

White Paper

Desktop Virtualization: Benefits and Best Practices for Solution Implementation



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DESKTOP VIRTUALIZATION

AUTHORIZED CONSULTANT

INFRASTRUCTURE VIRTUALIZATION



Desktop Virtualization: Benefits and Best Practices for Solution Implementation

VDI Lowers Costs and Improves Manageability

Background

From small businesses to enterprise organizations, everyone agrees that ultra-low PC prices don't mean much when considered from the perspective of the total cost of ownership (TCO). The cost of managing PCs continues to rise, dwarfing the cost of acquisition easily by 2-to-1. In fact, one respected technology analyst firm, IDC, last year estimated that the costs associated with managing PCs could be well over \$1,000 per PC per year.

Companies are seeking an alternative to the increasing proliferation of PCs that seldom, if ever, operate to full potential. These systems require on-going and often costly maintenance and upgrading. Companies want technology solutions and infrastructure strategies that contribute to IT optimization, lower TCO, increase ease of use, and empower greater productivity of staff.

These are the results delivered by Mainline's award-winning Open Systems Solutions Group and our dedicated team of desktop virtualization experts. As the first VMware National Premier Partner, Mainline developed the first bundled solution offering for desktop virtualization, bringing together all solution components needed to deliver a cost-effective, centralized solution that meets budget and green computing solution plan requirements. And, as the recipient of the 2009 Global VDI Partner of the Year award from VMware, our expertise is industry leading and based upon real-world deployments that span over 300 proofs of concept, over 150 production deployments and over 30,000 VDI seats.

Read further to discover the benefits and best practices for implementing your Desktop Virtualization Solution and how Mainline can help you to achieve break-through results.

Overview

During the 1970s and 80s, the marketplace transition from green-screen terminals with the mainframe to decentralized desktop PCs and laptops meant performance enhancements in multimedia, lower hardware costs, improved data accessibility, and mobility of information resources. Over the long run, however, consumers discovered that the benefits of personal computers were often outweighed by the costs of management and maintenance, as well as the need for more strict data security. Businesses and organizations have discovered that there are clear, sometimes significant, downsides with the decentralized PC computing approach. Consequently, they began to re-evaluate how their technology assets are deployed and managed in a PC-decentralized environment.

Such evaluations often reveal that more than 70 percent of the total cost of ownership in a desktop computing scenario is focused on equipment purchase, deployment, repair, maintenance, upgrading and replacement. With approximately 500 million PCs distributed around the world, the costs can be substantial. With growth in company size, IT organizations are constantly in need of bigger budgets, larger staffs and more space just to keep up.

Despite these factors, studies have also determined that desktop resource utilization rates are alarmingly low, and that an abundant amount of hardware capacity sits idle for prolonged



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periods. Overall, while capacity utilization on x86 servers is generally only between eight and fifteen percent, for the desktops accessing those servers, it is a paltry three to five percent.

To address this issue of improving capacity utilization, more and more companies, and IT departments, are implementing datacenter-centric solutions, such as server and storage consolidation through virtualization. With the promise of a new day in desktops, companies are taking a “return-to-the-mainframe” mentality, leveraging these same solutions, and in many cases, the same IT skills, to re-deploy desktops. Via mainframe-inspired x86 server hardware located within the datacenter, the entire desktop operating system and application stack can be virtualized, delivering a complete multimedia experience that users have become accustomed to, but without the security concerns and spiraling management costs of the traditional ‘fat client’ PC approach.

The Virtualized Approach

“Virtualization” is simply defined as the masking of server resources, including the number and identity of individual physical servers, processors and operating systems, from the actual users. Virtualization involves consolidating a large number of individual machines - servers, storage devices and/or desktops – onto a single system, with the number of hosted virtual machines being determined by the capacity and performance of the new underlying physical server device. This significantly improves manageability and enables a more efficient use of human and system resources by allowing prioritization and allocation by workload based upon user-defined rules. Contrasting sharply with the utilization figures cited above, IDC reports that virtualization architectures can now safely leverage over 90 percent of a server’s capabilities.

IDC experts have also forecasted that the virtualization services market will increase from a \$5.5 billion market level in 2007 to an estimated \$11.7 billion by 2011. One IDC analyst has stated that it may be possible to see annual growth rates in the 40 percent plus range in the x86 market segment alone – an area where Mainline has developed significant experience and expertise.

Mainline’s Solutions for Desktop Virtualization

Virtual Desktop Infrastructure – often called VDI or thin-client computing – is not a new concept. Having appeared over 15 years ago in the form of Microsoft Terminal Services on Windows NT, the methodology morphed as Citrix became a viable alternative for application delivery. While these past alternatives have solved certain needs, Mainline offers a different approach for solving this significant issue: controlling computing costs with centralized management without infringing on the user’s personal control of the computing environment. Simply stated, desktop virtualization is the most comprehensive approach to centralizing the desktop computing process since the days of the green screen terminal.

In 2007, Mainline developed the first bundled solution offering for desktop virtualization, bringing together all of the solution components needed to deliver a complete yet cost-effective solution, that in many cases was cheaper per seat than the cost of a comparable desktop.



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Mainline's strategy for desktop virtualization permits companies to host individual desktops inside virtual machines – in some cases, on the same hardware platform with adjacent virtual machines hosting virtual servers – but on more reliable, more fault-tolerant industry-standard x86 servers. Users can have the flexibility to access their desktops remotely from any PC or thin client in the world using the remote desktop protocol (RDP) or the more high-performance, PC-over-IP (PCoIP) protocol. With the operating system and applications managed centrally within a corporate data center, organizations gain better control over their desktops, as well as the data that these desktops access.

Operating system and application installations, updates, patches and backups are completed easier and faster when desktops are all aggregated centrally as virtual machines within your datacenter, making it easier to deploy to end users without the necessity of visiting individual desktop systems or pushing multiple updates via SMS or other third-party desktop management tools. This provides easier management, consumes less network bandwidth for updates, and speeds fulfillment of specific application and resources needs for certain users, as well as simultaneous global changes and updates for *all* users.

By applying the prevailing methodology of server virtualization and consolidation to a desktop environment, Mainline can reduce a significant cost component of every business – desktop management – while making significant contributions to IT optimization. Such contributions include:

- Improved security and backup of important company data by moving that data off devices that can be lost or stolen onto more reliable enterprise-class storage, meeting many regulatory compliance requirements
- Lowering the IT operations and maintenance costs associated with a desktop by as much as 28%, while reducing helpdesk calls by over 50%
- Reducing power by up to 90%, while increasing the productivity of IT personnel required to manage that environment by 78%
- Centralized management and control, reducing time for setup and deployment by up to 50%
- Doubling, even tripling, the number of desktops managed per IT administrator

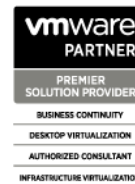
Desktop Virtualization Solutions on IBM System x or BladeCenter

Mainline's portfolio of Desktop Virtualization offerings is built on a hardware foundation of IBM System x or BladeCenter servers. These x86 servers couple the mainframe-inspired IBM X-Architecture design with industry-standard, cost-optimized components to deliver scalable, enterprise-class rack-based and blade servers of unmatched quality and performance with proactive tools that reduce complexity, improve reliability of virtualization environments, and aid in becoming more energy efficient.

With VDI built upon IBM servers, PC users can enjoy the benefits and personal control of a stand-alone desktop, while reducing many of the management challenges related to current stand-alone desktop environments such as desktop device failure. VDI, in general, is more reliable than traditional PCs as virtual machines boot faster, are less susceptible to hardware failure, and can be dynamically upgraded in processing, memory and storage capacity unlike their physical counterparts. Other benefits include limiting susceptibility to theft and viruses,



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speeding the deployment of new users and eliminating the need to rebuild preferences and migrate data after each client "refresh."

Effective Partnerships with Industry Leaders

In addition to our 20+ year partnership with IBM, Mainline Information Systems was recently awarded "VMware's Global Desktop Virtualization Partner of the Year" at VMware Partner Exchange 2010. Coupled with other awards from VMware and Wyse, there remains little doubt that Mainline has achieved a measure of success in desktop virtualization that no other solution provider can claim.

To provide our customers with the options that best suit their individual needs, Mainline has forged strong partnerships with industry leaders for all components of the VDI stack. Features and benefits of individual components within the Mainline Desktop Virtualization Solution offerings include the following:

IBM Hardware

- IBM BladeCenter blade servers are the epitome of consolidation, combining multiple servers in a single chassis with shared power, cooling, networking, and storage infrastructure.
- System x scalable servers built with eX5 technology offer unmatched virtualization performance, mainframe-inspired reliability and industry-leading virtual machine concentration.
- IBM System Storage allows organizations to take advantage of consolidating and sharing data in a direct-attach or Storage Area Network (SAN) solution, a critical component to the live migration capabilities of virtual machines.

Thin-Client Desktops and Laptops from Wyse and Others

- A more cost-effective, "disposable" yet reliable solid-state alternative to traditional PCs with up to twice the longevity of traditional desktops, at one-half the price
- Empowers end-users to run Windows XP, Windows 7 and Linux applications directly from data center servers through RDP or PCoIP without sacrificing the end-user experience
- Enables centralized applications management, network plug-and-play convenience, higher security and reliability, and wireless or Ethernet connectivity

Systems Management

- IBM Director is an integrated, easy-to-use suite of tools, which provides flexible systems management capabilities to help realize maximum systems availability, while reducing complexity.
- The IBM Virtualization Manager extension to IBM Director lets users discover, visualize, and manage both physical and virtual servers, as well as desktops, from a single console.

VMware View

- Can virtualize desktops, storage and networking, allowing multiple unmodified operating systems, and their applications, to run independently in virtual machines, while sharing physical resources without concerns for application compatibility of competing platforms
- Includes advanced functionality such as connection broker software for user management, tools for storage optimization, offline access, as well as application virtualization



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Consulting Services

- Mainline professional services are designed to identify and architect an appropriate solution based upon the unique requirements of your environment and budget.
- Mainline can lead a pilot or proof of concept within your environment to test the technology with your applications and network prior to production deployment.
- Mainline can deliver post-sales technical support for all components of the virtual desktop solution to give you a single point of contact for any post-deployment issues.

Desktop Virtualization From Mainline Addresses Traditional Thin-Client Issues

The contributions of the partners and components listed above combine to create a cost-efficient and customer-tailored virtual desktop solution – the first-ever bundled solution offering that eliminates many of the issues that may have been stumbling blocks to adoption of these advanced technologies.

Historically, application compatibility – particularly for custom-built, in-house applications – was a problem in some thin-client deployments with competing application virtualization platforms. For that reason, some organizations were unwilling or unable to deploy thin clients, or they struggled to make the solution perform, after the fact. Second, performance issues arose in some environments because of the manner in which application sharing was architected. Finally, there was the simple issue of “corporate ego.” In some user opinions, a thin client has been interpreted as a technological step down from a real PC, taking away an employee right to desktop computing of his or her choice rather than what the company would allocate to that employee based upon job requirements and company policy.

All three of these issues can now be addressed with desktop virtualization, as implemented by Mainline. First, each user has a customized version of Windows XP or Windows 7 that can be centrally managed and deployed. Running the operating system and applications within isolated virtual machines eliminates any application compatibility issues typically associated with shared services, without sacrificing the end-user computing experience.

Regarding the second concern (performance), depending on how the virtualized session software is configured, front-of-screen performance on client platforms can be greatly improved, and even dynamically altered on the fly. In some cases, the entire OS image can be ‘streamed’ to the clients with all operations executed locally, just as if the thin client was a standalone PC. In others, each client can be allocated a dedicated amount of CPU capability from the server, which can improve performance even when using screen protocols typical in traditional thin-client environments. In some cases, multiple CPUs can be allocated to a single virtual machine, providing the possibility of faster performance on the thin client than on a dedicated PC.

Very simply, Mainline with VDI takes a full-featured operating system, such as Windows 7 and runs it on an IBM System x or BladeCenter Server in a secure managed datacenter environment. As stated previously, virtual machines created from within VMware ESX Server, further simplified with the Connection Broker, are the new desktop device delivering portability, isolation, reliability and performance. With this approach to thin-client computing, users retain all of the PC experience and, at the same time, realize all of the savings possible through centralized PC management.



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IT Investment Optimization Through Mainline VDI

Mainline's Solutions for VDI empower companies, and organizations of all sizes, to realize multiple benefits from a unique approach to desktop deployment and management. Chief among desktop virtualization benefits is the contribution the solution offers in the area of IT investment optimization. According to IDC, "Not only do operational costs far exceed the budgets for new hardware, they are growing at approximately two and a half times the compound annual growth rate." CIOs across the country, and around the world, are not just being asked to do more with less, but also to deliver an infrastructure able to keep pace and adequately respond to multiple business needs. "Position the company for growth and success...but do it on last year's budget...or less." VDI with Mainline can help improve utilization of existing system resources, reduce complexity and cost, and improve response time through virtualization and provisioning to maximize your investments and deliver what we call the 'Day-One ROI.'

Most businesses, and organizations considering virtualizing their desktop environments, have already made significant investments in legacy hardware and software like PCs, servers and networking equipment and methodologies. While much of this equipment can be leveraged for desktop virtualization, some additional hardware or software may be necessary to derive the full benefits. It is entirely possible that the costs associated with such acquisitions can be offset by the optimization benefits achieved by existing equipment and technologies, especially in light of the fact that desktop virtualization can be rolled into the company's annual refresh process, without impacting productivity.

Though users seldom notice the differences, the company enjoys optimal results from the technical merits of desktop virtualization.

- Partitioning – This is the division of a server's resources so that multiple virtual machines can run simultaneously on a single physical server device, allowing organizations to consolidate hundreds, even thousands, of concurrent desktop users in as little as 9U of datacenter rack space.
- Encapsulation – Everything about a virtual machine, including operating system and applications, is stored in files. For that reason, making, copying and moving virtual machines on the server is as simple as copying and moving files and directories. This provides increased reliability because users are able to move virtual desktops from one server to another while the desktop OS continues to run.
- User Isolation – Since virtual machines run independently of one another, crashes or viruses affecting one machine do not impact other virtual machines running on the same server. That means less downtime and sustained productivity. With a simple re-boot of the virtual machine, a fresh desktop can be created minus the malware.
- Hardware independence – The VMware virtualization layer abstracts hardware from the operating system and the applications. As a result, virtual machines do not care what the actual hardware is, making it possible to migrate virtual desktops from blades to racks without impacting user productivity.
- Consolidation – It is more cost-effective to manage fewer servers running at higher capacity than hundreds or thousands of physical desktop devices out in the field. Desktop virtualization combines the virtues of server consolidation, for better utilization with desktop virtualization, to ease the management burden and ultimately lower the overall cost of purchasing, deploying and maintaining the environment over time. By consolidating full desktop environments onto servers, businesses and organizations can



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quickly add new users, or recreate an entire workgroup department quickly, in the event of a disaster.

- Software Maintenance – A major drain on IT budget and time lies in the frequent and on-going need to patch operating systems and applications on PCs in multiple locations. In a virtualized environment, these files can be quickly updated on the server in a corporate data center once rather than having to push updates and hope for the best. Patching a standard virtual machine image is fast, efficient and totally transparent to users, returning control to the IT administrators championed with the care of the environment.
- 24-Hour Usage Potential – With Mainline's desktop virtualization solution, there is no need to let CPU resources lie dormant on desktops every night. Servers that support virtual machines by day can be easily repurposed by night for such business tasks as sales data analysis, supply chain optimization and data backup.

Other Benefits of Mainline's Desktop Virtualization Solutions

- User Familiarity – With virtual desktops, a user sees a working environment that is no different from that already used on a PC. With very little re-training, users logging onto Windows XP or Windows 7 will be greeted by their familiar Windows applications and customized desktop environment, like wallpaper and color schemes. Thanks to centralization, users gain the added capability of being able to access their same desktop from anywhere in the world at any time without concern for data loss.
- Lower Acquisition and Energy Costs – Thin-clients, desktop appliances acting as simple access devices, significantly drive down the cost of acquisition. Acquisition costs can be up to 30 percent lower than traditional PC costs, with power consumed in the thin-client environment reduced by up to 90 percent when compared with traditional PC deployment models. Based upon current costs for electricity (but not including additional costs for cooling), the power savings of a virtual desktop environment will pay for the thin-clients alone within 2 to 3 years.
- Expertise and Experience – Mainline's trained workforce, of industry-leading systems engineers, has expertise in both server and desktop virtualization that is second to none in the industry, acquired through more than 150 real-world deployments of all sizes and complexity. From consultation to proof of concept through to production, Mainline is the go-to solution partner for Virtual Desktop Solutions.
- Lower Management Costs – Faster deployment and repairs, as well as easier remote management, translate into less time needed to maintain a growing desktop environment. Because it can reduce the total cost of ownership by up to 35 percent over the life of the environment, desktop virtualization has been called by many "the future of the corporate PC."
- Improved Branch Offices Management – Businesses and organizations, with branch offices and remote employees, are better able to manage desktop environments and applications from their corporate data center, where backups, upgrades and complete maintenance can be performed from a single, central location. This reduces, or eliminates, the necessity to send IT administrators to those remote sites for diagnostics and repair.
- Regulatory and Policy Compliance – Mainline Virtual Desktop Solutions enable the transfer, consolidation and control of sensitive data normally stored on a PC back into the corporate data center, to maintain data integrity and meet corporate policy or governmental regulatory compliance requirements. This capability is particularly valuable in light of the Health Insurance Portability and Accountability Act (HIPAA), as well as



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Sarbanes-Oxley, and Gramm-Leach-Bliley legislations.

- Security and Reliability – Virtualizing a desktop environment centralizes sensitive data on a more easily managed, reliable and secure server. If a thin-client machine is lost or stolen, security is not compromised, confidential information is not released into the public and intellectual property is not lost. Since the thin-client has no hard disk, no sensitive data can be actually stored therein. The thin-client is simply the means for accessing data from the data center through an authorized user login and password, making it ideal for offsite facilities used for development, call-centers, order processing or other transaction-based tasks.
- Management Flexibility – Desktop Virtualization provides the ability to dynamically manage users, data access rights and desktop resources (such as CPU, memory and application use). User access can be tracked and users can log on from any thin-client, not just the assigned workstation. This leverages roaming profiles to ensure a consistent and personalized workstation experience every time.

Summary

Mainline Desktop Virtualization Solutions help businesses and organizations achieve a 25% or better return-on-investment (ROI) improvement versus their current desktop computing costs. Boasting exceptional performance and reliability at price-points lower than a comparable PC, desktop virtualization marks a true paradigm shift in the deployment of desktops. From standardization and ease of management, to improved security and lowered cost, and everything in between, desktop virtualization is built upon the power of industry-leading products and Mainline expertise. This creates a solution that is both timely, for today's cost-sensitive corporations, and simple for realizing ROI. As we witness the swing of the pendulum back to a more centralized PC computing model, away from the demanding free-for-all of today's cumbersome PC environment, we hear the collective cheers of IT administrators far and wide, excited by the potential of control usurped by user desktops now being returned. Virtual desktop solutions promises to become the next great corporate computing initiative; and if boardrooms and bottom lines continue to govern the behavior of future corporate spending, then rest assured, the prediction by Forrester Research will indeed be realized as desktop virtualization will become the new corporate PC.

Authors Biography

This whitepaper is a result of the collaborative work effort of Mainline Solution Architects and Systems Engineers to provide you with a high-level overview of the components of Desktop Virtualization solutions.



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