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WHITE PAPER

The Path to Enterprise Desktops: From Personal Computers to Personalized Computing

Sponsored by: VMware

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IDC OPINION

The world of client computing within the enterprise is in the midst of reevaluation. Not only are user needs increasing in diversity and complexity, but the increased capabilities and mobility being made available to them are creating security risks and causing growth in management and support costs for organizations of all sizes.

In response to these growing challenges, CIOs and other IT managers are revisiting their client computing strategies and are increasingly considering a move toward a more centralized client environment. To accomplish this goal, a growing number of organizations are beginning to deploy (or pilot) desktop virtualization solutions such as VMware's Virtual Desktop Infrastructure (VDI) and Assured Computing Environment (ACE). These technologies leverage virtualization software to separate desktop environments from the underlying hardware on which they run, and in many cases, they are enabling greater levels of security and manageability than was possible within distributed desktop environments. All the while these technologies still maintain, to a large extent, the flexibility of the distributed model.

IN THIS WHITE PAPER

This IDC white paper considers the concept of desktop virtualization, specifically as made available by VMware's VDI and ACE. The document also considers the benefits and limitations of these technologies as well as the best use cases for each, exemplified through user case studies.

SITUATION OVERVIEW

From Centralized to Distributed Environments and Back Again

In the early 1980s, the IT landscape largely consisted of centralized computing environments. In this centralized model, the processing and storage of data were performed centrally while user inputs were made from fixed computer terminals at end-user locations. These terminal devices were connected to mammoth-sized mainframe computers located in a remote datacenter that processed the terminal inputs from the user and sent back the outputs to be displayed by those same end-user devices.

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As computer software became increasingly complex in both capabilities and hardware requirements, IT departments responded by pushing processing resources further out, moving processing power from datacenters toward department-level minicomputers and eventually out to PCs that sat on individual workers' desks. This move put unprecedented computing power, flexibility, and customization into the hands of end users, improving productivity and creativity. The invention of the laptop made possible the mobility of those computing resources.

Ironically, this transition toward a decentralized model became universal around the same time that sensitive data was increasingly being stored within the IT environment and users were gaining access to outside networks, introducing concerns around security.

Today, distributed computing environments have become the norm for virtually all enterprise organizations. Although the benefits of this model are clearly understood, many of the costs associated with the model are increasing substantially as environments scale. This is creating pain points for IT managers, including the following:

- **Total cost of ownership (TCO).** The TCO for an individual distributed desktop ranges significantly but in all cases is fairly expensive. These costs include hardware, maintenance, help desk support, change management issues including application provisioning and patching, and unplanned downtime limiting user productivity. In environments in which PCs are tightly managed, these costs can range from $700 to 1,000 per PC per year, and in very loosely managed environments, they can balloon to several thousand dollars per PC per year. With an approximate 496 million PCs distributed across IT environments, these costs are very substantial.

- **Security.** The stories about computers either walking off or being lost and exposing valuable data are becoming routine. The potential for this kind of physical theft or misplacement is very high with today's distributed desktops and, especially, notebook PCs.

- **Data loss.** With decentralized client environments, information is typically stored and processed locally. As such, a significant amount of data needs to reside on an individual user's computer, threatening data in the event of a local hardware failure. Even the most rigorous backup policies cannot eliminate this problem.

- **Regulatory compliance.** Governments have enacted laws and regulations designed to protect sensitive data in order to defend consumers, businesses, and government agencies. Many of these regulations are a result of the drawbacks of a decentralized computing environment and are easier to comply with by moving to a more centralized model. For example, in the U.S. healthcare industry, the Health Insurance Portability and Accountability Act (HIPAA) laws require that no patient medical information be stored on local PC hard drives. With centralized computing models, all data must be stored on the server, making compliance an essential part of the architecture. Similarly, in some regions, such as Japan, regulatory compliance is a primary driver for virtualizing certain components of the desktop environment.

In response to these problems, many organizations have transitioned portions of their user bases onto centralized computing environments through the adoption of solutions such as Citrix's Presentation Server and Microsoft's Terminal Services. These solutions effectively allow for the centralized processing and management of certain applications and can even offer users access to a centralized desktop environment. Though these solutions work very well in certain use cases, they have limitations and cannot offer the level of customization, compatibility, and performance to which users of corporate desktops have become accustomed. Compatibility, in particular, can be problematic because a single custom-built, in-house application that doesn't work (and can't be easily rewritten to work) in a shared application environment could prove to be a deal breaker.

The Next Generation: Desktop Virtualization

Virtual Desktop Infrastructure

Pioneered largely by VMware, VDI is similar in principle to the well-known server-based computing model facilitated by Terminal Services and Presentation Server, which allow for centralized desktop processing and storage.

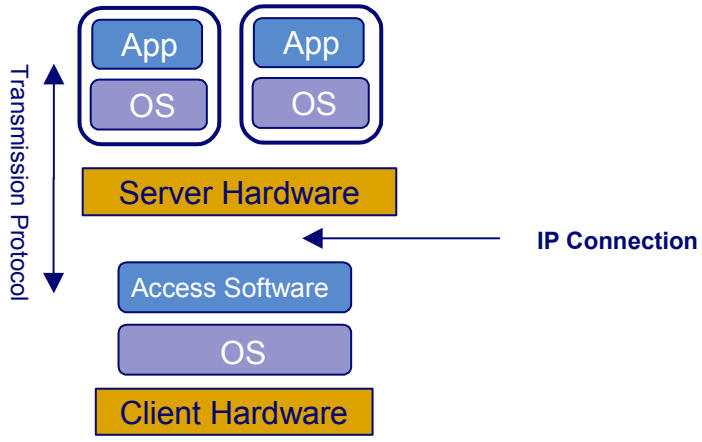
VDI takes this model one large step forward through the implementation of a virtualization layer to separate the centralized desktop from the underlying hardware on which it runs (see Figure 1). This separation facilitates a great deal of increased functionality from user and management perspectives.

VDI can be implemented by adopting VMware Infrastructure 3 (VI3) software. Using VI3 in this way enables an IT organization to run multiple, unique, isolated virtual desktops on one physical server. These virtual desktops are made up of a single-user copy of Windows (or any other client operating system [OS]) as well as typical PC applications, and they present to the user an environment that looks, feels, and operates exactly like a standalone PC. Users access these virtual desktops through local devices such as thin clients, diskless PCs, or even regular PCs that are located on an individual user's desk. Because these virtual desktops are actually running within the tightly managed and more easily controlled environment of the datacenter, they bring together many of the advantages of the centralized and decentralized computing models.

Operationally, on boot-up (or application start-up in the case of PCs with local storage), client devices usually run a piece of access software called a connection broker, which initiates the start-up of, or connects to, either a uniquely assigned virtual desktop or a shared pool of desktops via RDP or ICA.

FIGURE 1

Virtual Desktop Infrastructure



Source: IDC, 2007

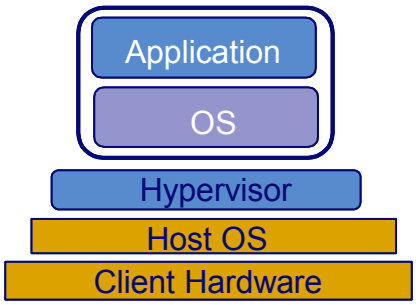
Because VDI is a server-based computing solution, users must maintain a physical connection with the server on which their desktops are running. As such, the VDI solution is network dependent, mainly limiting adoption to fixed users within the corporate environment. Additionally, because of the nature of the technology, the performance experienced with multimedia and three-dimensional graphics use can be very limited. To address these limitations, VMware also offers ACE.

Assured Computing Environment

VMware's ACE product allows organizations to create unique virtual desktop images that can be accessed on local (distributed) computers. With ACE, the virtual desktop images reside on the local device (or an attached portable storage device, such as a USB stick or an iPod, in the case of the portable features found in the new version of the product, ACE 2.0) in a completely isolated environment, ensuring security and eliminating conflicts (see Figure 2).

FIGURE 2

Assured Computing Environment



Source: IDC, 2007

These virtual images, which can be centrally created and managed, function identically to the virtual machines used in VDI. ACE images include a complete client OS (which operates independently of the host OS), as well as any applications, data, and user settings that are required. Users simply double-click on the virtual machine file and are presented with a desktop environment within their existing desktops. (For some end users, this "desktop within a desktop" concept may require a bit of simple training to understand.)

An example of an important real-world scenario for ACE would include an enterprise-managed and enterprise-controlled desktop environment running alongside a user's personal desktop environment. In other words, the corporate virtual machine environment could hold the standard OS image, application suite, settings, and so forth in a tightly locked-down manner, while the user environment could hold an individual user's personal photos, music, and any other applications or data that the user wants to carry around on his or her notebook. Because ACE isolates the two environments from each other, a virus attack on the user environment would have minimum to no impact on the corporate environment. In this way, both end users and IT managers can be satisfied; thus, ACE offers the best of both worlds.

One of the primary advantages of the ACE solution is that it can be processed locally, eliminating the need for a physical connection with a server. This enables the adoption of desktop virtualization technology for mobile users. Additionally, the isolated and encrypted nature of the virtual desktop enables access to corporate data without the security risks that plague unsecured mobile devices.

The advantages brought about by adopting desktop virtualization in its two forms are numerous and include the following:

- **Hardware independence.** By virtualizing the PC hardware, organizations can create a standardized desktop image that can run across a wide variety of different hardware devices on the desktop. In addition, because the same desktop image can run across multiple brands, models, and types of PCs, organizations don't have to worry about driver conflicts and other potential hardware-based incompatibilities. The isolation between software and hardware can also greatly reduce software-based problems because organizations can focus on creating standard desktop images that work within a single, fixed environment.

- **Portability.** Virtual machines are self-contained, encapsulated files that can be easily copied and moved from server to server or device to device.

- **Increased resource utilization.** Like servers, desktop devices have alarmingly low utilization rates. Using virtualized servers to host these desktop environments can increase utilization rates by factors of ten.

- **Increased security.** Virtualizing clients can significantly increase the security of endpoint data that would otherwise be vulnerable to theft. Centralized processing and storage allow for the complete separation of information from local devices.

- **Management.** Centralizing desktop environments, in conjunction with the appropriate application and desktop management tools, makes possible an increase in management efficiency. More important, in a virtual client environment, the focus of attention moves from managing diverse hardware to the capabilities, requirements, and data of each user.

- **Availability.** Centralizing desktop environments onto redundant server hardware increases the availability of the PCs by increasing fault tolerance. Additionally, both virtualizing and encapsulating these environments eliminate the physical hardware bond, enabling these environments to be moved dynamically from dysfunctional to functional hardware.

- **Ease of deployment.** Instead of having to go through the multistep, multiday process of ordering, provisioning, imaging, and installing individual client PCs, organizations can deploy new virtual clients very rapidly by plugging in a generic thin client and pointing it to the appropriate connection broker and/or virtual machine.

MAKING THE TRANSITION

Before adopting solutions such as VDI or ACE, organizations must recognize that neither solution can address all use cases. Thus, before deciding which solution to adopt for which users, organizations need to understand the factors that affect this decision. The following characteristics of user requirements should impact the decision around which desktop virtualization solution to adopt:

- **Mobility.** The extent to which users are connected to the IT network significantly affects the decision of which technology to adopt. Because VDI requires a physical connection between local device and server, users who do not have regular access to the corporate network would most likely be better suited for ACE, with which users can access and use their virtual desktops locally.

- **Graphics/multimedia.** The extent to which users access multimedia and graphics-intensive data should affect the decision around desktop virtualization adoption. The nature of server-based computing limits its ability to deliver multimedia and graphical information, and as such, users who require access to this type of data would likely be best suited utilizing local computing resources and could best utilize desktop virtualization through ACE.

- **Location.** The physical location from which users access desktop environments should impact the decision around desktop virtualization. Because VDI leverages datacenter resources, users typically access their desktops via highly fault-tolerant and inexpensive thin-client hardware. As such, users in physically dirty or theft-prevalent locations would be ideally suited for VDI if their other needs can be met. In contrast, ACE leverages local computing resources and requires users to have thick-client devices.

- **Relationship with organization.** Some users may be temporary contract employees, consultants, or partners. Therefore, the length of time users will require access to IT resources and the way in which users will gain access to IT resources vary. In these situations, ACE may work best because of the relative simplicity with which it can be provisioned, in addition to the ability to develop a virtual desktop's life span. However, VDI may also be applicable in these instances. Thus, organizations should spend time fully understanding user requirements and carefully planning which technology to deploy to which users.

- **Data access.** The type of data that users access should have a significant impact upon the decision of which technology to adopt. For example, for users who gain access to highly sensitive customer (or patient) information, organizations may need to ensure that no data is stored on the local device for regulatory compliance. In this case, VDI may ensure compliance, whereas ACE, while providing a significant improvement in the security of local devices, may not. In addition to regulatory compliance, the extent to which organizations allow localized access to sensitive data may impact the decision around which solution to adopt.

Given the functionality that VDI and ACE offer, it's easy to identify applications for which desktop virtualization is a very good deployment option:

- **Offshore environments.** For organizations that regularly deal with offshore workers who may or may not use company-purchased client devices, virtualization with VDI or ACE is a good fit.

- **Call centers.** Due to the task-oriented nature of most call centers, and the internal nature of the applications many organizations use, VDI may be an excellent solution. The ability to fully leverage centralized computing can improve security and desktop TCO while also offering high availability to ensure end-user productivity.

- **Disaster recovery.** Enterprises that need a solid, scalable disaster recovery mechanism will find that the portability of virtual machines in conjunction with the ability to easily and rapidly deploy new clients makes desktop virtualization a solid choice.

- **Highly secure environments.** In environments, such as government or military, in which data security is of the utmost importance, the centralized, hardware-independent nature of virtual clients makes them a good fit.

FUTURE OUTLOOK

By leveraging the power of desktop virtualization, desktop environments could become autonomous units that are fully secure and manageable. It is not hard to imagine an environment in which an end user could access his or her desktop from anywhere. For example, a user could access his or her desktop via a fixed computing device while in the office, and once the user leaves the office, either the applications or the full desktop could move from the user's fixed device to the user's mobile device, where it could be accessed on the road without network connectivity. Then, when the user accesses another device, from the office or on a home computer, the latest iteration of the desktop could move again from the user's mobile device onto the new hardware.

The flexibility and power of this pervasive desktop scenario are undeniably appealing to end users and IT organizations alike because they allow for the delivery of the capabilities that end users need to be productive and at the same time maintain the security and control that IT organizations increasingly require.

To realize this concept, IT departments will need to deploy desktop computing architectures that are highly flexible and dynamic, incorporating both localized and centralized components. With the growing use and performance capabilities of portable devices, the requisite hardware infrastructure to meet the needs of this kind of an environment is becoming increasingly available. Given the recent technological innovations available through desktop virtualization technology, it appears that the software infrastructure may not be too far behind.

CHALLENGES/OPPORTUNITIES

The adoption of desktop virtualization will require some organizations to completely rethink and rearchitect their client infrastructure. The benefits of transitioning to this environment are numerous and so are the uncertainties involved. The concept of virtualization may be clear and well understood for servers, but it's still new territory for clients, and it will take some time before all the implications of this move are fully understood and best practices have been clearly defined.

In addition, there are practical issues to consider. For example, in IT organizations that are split into desktop and server groups, who owns virtual clients? What happens to client support? The answers to these questions aren't technically challenging, but they may require a structural change within IT departments that can stall or even block the adoption of these technologies altogether.

From a cost perspective, the move to virtual clients may require the acquisition of more servers or new thin-client devices. Over time, these costs could be made up in real-world savings, but the initial outlay for some organizations could be difficult. Additionally, although Microsoft recently relaxed some of its licensing policies, some questions remain about the ultimate cost of virtual client OS licenses versus typical enterprise license pricing.

On the other hand, the flexibility offered by desktop virtualization could easily reduce other upcoming IT costs, such as the cost of transitioning to Windows Vista. With virtual clients, moving users from Windows XP to Windows Vista is a trivial process of pointing users to a different virtual machine "file" — in fact, it's equally easy to switch back and forth between the two operating systems.

In addition, by matching virtual client solutions with applications that can stream a single copy of an OS (or complete desktop image) across hundreds or even thousands of virtual machines, IT departments can dramatically reduce the efforts and hassles necessary to keep the corporate image completely up to date with the latest security patches, antivirus updates, and other critical fixes.

CONCLUSION

Desktop virtualization represents an intriguing blend of the future and the present. On the one hand, the concept of virtualizing client devices is an undeniably futuristic idea of true anytime/anywhere/any device computing — utility computing in its purest form. At the same time, it leverages the present-day realities of server virtualization, reliable high-speed networks, enormous CPU horsepower, and smart software.

For enterprises looking to combine the benefits of centralized computing architectures with the flexibility of distributed environments, desktop virtualization solutions also represent a practical, cost-effective blend of those two worlds. Tackling the requirements of today's security risks while satisfying the demands of end users is part of a futuristic wish list for many IT managers, but desktop virtualization solutions go a long way toward making those wishes a reality.

BUYER CASE STUDIES

Cardinal Health

Approximately 18 months ago, Cardinal Health consolidated 38 call centers down to two in support of one of their business units. The primary goal was to have a highly available desktop environment for workers to ensure high productivity while having a fairly lean support staff.

To achieve this goal, Cardinal Health decided to implement VDI for its approximately 1,200 call center workers. The call center environment consists of small form factor, lightly configured PCs; a custom-built connection broker; and 2U rack servers with local storage that together run six pools of Windows XP desktops, each pool with its own unique set of applications. Cardinal Health runs approximately 20–30 desktop sessions per server.

One of the largest challenges posed to Cardinal Health by this project was the time frame in which it needed to design and implement the environment. In fact, according to the individual in charge of the project, the speed with which he was able to architect and implement the solution was one of the greatest advantages he gained from his deployment of VDI. Within six months of Cardinal Health's acquisition of the physical facilities, two world-class call centers were operational.

Since the inception of this environment, Cardinal Health has reaped the advantages that VDI is capable of delivering in terms of managing the environment. The most important advantages include wide-ranging performance monitoring, capacity on demand, disaster recovery, high availability in the event of a server failure, and automatic rollback of a virtual desktop to its original state upon user log-off, thereby eliminating any potential issues that were introduced during the most recent session. These management benefits have significantly limited the cost to support these environments, significantly lowering TCO.

Looking back on the decision to adopt VDI for its call center environments, Cardinal Health had to overcome some hurdles. One of the most difficult hurdles was the lack of previous deployments from which to determine best practices. In fact, according to the company, it was "first on the block" with the technology. Nevertheless, it was able to successfully deploy the model within a tight time frame, thereby helping to prove the concept to industry peers. Cardinal Health also reiterated the cultural challenge that IDC has heard so often in relation to VDI adoption. As mentioned earlier, VDI can require a great deal of rethinking in terms of how the desktop environment exists and is supported. Cardinal Health urges that organizations considering this solution fully recognize this difficulty so they can properly plan for and manage it. The company has also witnessed the potential for increased fragility of the environment and its network bandwidth, particularly when users attempt to access multimedia content.

Cardinal Health has enjoyed the benefits it has received through its adoption of VDI within these call centers and is actively looking for ways to expand the technology to other use cases such as its accounts payable and receivable departments.

Europe-Based Energy Company

A Europe-based energy company began effectively implementing a VDI environment in early 2006 for the purpose of providing desktops to call center staff outsourced offshore. The deployment has been a major component of a heretofore successful business process outsourcing (BPO) initiative and represents another example of how the dynamic nature of the VDI model is allowing IT to better support an increasingly sophisticated set of business needs.

This company successfully provisioned approximately 3,500 virtual desktops to these offshore call center users. Because of the manageability benefits that the company realized, the leader of the project told IDC that the company expects to fully virtualize its entire outsourced environments, eventually taking the count up to as many as 17,000 virtual desktops within the next five years.

VDI has been especially beneficial to the organization because of the nature of its agreement with its outsourcing partner. This agreement splits the responsibility of providing the IT infrastructure required to perform the necessary business functions. According to the terms, the energy company is responsible for providing the back-end technology, including servers, storage, and virtualization infrastructure, while its BPO partner manages the network connectivity and local end-user physical devices. The hardware/software separation enabled by VDI, coupled with the nature of the BPO agreement, has allowed for the efficient management of user desktops locally despite the vast distance between the corporate datacenter and the end user.

Though the company also considered competing virtualized client solutions before adopting VDI, the model's ability to provide unique virtual desktops, each with a unique OS image per user, offered significant advantages. In addition to the improved manageability capabilities, the company was able to limit the amount of testing necessary before implementation, which offered a significant advantage over some of the other solutions available given the time frame requirements of the project. With the other solution alternatives, the testing and development time would have taken at least six months, according to the project manager; with VDI, the project was completed in three weeks. Additionally, because of the speed with which virtual desktops can be deployed, the organization can be much more flexible and quickly provision new desktops to remote users — a task that used to take weeks.

Another reason that the organization adopted VDI instead of the other available options was a function of the project's application requirements and network limitations, such as latency and bandwidth requirements. The advantages that server-based computing offered in terms of these requirements were profound. In fact, the project manager stated that adopting VDI saved the company over 1 million pounds in WAN costs.

Despite the great success that the company achieved through its adoption of the technology, it had to overcome some major barriers — largely cultural barriers — beforehand. One of the most difficult barriers to overcome was the fact that the concept was relatively new, and at the time of deployment, such an infrastructure had not yet been largely proven within the industry. This represented a great risk to the IT organization and required certain individuals not only to evangelize the concept but to take on a great deal of personal responsibility if things went badly.

After the success of its original offshore deployment, the company has continued to find use cases for the technology. Because of the quick time to deployment, VDI is also being used within the organization for tactical situations in which it needs to provide a range of desktops to users in a secure environment within a very short period of time.

Additionally, the company looks forward to further adoption of the technology within its environment. It also anticipates using VDI together with tools such as application virtualization, which has the potential to improve the manageability of a virtual desktop environment and help IT move closer to the ideal of a truly dynamic desktop environment.

TSI Terminal Systems

TSI Terminal Systems is a port management company based in Vancouver. The foundation of its profitability lies in the automation and efficiency of its operations. To this end, the company has been better able to achieve its business goals through the adoption of VMware's ACE technology.

TSI uses ACE in two major ways: for the provisioning of test environments to its quality assurance personnel and for the efficient provisioning of training environments. The company was an early adopter of the technology, implementing it two weeks after its official release.

Using ACE to provide a locked-down environment with a known good state has dramatically improved the effectiveness with which application testing operations can be performed. Additionally, from a software testing perspective, the ability to roll back to a last known good state improved the ability of assurance staff to test changes made to an application.

In addition to the testing environments for its quality assurance personnel, TSI also has used ACE to effectively and very efficiently provision desktop environments into rented training rooms. Because the desktops are in rooms that are not dedicated to training, they do not have the proper applications installed. Provisioning and then deprovisioning the necessary applications onto these desktops was a very laborious task and dramatically limited the efficiency with which TSI could train employees. Using ACE, the IT staff can now deploy an isolated and fully tested ACE image onto these desktops without having to worry about installation hassles or software conflicts. As a result, TSI has been able to dramatically increase the throughput of its employee training program, which recently educated 1,500 employees over a 10-week period.

An additional benefit realized by TSI through its adoption of ACE has been its disaster preparedness. Because of the hardware-independent nature of ACE desktop images, they can be deployed with relative ease onto remote hardware in an employee's home. In the event of a disaster, employees using ACE can access their corporate environments remotely, thereby eliminating downtime if it is not safe to travel or to be in the office.

In the future, TSI looks to increasingly utilize ACE for other lines of business personnel to provide for increased worker mobility and to improve management efficiency and security.

Kane County

Kane County, a governmental organization, was one of the first organizations to adopt VDI — with great success. Thus far, it has deployed approximately 400 virtual desktops, and over the next three years, it expects to provision virtual desktops to as much as 80% of its user base.

Originally adopting VDI to deploy a legacy application, Kane County is increasingly realizing that a virtual desktop environment can significantly improve upon the traditional distributed computing model prevalent today. In addition to the tactical ability to deploy its legacy application, the nature of centralized computing and its centralized data storage have enabled Kane County to more effectively comply with governmental regulations, such as HIPAA, that are focused on improving the security of sensitive data.

One of the areas of greatest benefit for Kane County has been desktop management. Many of its users are geographically dispersed, and by using highly fault-tolerant thin-client devices and virtual desktop environments that can be centrally managed, the company has almost eliminated the need to perform onsite desktop support for the users to whom VDI was deployed. Additionally, the adoption of VDI has significantly improved hardware utilization rates. The county is able to run as many as 70 virtual desktop environments on one physical host, which translates into an approximate 70% utilization rate; this rate is significantly higher than the rates for distributed

desktop computer hardware, which range from 5% to 10%, according to IDC estimates. Because of the separation between the desktop environment and the physical hardware on which it runs, VDI is also enabling Kane County to improve upon business continuity and disaster recovery capabilities. In the event that a user corrupts or in another way destroys his or her desktop environment, IT is able to quickly restore that user's desktop, limiting downtime and lost productivity.

As is common in the adoption of any virtualization technology, Kane County had to overcome obstacles, primarily of a cultural nature. The project manager for Kane County's VDI deployment, David Siles, felt that most of these cultural issues stemmed from a lack of a core understanding of what virtualization technology can do. To address these barriers, he came up with the idea of setting up an isolated test environment for users and other interested parties to compare their computing experience using a desktop PC against using a virtual desktop accessed through a thin-client device. After completion of the experiment, the vast majority of users were not able to notice a significant difference in the functionality of the two devices. As a result, many people within the organization became increasingly open-minded about adopting VDI as an alternative to the traditional distributed computing model. This open-mindedness was further accelerated when users considered the space that they would save on their desks when using a thin-client device as opposed to a minitower desktop. Thus, Siles' experiment was able to significantly improve upon users' overall impressions of VDI.

As one of the first organizations to adopt the technology, Kane County has learned a great deal about best practices for the adoption and integration of VDI. According to Siles, IT managers must optimize the efficiency with which the desktops run in a virtual environment. By performing memory shaping, disabling screen savers, and clustering similar users together onto the same hardware, Kane County has been able to maximize the efficiency with which its virtual desktops run.

Siles also told IDC that he and his department are very satisfied with the benefits that they have received through their implementation of VDI technology. As a result, they plan on expanding their adoption of the technology to new use cases, ultimately with the potential of increasing the deployment of the technology to as much as 80% of their user base.