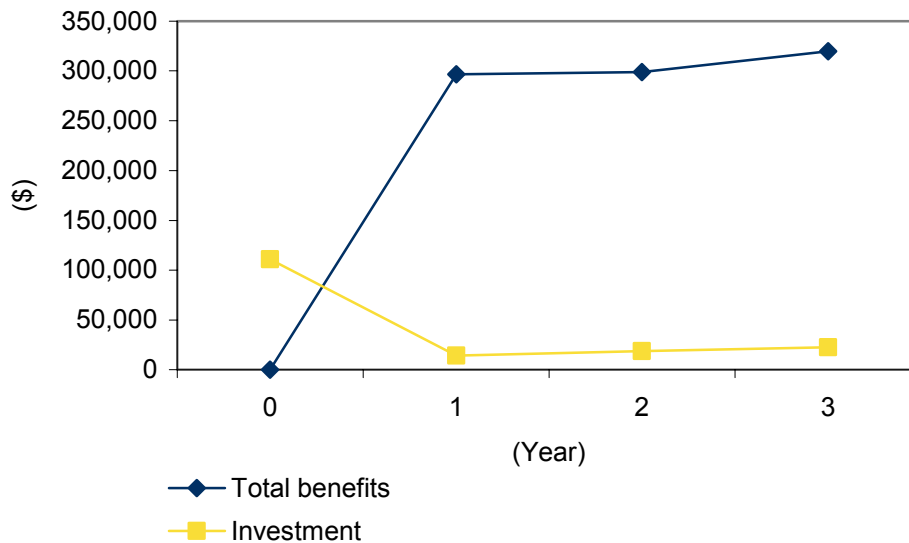
For a premium of 44% above what these companies would have paid for conventional PC assets, they were able to generate an ROI of 413% and pay back the costs in a little over 6.8 months once the blade clients solution was deployed. A summary of the ROI analysis is shown in Table 2.

TABLE 2**Three-Year Summary of ROI for ClearCube Solutions per 100 Users**

Average annual benefit	\$305,098
Investment	\$141,514
Net present value (NPV) of savings	\$584,707
ROI = NPV savings/investment	413%
Payback in months	6.81

Source: IDC, 2005

The investment or cost of change took place up front, while the benefits grew annually as each company migrated more of its users to the ClearCube platform. This drove cash flow positive in year one. Figure 2 compares the average investment and value of benefits of the companies studied.

FIGURE 2**Three-Year ROI Analysis**

Source: IDC, 2005

Benefits

IDC was able to identify multiple quantifiable benefits of deploying ClearCube blade clients based on customer interviews:

- ☒ **Reduced support costs.** By taking the hard drives out of the hands of users and consolidating those assets in protected cages inside closets/datacenters, ClearCube customers were able to support 16% more users while reducing desktop support costs by 60% and help desk costs by 13%.
- ☒ **Higher uptime.** Centralized control of the desktops enabled the IT staffs to employ proactive best practices such as integrated systems management and hot swapping to reduce outages. Companies enjoyed an average reduction in downtime of 69% as well as reduced mean time to repair (MTTR) of 36% in those rare cases of downtime. In addition to achieving lower downtime, users got up and running quicker and spent less time doing their own software deployment and troubleshooting or calling the help desk for assistance.
- ☒ **Asset security.** Locking away the systems in a controlled environment yields many benefits. The asset is protected from damage and theft. Companies in our study averaged one to two stolen PCs annually before they implemented ClearCube. Physical asset security is an important issue in colleges/schools, hospitals, and remote locations. More significantly, with the ClearCube technology and through the device on the user's desk, IT personnel can choose to enable/disable the user's ability to connect mass storage devices (e.g., floppies, CD/RW, disk on key) so that the user cannot download sensitive data or upload unauthorized software. In certain sensitive government/military situations, users no longer have to secure their hard drives to a safe/lockbox when they are not in use, which is a significant operational benefit.
- ☒ **Working environment.** With the PC heat source and attendant fans out of the workplace, users enjoy a cooler, quieter, more spacious working environment. Some of the companies reduced their space requirements by an average 25%. One hospital felt that eliminating the fans reduced the risks of spreading germs.

As shown in Table 3, total benefits over the three years averaged \$915,293, with \$401,768 (44%) coming from hard cost savings (e.g., IT efficiency, facilities, PC security, and equipment).

TABLE 3

Three-Year Benefits per 100 Users

IT efficiency	\$156,320
Facilities (space, HVAC, storage)	\$131,250
PC security	\$563
Equipment savings	\$113,635
IT productivity	\$161,501
User productivity	\$175,772
Revenue	\$176,252
Total savings	\$915,293

Source: IDC, 2005

Reduction in the Total Costs of Desktop Computing

Despite the higher initial cost for the blades form factor and the one-time investment for cages, racks, and ports, blade clients tend to have lower total costs when viewed from three or four years out. Lower hard costs resulted in average annual savings of \$133,922 (per 100 users) for the companies interviewed and meant that they could recover their higher initial costs in as little as 13 months on hard-dollar (IT budget) savings alone without considering the increased productivity and downtime reduction benefits. Reduced total cost of ownership was the result of the following factors:

1. Consolidation, control, and centralization

- Removing desktops from the workplace reduced facilities costs for space, HVAC, security, and electrical by 25%.
- The ratio of users to systems varied in our study; for example, each user in a highly technical classified environment has three to five PCs, whereas five users at a multishift nurses' station use a single PC. On average, blade clients were able to serve 24% more users than conventional PCs.

2. Increased security

- Most companies in the study averaged one to two stolen PCs per year. Losses due to theft were reduced to zero once blades were deployed.

3. Improved IT efficiency

- ❑ While growing their user bases by 13% per year, these companies were able to reduce their desktop support staffs by 60%. In some cases, the companies simply reallocated resources to other functions and thus avoided the costs of additional hires.

4. Taking PCs out of users' hands

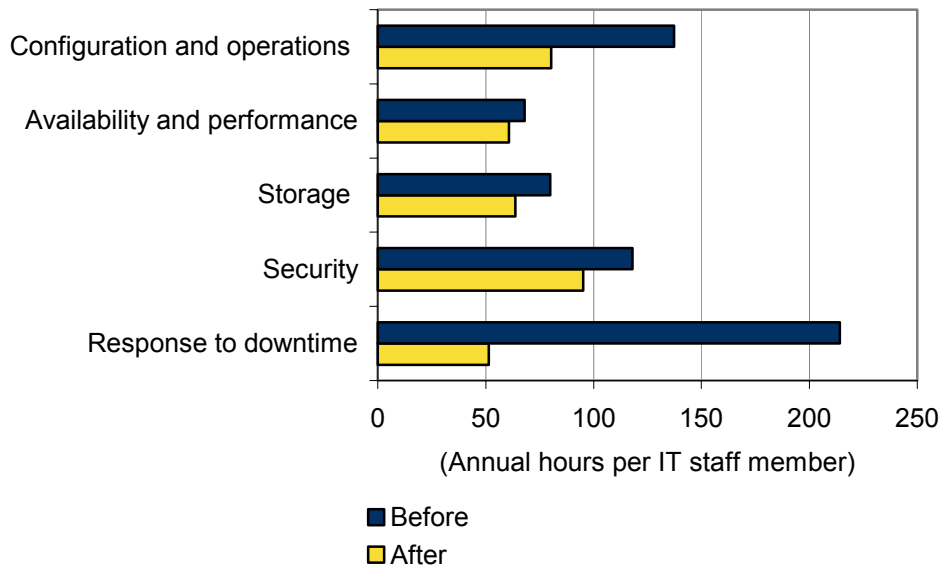
- ❑ Removing workers' desktops reduced maintenance costs associated with routine and catastrophic wear and tear.

Productivity – IT Staff

Not only do blade clients require fewer staff in direct support of users, but the time required for all IT tasks associated with desktops is reduced by nearly 28%. The time freed up amounted to an average of 248 hours per IT staff per year to be used in more proactive business support activities. Figure 3 illustrates staff time savings by comparing time spent on tasks before and after the ClearCube installation. IT staff benefited most from reducing the time spent fixing downtime issues. The largest bucket of hours saved from routine operations came in security functions such as user administration and securing hardware assets. The greatest reductions in time in terms of percentage came in configuration and operations tasks such as desktop software installation and job scheduling, which were cut in half.

FIGURE 3

IT Time Spent on Desktop Support Before and After ClearCube Implementation



Source: IDC, 2005

User Productivity – Friendly, Functional, and Flexible

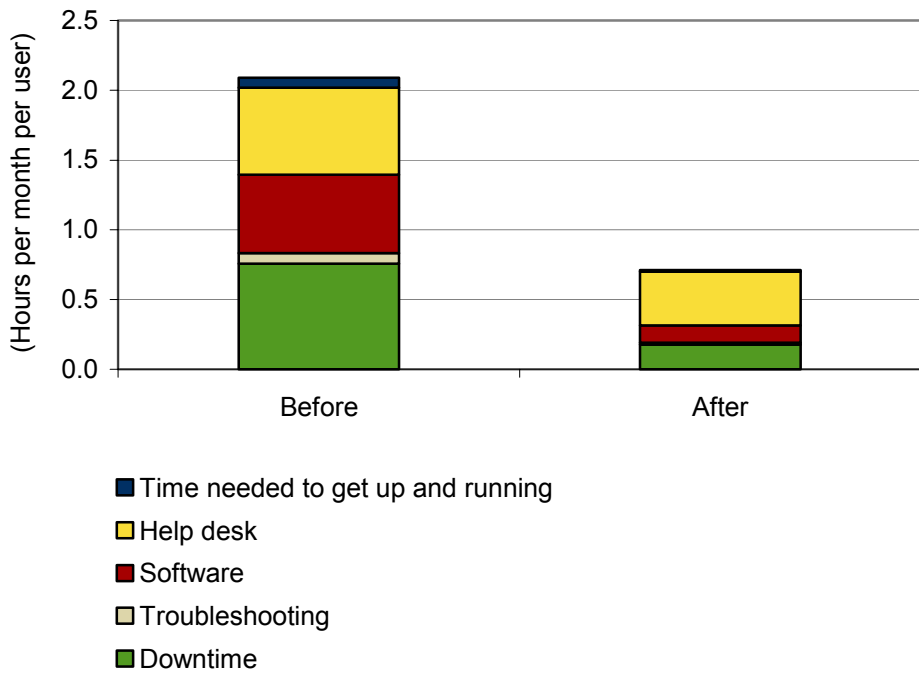
One of the key measures of user productivity is the time that users have access to the applications they need to do their jobs. Every hour without access is only 80% productive, and so 20% of the hourly wage is wasted. The ClearCube solutions contributed to higher levels of productivity by significantly reducing the barriers between users and applications:

- ☒ Centralization helped the IT staff to configure and install each desktop 40% quicker, which saved each user 2.2 hours getting up and running.
- ☒ Users also spent 0.5 fewer hours per month loading their own software and troubleshooting.
- ☒ Help desk calls dropped off by 35% as users recovered 0.24 hours per month through better operations.
- ☒ Downtime reductions returned 3.5 hours per year of productive time to each user.

Figure 4 illustrates user productivity savings by comparing time lost per month dealing with IT problems before and after the ClearCube installation.

FIGURE 4

Lost User Productivity Before and After ClearCube Implementation



Source: IDC, 2005

Revenue Savings

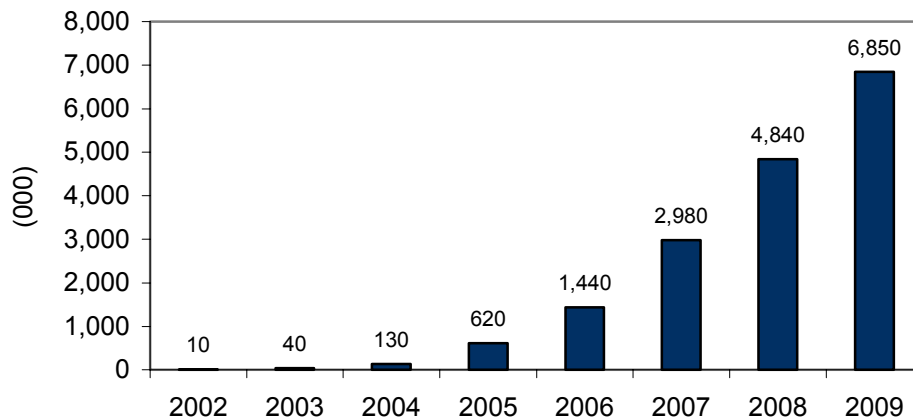
The companies studied reduced downtime by 69% to an average of 1.8 hours per month following their ClearCube implementations. This reduction resulted in savings after tax revenue of \$58,751 per 100 users per year, based on hourly downtime loss rates reported by the companies.

FUTURE OUTLOOK

Blade clients are currently shipping in low volumes. IDC's tracking team pegs the entire industry as shipping in the range of 10,000 units per month. These volumes are fairly modest for the moment, but we expect them to rise steadily over the next few years, hitting a nearly 7 million annual run rate by 2009 or between 2% to 3% of the overall client PC market (see Figure 5).

FIGURE 5

Worldwide Blade Client Shipments, 2002–2009



Source: IDC, 2005

Of course, growth rates are high now, coming off a low base, but we expect the rates to continue in the triple digits through 2007 and then maintain healthy double digits in the later years as a volume market is established. This forecast is based on the following assumptions:

- The benefits of the technology (e.g., security, availability, manageability, and cost savings) are substantial and can be realized by a wide range of organizations.
- The price premium for the technology over comparable "vanilla" solutions will diminish over time.
- A growing network of OEMs and distributors is adopting blade technology for specialized customers.

- ☒ New entrants will increase visibility and volume of blade solutions.
- ☒ IT managers will continue to value their familiarity with basic PC architecture.

CHALLENGES/OPPORTUNITIES

Thin clients are among the solutions that compete with blade clients. It is quite possible that some firms, by the time they are convinced of the benefits of centralizing critical resources, will come to the conclusion that the best choice is to go all the way to a thin client/server architecture, assessing that many of the same benefits accrue to both blade clients and thin clients. Although in some instances a thin-client solution may be more reliable and stable, building a redundant server environment to accommodate thin clients may increase total costs. The key arguments in favor of blade clients is that thin clients may not meet the needs of users who require high availability and dedicated bandwidth. Often, thin-client solutions require IT departments to deploy yet another type of computer for high-end users. Additionally, thin clients require that the server and network side do a lot of housekeeping, such as graphics rendering and pixel painting, normally done locally by clients. IT managers will have to assess whether their network and server performance would be negatively affected by all this low-value traffic.

CONCLUSION

Blade clients, in addition to providing significant increases in security, availability, and manageability, can reduce desktop operating costs by 40% based on customer analysis. The technology, while not for everybody, will serve a specialized role in client computing for the foreseeable future. Companies with high requirements for serviceability, security, availability, or low-noise environments should consider a blade client solution for at least a part of their end-user computing needs.

CASE STUDIES

NORAD Cheyenne Mountain Air Force Station

Meeting Increased Demands

The Cheyenne Mountain Air Force Station (CMAFS) is an information collection operation for a worldwide system of satellites, radars, and sensors that provide early warning of a missile, air, or space threat to North America. The operation is part of the North American Aerospace Defense Command (NORAD). Being 2,000 feet underground, CMAFS is under tremendous pressure to save space and control power and heating resources. As with all government agencies today, the organization also must become increasingly efficient to meet increasing demands on security organizations while reducing IT costs.

With these objectives in mind, about three years ago the IT staff began evaluating alternative IT architectures. The blade architecture appeared particularly attractive because it minimized the use of hardware while potentially reducing IT costs. The staff decided to invest in a blade architecture, choosing ClearCube's blade solution because it offered the performance of a traditional PC and the flexibility, security, and reliability that the blade architecture promised. According to Garland Garcia, a network chief at CMAFS' Network Control Center (NCC), "The other blade vendors were generally associated with server blades, which cost 3–4 times as much as a client blade solution."

When CMAFS first installed its solution, ClearCube was the only vendor that had a client blade solution. When another client blade solution came on the market about a year ago, the CMAFS NCC compared the product to ClearCube. Its conclusion, says Garcia, was that "the new machine didn't even come close to the performance of the ClearCube blades. The most the new machines offered was 1GHz performance. I think ClearCube is at 3.6GHz right now. ClearCube essentially offers the same level of performance you can find on conventional PCs. ClearCube seems, more than the others, to keep up with technology as it evolves."

A typical installation for a traditional PC user at CMAFS includes a keyboard and mouse, a set of speakers, a monitor, three computers, and a KVM (keyboard/video/mouse) controller switch. Multiple PCs are often required for physical separation of network-based applications. "Now, with ClearCube, they have essentially the same configuration as before, minus the three computers under the desk," says Garcia.

Getting the blades installed and running is simplified as CMAFS can use all of its existing software; the processing power is the same as that of a traditional PC. The same servers are used as well. "The servers didn't change a bit."

The end users often operate at top secret (TS) security levels. "Having the blades in a central location away from the floor where top secret information is being processed helps us reduce security concerns in a variety of ways. The customer could be processing top secret on the floor, but the ClearCube in the closet is only operating at a secret level; this negates the need for a technician to have a TS clearance because

they would not be exposed to any TS information," relates Garcia. Before ClearCube, going out on the floor to repair a PC in a TS environment required technicians to have TS clearance; otherwise, the floor would have to downgrade its security level to accommodate the presence of the technicians, a cumbersome process. "We don't have to secure the machines when they are not being used because they are now always secured. And we don't have to have as many top secret-cleared technicians."

The organization could have implemented another solution, but it felt that the ClearCube architecture was the better answer. In Garcia's opinion, "You could do it without blades. You could use a KVM extender solution. But that's real messy. We did that in our command centers in the past. We had a room below the command center, and we extended up through the floors, using KVM extenders and media converters. It complicated maintenance and increased the level of difficulty when it came to troubleshooting. We prefer using ClearCube."

Saving Space

Space savings is a major driver at Cheyenne Mountain when CMAFS thinks about future IT plans. When new security goals were implemented, the operation felt that space constraints were limiting the options for increasing the use of IT. CMAFS doesn't have the option of "expanding the building" — it is under a mountain. The blade architecture looked particularly attractive because it minimizes the amount of space required for hardware. "If we didn't have ClearCube, we'd have at least one machine under every desk," says Garcia. "For a good percentage of users who need to access a variety of physically separate networks, they might need to have multiple machines under each desk. That kind of crowding and noise inhibits user productivity!"

Quieter Operation

Acoustics are another reason why ClearCube has worked out well for CMAFS. Its operations rely on very clear communications among the staff at the command center. The new command center has the latest technology across the board. During major operations, the users need to be able to talk to each other. The acoustics of the room are designed so that users can hear one another. According to Garcia, "When you go in the old room with conventional PCs, there is significant noise from the computer fans. When you're in the new rooms where ClearCube is used, there's no noise. The users can all hear each other easily in those rooms."

Greater Security

Security was also a driver when CMAFS looked at its future IT options. With ClearCube, all of the hard drives are in one place; thus, IT can more easily secure them and keep track of assets. It makes accountability easier because IT can go to one closet instead of walking around the center looking for devices. Also, users don't have to lock up their hard drives when they are done using them. The operation is so secretive that users would have to move their hard drives to a secure location, which would take about 15 minutes each time. It would then take additional time to make sure network connectivity was in place once a hard drive was put back at a user station. "With ClearCube, we don't have to do any of that. It's more physically secure."

Less Downtime

The blades are all physically located in centralized closets so they are easier to manage and diagnose than traditional PCs. "It's not being 'touched' on a daily basis," says Garcia. "Because we're capable of doing more maintenance tasks/patching remotely, it increases our efficiency. We can only fix about 60% of our traditional PC problems remotely. With ClearCube, we can fix at least 80%." Because the blades are out of reach of the user, there are fewer user-generated problems. The traditional machines were being "kicked around" quite a bit, and users were moving them around. "It was an administration nightmare, basically." Now, the blades are in a controlled environment. The user never touches them.

CMAFS says the ClearCube machines are more reliable than traditional PCs and are easier to repair when there are problems because the blade itself is hot-swappable. "To get a user up and running after a downtime event took hours on average with traditional machines," according to Garcia. "With the blades, because they are hot-swappable, we generally have users up in a couple of minutes. The average MTTR has been reduced from about 10 minutes to about 6 minutes. Overall, about 30% of unplanned user downtime has gone away because of the blade solution."

Garcia goes on to explain how the ClearCube solution improves user efficiency. "We're responsible for the operations and management of the IT infrastructure. It's easier with ClearCube blades because when the technician needs to service a machine, they don't have to interfere with the operations of the organization. They don't go onto the floor. The floor could be operating at a peak level, and we don't have to interrupt the operation."

Reduced IT Costs

The higher reliability, easier security implementation, and faster problem fixes stemming from the ClearCube implementation have increased the IT organization's efficiency. The help desk and the desktop administrators are about 30% more efficient when dealing with problems with ClearCube machines, compared with traditional PCs. The staff estimates that it could support about 200 traditional desktops per technician before it started using ClearCube. Now, with ClearCube blades, it's on the order of 500 each, which is excellent given the high complexity of the applications. "Because of ClearCube, we will not have to hire additional IT staff even though we are adding networks and applications and increasing the complexity of the applications," predicts Garcia. "We're gaining more and more requirements. We're growing in terms of the number of missions we support. We'll probably be growing the number of different types of missions by two-thirds, but we'll have the same number of people, more than likely." The staff doesn't feel like it could support that many new applications or their increased complexity without ClearCube, unless it added hardware and people.

The ClearCube solution gives the IT organization the ability to do more with the same equipment and staff. The NCC estimates that it has avoided hiring five people in IT because of the ClearCube solution. Just for the desktop setup/config function, the staff would have had to devote about a half an hour per year per traditional PC. For each ClearCube blade, the staff needs to devote less than a quarter hour per year. The IT staff devotes about five hours per year for software install/upgrades for each traditional PC, compared with only about an hour and a half per year for each blade.

The blade clients have also allowed the IT staff to spend less time on hardware/software asset management.

IDC estimates that through reductions in costs and increases in user and IT productivity CMAFS has enjoyed annual savings and productivity benefits of \$3,100 per user based on an annual investment of a little under \$800 per user.

CMAFS now has hundreds of ClearCube blades in use in mission-critical centers for both classified and unclassified networks. Garcia concludes, "We've been really happy with the ClearCube implementation. We're not using it everywhere yet, but we'll continue to deploy ClearCube as closets are outfitted with A/C and power." Although the ClearCube installations represent only a fraction of the total computing devices at NORAD, the share is increasing as NORAD realizes the long-term cost savings and user productivity benefits of the ClearCube blade architecture.

WestLB

WestLB, with over 9,000 employees in more than 30 countries worldwide, is one of Germany's largest commercial banks. With over 25 years of commercial banking and over 10 years of securities business in equities and fixed income, WestLB has become a leading provider of financial services to a domestic and international clientele.

In its Japan office, WestLB employs nearly 150 people. To be successful in Japan, WestLB has established itself as a top performer. Its continuing success will depend on the company's ability to keep its traders operating at peak performance. Murray Toews, the IT manager, explains that a key IT objective has been to add to the performance of the traders. To achieve this, IT set out to increase the performance opportunities for the end-user computing devices while reducing downtime and increasing the efficiency of the workspace. About a year ago, the bank started installing ClearCube blades. The Japan office is the first place that WestLB has tried ClearCube solutions. "We chose the trading floor to use ClearCube first because of our desire to make the environment as clean as possible for the traders," says Toews. "We wanted to reduce the number of reasons for IT techs to crawl around under the desks of the traders."

According to Toews, WestLB chose ClearCube because "frankly, it was just the best solution available. We couldn't find another solution that had the computing power that we needed. At the time, the alternative would have been to use a 1GHz machine, and we needed at least 3GHz."

Expensive Real Estate Requires Compact Solution

Like other trading companies, WestLB has specialized desks on the trading floor. These desks are not like those found in a typical enterprise cubicle. The trading desks are designed to maximize the efficiency of the traders, but at the same time they are usually quite compact because of the very high cost of trading floor real estate. Traders have intense information demands that require multiple machines per trader. They often have several applications running at once, for example, high-end analytics running simultaneously with Bloomberg and/or Reuters applications. Each of those applications requires a separate machine. Toews knows that "having separate machines for each application on or under the desk is just too cumbersome for this work environment."

To accommodate its high-performance computing environment, WestLB chose ClearCube's "FatBoy" solution, which is configured with four dual processor blades in a "cage" instead of the more typical setup of eight blades. The desks have room for multiple LCD monitors via arms that extend from the back of the desk wall. There are no cables on the desk.

Less User Downtime

"We wanted to decrease the time for MACs [moves, adds, and changes] on the trading floor," explains Toews. "We wanted to be able to replace a dealer's desktop machines more quickly than if we were crawling around under a dealing-floor desk. And we've accomplished that." With traditional PCs, Toews estimates that there would be about an hour and a half of unplanned user downtime per month, "for whatever reason. But with ClearCube their downtime has been reduced to virtually zero. Not only is there a significant reduction in the number of failures; when there is a failure, switching a user to a live blade is easy. With ClearCube, using an automated 'switcher,' I can switch [users] over almost immediately to a temporary blade." This is key because a trader's time is very valuable. "Any kind of downtime on the trading floor is expensive." Downtime is just not acceptable. All in all, Toews believes that the ClearCube solution has helped reduce the amount of user downtime by about 90%.

Increased Security

Although WestLB required high levels of security before ClearCube, the new solution adds another level. WestLB wanted to alleviate all security concerns and liked the idea of centralizing all of the computing platforms. With the blade architecture, the blades are locked away in a different room from the users. "The users never get near the machines now. We wanted to increase the physical security of the machines, and we've done that with the ClearCube solution," says Toews.

Reduced IT Support Costs

Because ClearCube has made computing more reliable and easier to fix and support, the company has been able to reduce IT costs. The IT team did not have to hire another person to support growth of users and more complicated applications. At the same time, the average MTTR for a machine has been reduced from about an hour with a traditional PC to about 20–25 minutes with a ClearCube machine. The equipment is more centrally located, making repairs more manageable and MACs easier and less expensive. The IT staff can fix about 50% of traditional PC issues without going to the desktop. "With ClearCube, it's more like 90%," relates Toews.

Toews estimates that with the ClearCube solution, setup and configuration of the desktops takes one-third the time needed for traditional PCs. Instead of about 10 hours a month for repair and restoration, ClearCube machines have proven to need only about an hour every six months or so, "if that." The number of help desk calls has been reduced as well, from over 2.5 calls per user prior to the ClearCube implementation to about 0.5 calls per user after the implementation. Users of the ClearCube solution, about two-thirds of all users, generate only a tenth of all calls.

Reduced Need for Air Conditioning

Toews explains that there are significant benefits from the lessened need to cool the trading floor. "If we used traditional PCs, we would need multiple machines per person. Unfortunately, on the trading floor, people are really packed in there, and the machines generate a lot of heat. So, because of the number of machines, we have to make special provisions for cooling. We could cool them from below, or we could cool them from above. Either way, it's very expensive." But with the PC-blade architecture, the blades are in a centralized, smaller space where temperature control is an easier and less expensive operation. Toews cites this as one of the major benefits of the ClearCube solution for WestLB. It avoided the costs of raising the floor and putting in more air conditioning and reduced the ongoing costs of air conditioning at the same time.

Cleaner, Quieter Working Environment

The working environment is not only cooler but also cleaner. "We have a cleaner environment. Cleaner looking. More room to move around," says Toews. "We have a quieter environment, with nothing under the desktops. The users like how quiet it is. We not only have eliminated the noise from the PCs themselves, but we've avoided the noise from the air conditioning that we would have needed if we used traditional PCs."

Value and ROI of the ClearCube Solution

When asked if the ClearCube solution was worth implementing, Toews emphatically responds, "Yes, absolutely. I can justify it quite easily. It's been a resounding success." At first glance, the ClearCube solution looked more expensive than a traditional PC. But when the bank looked at the total costs of traditional PCs over the lifetime of the solution, it became clear that the more cost-effective solution would be ClearCube. WestLB was going to have to buy new PCs because they were at the end of their life cycle. With the reduced IT costs and reduced downtime, the benefits of the blade PCs became far greater than the costs. "We broke even in the first year, and we're enjoying an ongoing lower total cost of ownership for the maintenance and operations," concludes Toews. "For me, it's just a good deal."

Based on information gathered from WestLB, IDC estimates that through reductions in costs, increases in user and IT productivity, and reduced lost revenue due to downtime, WestLB has enjoyed combined annual benefits of nearly \$5,000 per user, based on an annual investment of \$870 per user. Using an NPV methodology and a discount rate of 12%, IDC estimates that WestLB will reap a 270% ROI and achieve payback in a little over 10 months.

Plans to Expand Use of ClearCube

Asked about plans to use ClearCube elsewhere in the organization, Toews exclaims, "We already are! We started with the trading floor because of all of the benefits discussed, but we've already started installing ClearCube in the back office. The executives have really taken to the physical benefits of the technology. They like not having a PC under their feet. They like the quietness. They like the 'cleanness' of the solution. I don't think anyone wants to go back to having PCs under their desks."

Healthcare

To study the experience and impact of ClearCube technology in healthcare delivery, IDC interviewed five healthcare delivery organizations, including hospitals and clinics, in the United States. These organizations implemented the ClearCube solution with the goals of reducing overall operating costs, increasing security, and decreasing downtime. Participants from all organizations say that the ClearCube technology has met or exceeded their expectations in these areas.

Several participants note how the ClearCube solution supports their philosophy of excellence in healthcare; in particular, they note that it is quieter and more sanitary than traditional PCs. All participants report a major difference in their doctor-patient experiences, saying that the centralized blade clients allow them to avoid entering the patient care areas and interrupting medical processes. Participants are also very pleased with the smooth implementation of the ClearCube solution, which uses existing cabling and software.

The organizations interviewed for this case study are using the ClearCube technology in all healthcare delivery areas, including operating rooms, exam rooms, birthing stations, nurses' stations, labs, and doctors' offices. One organization has expanded its use of ClearCube solutions into its administrative area, based on its success with ClearCube in the healthcare delivery areas.

This case study of healthcare delivery organizations begins with a profile of a midsize suburban hospital using the ClearCube solution and concludes with a summary of the select experiences of other healthcare providers using ClearCube systems.

Hospital Profile

In keeping with its philosophy of excellence in healthcare, a U.S. suburban hospital with several hundred beds set out to update parts of its IT operations with several goals in mind:

- Decrease IT operational costs
- Reduce IT security risks
- Reduce the risk of infection in patient care environments
- Increase the serviceability of the IT infrastructure
- Reduce end-user computing downtime

The hospital was also looking for a way to reduce the degree to which technicians interrupted the patient-doctor experience while supporting end-user computing devices.

Increased Efficiency of IT Operations

The hospital initially decided on a trial of the ClearCube blade solution in its administrative offices, installing 55 blades to serve hundreds of users. The implementation has been very successful, and end users like the quieter operation of the equipment and the increased reliability. The IT staff has also benefited from the increased reliability of the blade architecture, which has helped it to increase its efficiency. With the ClearCube machines, "we're 90–100% more efficient in terms of the help desk functions and in terms of managing and supporting the desktops," says the director of IT.

The IT staff is receiving fewer calls to the help desk since the ClearCube implementation. According to the director of IT, "For the ClearCube desktops, I don't think we've gotten any calls yet, and we've had them in production for almost a year!" The blades are secured in a closet, so there is no way for users to add unsupported software, and there is less physical disturbance to the CPU.

When there is a problem, the ClearCube blade clients are easier to service. ClearCube's switching capability enables IT to quickly swap a user from a failed blade to another one, and remote management software allows IT to access the blade from any location. While it previously took between 45 minutes and an hour of work to get a user up and running after a problem, it now takes "about two minutes." Replacing a blade experiencing a problem is simply a matter of taking out the problem blade and inserting another with the IT department's standard image. For a traditional PC, the IT department had to retrieve, reimaging, and return the device, a much more time-consuming effort.

The IT department has virtually eliminated tasks such as securing hardware assets and inventory control because the key equipment is "all in one closet." Was the cost of installing closets worth it? "Absolutely," says the director of IT. "The blades cost about the same as a PC. It's very competitive. The cost of the closets have been paid for because of the efficiency gains." Additionally, the ClearCube solution has helped to save space overall, a big benefit in an environment in which "real estate is at a premium."

The director of IT says the bottom line is that it takes 90% less time to do things such as:

- System setup/configuration
- Software installation
- Hardware/software asset management
- Repair/restoration

Improved Security

Beyond the increased operational efficiencies, the hospital is finding that its IT security has increased. The computing devices (blades) are no longer in rooms that the public can access; therefore, patient information is more secure and hardware is less vulnerable to theft by the general public. "We'll avoid the costs of PCs being stolen, which has happened once or twice a year," the director of IT relates. "When PCs were in public areas, people would steal the hard drives right out of the machine ... right off the desk. We'll also avoid the cost of having to track them down."

End-User Benefits

From the end-user perspective, there has been a significant reduction in the downtime that a typical user experiences. ClearCube users experience about 75% less downtime than users of traditional PCs at the hospital. Users are very pleased with the reduced downtime and the speed with which they can get up and running after a problem occurs. The IT director reports that users are each saving about an hour a week because their workstations do not have any way to burn disks or download from floppies/CDs.

Future Plans

The initial success of the ClearCube solution has led the hospital to make plans for doubling the use of ClearCube equipment within a year. As currently installed PCs reach the end of their planned life cycles, the IT organization is rolling out the ClearCube solution to replace them. According to the director of IT, "I expect that it will reduce our maintenance costs all around, especially in terms of ghosting and getting things imaged and out onto the desktop. Also, I expect savings in terms of repairs, asset management, and more."

Eventually, the hospital intends to use ClearCube in the operating room (OR), taking advantage of the accessibility of the computing blade outside of the OR. Going into the OR to fix a simple problem requires a technician to put on scrubs. With ClearCube, a technician would not have to go into the OR unless a monitor malfunctions, which rarely happens.

As a result of the operational efficiencies gained from the ClearCube implementations, the IT organization is saving money by avoiding new hirings as the hospital grows.

ClearCube is helping IT to deal with significant pressure to reduce costs. The director of IT expects much more savings as ClearCube is rolled out to more of the organization.

In the Words of Healthcare Providers

This section features excerpts from interviews conducted with other healthcare providers about their experiences using ClearCube solutions. Among the other healthcare providers interviewed were:

- ☒ Northwestern Memorial Physicians Group (NMPG), a network of primary care medical clinics associated with Chicago's Northwestern Memorial Hospital
- ☒ Duncan Regional Hospital, a 148-bed nationally accredited hospital located in southwest Oklahoma
- ☒ Oklahoma Heart Hospital, an Oklahoma City hospital dedicated exclusively to preventing and treating cardiovascular disease

Ease of Implementation

The participants are very pleased that the ClearCube implementations went quite smoothly using existing cabling and software. Jeff Jones, MIS Team Lead at Oklahoma Heart Hospital, reports they are able to "run the exact same software on ClearCube blades as we do on [traditional PCs]."

Security of Patient Information/HIPAA

HIPAA was an important factor mentioned in most interviews. Respondents say the security of patient data has increased with ClearCube because the C/Ports do not have floppy drives, eliminating the ability to download data. In addition, PCs or hard drives cannot be stolen. Guy Fuller, Information Technology Manager at NMPG, notes another aspect of how HIPAA is a driver for his hospital. "ClearCube allows us to use proximity sensing devices so that if a physician leaves the room, his computer information is automatically locked. If he comes back into the room, the computer is able to engage again based on the proximity badge that each physician or medical assistant wears." Fuller adds, "We feel that we are now truly HIPAA compliant [with ClearCube]. We feel that we have a truly managed environment."

Performance and Flexibility

Jones of Oklahoma Heart sees ClearCube as a way to leverage technology in ways that he was never able to before. "We look at the benefit of ClearCube differently than most people. Many people look at it for security or management. We look at it for the service level that we can provide to the end user, the flexibility for customization ... We're all digital ... we want to be on the leading edge, and you can't do that when you're tied down with a dumb terminal." Jones cites several performance gains in using ClearCube's blade architecture compared with the hospital's prior thin client solution, saving users valuable working time.

Improved Sanitary Factors

According to several respondents, a big reason for implementing ClearCube is to make the patient care rooms more sanitary by eliminating the risk of infection from PC cooling fans used in those rooms. As Oklahoma Heart's Jones says, "Originally, when we were building this place, we didn't want to have any fans in patient rooms or any patient care areas. We didn't want fans spreading infections. If someone has tuberculosis or [other infectious disease], and they are coughing around the computer, the fan is going to suck it inside. When someone bumps the computer later, it can dislodge the infectious dust and blow it out. This is a real problem. It's a possible source of disease."

Improved Patient Comfort

Several of the healthcare providers stress the importance of eliminating equipment noise — from whirring/grinding disk drives to humming fans — in patient care rooms and observe that ClearCube eliminates these noises. Jones of Oklahoma Heart emphasizes the importance of the physical environment in determining what goes into a patient care room. "This hospital was built around the concept of patient-focused care. Everything is built around patient comfort." He adds, "People notice things like fans." Others note different benefits of eliminating noise. As Roger Neal, Director of

Information Services at Duncan Regional Hospital says, "If an expectant mother comes into our birth center in the middle of the night, we want it to be quiet. It's a great personal moment. We don't want the fans running and PCs beeping and other noise from machines running in the room." Also, as Jones comments, "When you've got a patient sleeping, you don't want a hard drive grinding in their ear ... or fans blowing."

Cost Reduction and Avoidance

Every organization interviewed has experienced a reduction in the cost of client-based computing by implementing ClearCube blade technology. Several organizations note significant improvement in the utilization of the IT staff's time. For example, NMPG's Fuller reports, "We added 120 blades, but did not increase the number of administrative support staff." Jones of Oklahoma Heart comments that his hospital was going to have to increase the air conditioning in the operating rooms and patient care rooms because of all the technology they house. With ClearCube, he notes, "You can consolidate the A/C in one data closet and not have to worry about PCs spread out all over the place. All those BTUs add up."

Future Use of ClearCube

Citing the benefits they have realized thus far, all healthcare providers we interviewed plan to increase their use of the blade architecture.

APPENDIX

IDC's ROI Methodology

IDC has developed an ROI methodology that measures the total costs of deployment and the sum of the savings achieved. The methodology calculates the ROI in a three-step process:

1. **Ascertain the investment** made in the purchase and implementation of the solution and the associated training and maintenance costs. To get an accurate assessment, IDC asked for the deployment, setup, upgrade, and maintenance costs, as well as the total cost of the software and training.
2. **Measure the gains** in IT staff and user productivity from deploying the solution, revenue recaptured from reduced downtime, and cost savings from increased IT staff efficiency and lower capital and operating expenses. Even in the full business case, most of the savings were hard-dollar savings and only a small fraction would be considered soft savings.
 - **IT staff productivity** indicates how effectively IT managers and their staffs use their time. Besides reducing operations costs, gains in IT productivity can free up staff to implement new initiatives more rapidly, helping to create a competitive edge. Providing the productivity boost required to grow the business while keeping the IT staff headcount level flat is considered a hard savings area because only a fraction of the overall time saved by the team is counted toward a hard ROI result.

- ❑ **User productivity** is increasingly dependent on service uptime as organizations become progressively more network-centric. When users are unable to access network resources, their productivity may be severely impaired. User productivity also suffers when employees have to wait for help desk support or other IT administrative tasks. Because users often are able to move to other business applications when service interruptions or performance degradations occur, only a small fraction of the potential user impact time is counted toward the final ROI result.
- ❑ **Recaptured revenue.** Higher service availability also contributes to a business' top lines because less revenue is lost due to downtime and potential service penalties are avoided. Additionally, downtime can be costly in terms of diminished customer satisfaction and possible loss of a customer's business.
- ❑ **Cost savings.** IT staff efficiency is a measure of how well the IT management organization can achieve economies of scale and scope of work with its people, tools, and practices. To remain competitive, companies must be able to grow their systems and networks at a faster rate than the IT staff required to support them. Skilled IT professionals continue to be scarce; therefore, companies are expecting existing staff to take on more work and responsibilities. Because improved IT staff efficiency reduces payroll costs, the savings are hard savings. Other hard savings include cost reductions from lower travel expenditures and from reduced spending on hardware, software, communications, and facilities.

3. **Calculate the payback period and ROI for the deployed solution.** From the results of the interviews, IDC was able to calculate the average payback period and rate of return from investing in ClearCube client blades, as well as the net present value of the savings. IDC also calculated a separate hard ROI using the hard savings and excluding the soft savings from improved IT staff and user productivity.

IDC bases its calculations on a number of assumptions:

- ☒ Time values are multiplied by burdened salary (salary + 40% for benefits and overhead) to quantify efficiency and manager productivity savings.
- ☒ Downtime values are a product of the number of hours of downtime multiplied by the number of users affected.
- ☒ The impact of unplanned downtime is quantified in terms of impaired end-user productivity and lost revenue.
- ☒ Lost productivity is a product of downtime multiplied by burdened salary.
- ☒ Lost revenue is a product of downtime multiplied by the average revenue generated per hour.

The net present value of the three-year savings is calculated by subtracting the amount that would have been realized by investing the original sum in an instrument yielding a 12% return to allow for the missed opportunity cost. Because every hour of

downtime does not equate to a lost hour of productivity or revenue generation, IDC attributes only a fraction of the result to savings. As part of our survey, we asked each company what fraction of downtime hours to use in calculating productivity savings and the reduction in lost revenue. We then tax the revenue at that rate.

Further, because IT solutions require a deployment period, the full benefits of the solution are not available during deployment. To capture this reality, IDC prorates the benefits on a monthly basis, then subtracts the deployment time from the first-year savings.

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