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## Introduction to vDesk

Today’s enterprises are under pressure to lower costs, increase productivity, and accelerate business initiatives. IT organizations have already driven down costs, increased efficiency, and been able to stay ahead of growing business demands by applying virtualization technology to servers in the datacenter. Desktop virtualization has the potential to have an even greater impact on business computing. This technology could reduce the source of the largest IT support and provisioning costs, and make businesses far more agile. However, enterprise attempts to apply traditional server-centric virtualization technology to desktop computing for the majority of their users have not succeeded because provisioning, storing, licensing and managing virtual machines is too complex and costly. In addition, users are reluctant to accept virtualization when it means that their applications perform more slowly and/or they can no longer take their desktop environment offline.

In this paper, we’ll discuss the barriers of desktop virtualization adoption in the enterprise, the need for convergence in desktop virtualization approaches and the unique requirements across different types of enterprise users.

Finally, we’ll review the RingCube vDesk solution, including how it works and how it’s Workspace Virtualization Engine (WVE) overcomes the barriers posed by legacy virtualization technologies.

For a more technical look at desktop virtualization technologies, please refer to Introduction to Virtual Desktop Architectures white paper.

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## **Barriers to Desktop Virtualization Adoption**

Virtualization, which has saved enterprises millions in the data center, is now moving to the desktop. Desktop virtualization promises to cut desktop management costs, increase user productivity and fundamentally change desktop computing. However, existing desktop virtualization approaches have had limited success in delivering a viable alternative to traditional PCs both in terms of cost savings and user experience. To achieve broad adoption, desktop virtualization must dramatically reduce desktop management costs while preserving the user's familiar desktop experience.

### ***The Barriers to Local Virtual Machine Adoption***

A virtual machine is a software implementation of a computer that enables the sharing of the underlying physical machine resources between different virtual machines, each running their own operating system. While local virtual machines have been widely adopted for development and testing applications, their adoption for general desktop computing has been limited due to resource requirements. When PCs run local virtual machines with a second operating system (type II hypervisor), the PC requires large amounts of CPU and memory resources to run properly. The result is poor application performance, the requirement to purchase and manage a second operating system license and a monolithic virtual machine that is hard to provision and tied to a single PC.

#### **Key Barriers to Adoption:**

- Application performance
- 2<sup>nd</sup> operating system
- Additional CPU and memory
- Central management and delivery

### ***The Barriers to Virtual Desktop Infrastructure (VDI) Adoption***

Virtual Desktop Infrastructure (VDI) is a solution for server-based virtual desktop computing that improves control and manageability while providing end users with a familiar desktop experience. A total cost of ownership (TCO) comparison by Gartner shows that switching from traditional PCs to VDI requires millions in upfront capital expenditures and only saves between 2% and 10% in the long run<sup>1</sup>. For users, a switch

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<sup>1</sup> Mark A. Margevicius, Michael A. Silver, Federica Troni, August 4<sup>th</sup>, 2008, Total Cost of Ownership Comparison of PCs With Hosted Virtual Desktops, Gartner, Inc.

to VDI means that they cannot install their own applications or work offline as they could with their traditional laptops without incurring significantly higher costs and infrastructure build-out. Even the latest generation of VDI solutions that piece together hosted virtual desktops, application streaming/virtualization and roaming user profiles force enterprises to choose between an acceptable user experience or lower costs.

**Key Barriers to Adoption:**

- Server, storage, and infrastructure costs
- Offline mobility
- User personalization
- Application provisioning and patching

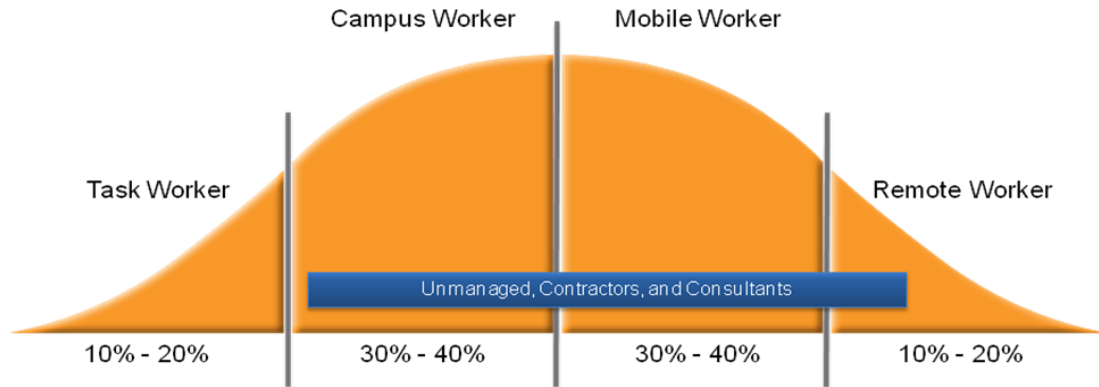
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## **The Need for Convergence in Desktop Virtualization**

Desktop and application virtualization technologies have made incremental progress by developing specific approaches to solve individual desktop computing challenges. Local virtual machines have been successful in development and testing because they provide complete operating system isolation. Server-based computing and VDI have enabled enterprises to centralize desktop computing in the data center for task workers and outsourcers to increase security and availability. Application virtualization and streaming have enabled enterprises to distribute applications without installation and run multiple versions of the same application at the same time. However, no single approach to desktop virtualization has delivered a compelling solution to replace traditional PCs because each has significant barriers to widespread adoption. What is needed is a desktop virtualization solution that provides complete convergence and delivers the familiar experience of a Windows desktop using the right desktop virtualization technology for the right user scenario.

### ***Desktop Virtualization User Requirements***

Enterprises are made up of different types of workers that have unique desktop computing requirements. While the percentage breakdown for each type of worker varies by industry and company, most large enterprises have some population within each category (see Figure 1). Traditional PCs have evolved over the past two decades to meet the requirements of each type of user. To replace traditional PCs, desktop virtualization must provide a single desktop virtualization platform that can meet the needs of task workers, campus workers, mobile workers, remote workers and address unmanaged PCs used by employees, contractors and consultants.



**Figure 1. Desktop Virtualization User Segmentation**

### ***Task Workers***

Task workers use a thin client or low end PC to accomplish a specific task while working on a campus network. This type of user does not typically require personalization or the ability to install applications. In fact, task workers often share the same PC with other users during different shifts. VDI or server-based computing is often ideal for this type of user because of the ability to centralize and pool resources. Network streaming can also be used for these types of users.

### ***Campus Workers***

The campus worker uses a desktop PC (or thin client) on the internal LAN to connect to computing services. Campus workers prefer a personalized desktop environment where they can install their own plug-ins and applications and configure settings to their preference. Depending on the types of campus worker, local desktop virtualization, network streaming or VDI may be appropriate.

### ***Mobile Workers***

Mobile workers use a laptop as their primary workstation. These users work at home, on the road, and in the office. They use a mix of wired and wireless networking to connect to computing services over the LAN and over the WAN using VPN. Mobile workers require personalization, the ability to work offline and sync their desktop, particularly if they have multiple computing devices. Using local desktop virtualization on a laptop or running their virtualized desktop from a portable drive is ideal for mobile workers.

### ***Remote Workers***

Remote workers work primarily at home or at a remote branch office that is connected over a WAN using a VPN. Remote workers use either a laptop or a desktop computer depending on their mobility and rarely if ever work on campus. Using local desktop

virtualization on a laptop or running their virtualized desktop from portable drive is ideal for the mobile worker.

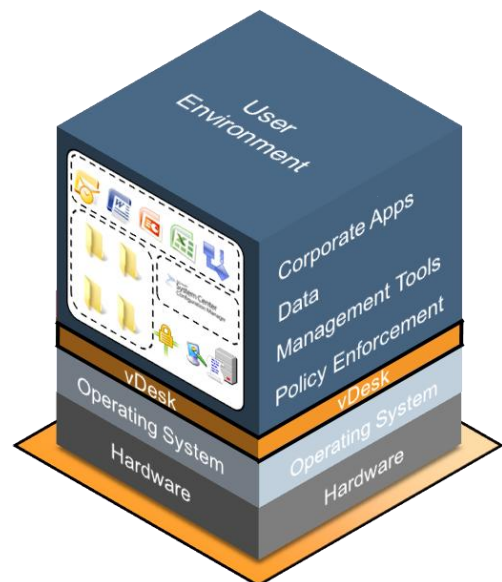
### ***Unmanaged, Contractors and Consultants***

Unmanaged workers (contractors, consultants, temporary workers, outsourced workers) are provided with a computing environment on a project basis to perform a specific set of tasks. They are usually a subset user group within the mobile, remote, and campus workforce. When their project is completed, their computing environment needs to be de-provisioned and their user data secured. Depending on the type of unmanaged worker, local desktop virtualization, network streaming, VDI or running their virtualized desktop from a portable drive may be appropriate. vDesk Solution Overview

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## **vDesk Solution Overview**

RingCube vDesk is a high-performance enterprise desktop virtualization solution that simplifies the creation, access and management of Windows desktops through Workspace Virtualization. The vDesk solution increases user productivity, lowers desktop management costs and eliminates the performance and resource overhead of legacy virtualization technologies. Users may run their virtual desktop at the office or on unmanaged PCs – at home, or at a client site. When users start their vDesk workspace, it transforms any PC into their own familiar and personalized workspace where they can access their files, applications, settings and entire desktop, just as if they were on their own PC. RingCube’s innovative desktop virtualization platform, Workspace Virtualization Engine (WVE), is the industry’s first workspace virtualization solution to deliver a lightweight and complete virtual desktop that can join an enterprise domain, has an isolated network stack and supports applications such as endpoint security, databases, and PC management software that require drivers and security services. Today, vDesk is the only desktop virtualization solution that meets the enterprise cost, management, mobility, performance and security requirements to deploy desktop virtualization throughout the entire enterprise.



**Figure 2. vDesk Workspace Components**

## ***How Does vDesk Work?***

vDesk's virtualization technology, with 24 virtualization patents pending, separates the user's desktop environment, including applications, data, and settings, from the operating system and encapsulates it into a virtual workspace. To self-provision vDesk workspaces, users login to the vDesk Client Portal, select a master workspace, and create their own personalized workspace instances. vDesk has the flexibility to deliver virtual desktops to users wherever they are through a variety of deployment options, including:

- **vDesk on a PC** – vDesk is stored and runs locally on the users' PC
- **vDesk on a Drive** – vDesk is stored on USB drive or other removable media and run locally
- **vDesk over the Network** – vDesk is stored on a network file share and runs locally
- **vDesk over VDI (Virtual Desktop Infrastructure)** – vDesk is stored in the data center and accessed remotely over VDI

For example, users can access their vDesk over the network while in the office and check out their vDesk workspace to a laptop or portable drive for a business trip or to work at home. When they come back to the office, they are prompted automatically to check in and synchronize their vDesk workspace to the network. Once checked in, users can access their vDesk workspace through the network and have all the changes that were made offline reflected in their online vDesk workspace.

## ***vDesk End-User Experience***

Typically to get started, users enter their Active Directory username and password into the vDesk client which can easily be downloaded through the vDesk client portal from a web browser. Then, the users will see their familiar Microsoft Windows desktop environment in the vDesk workspace. Upon first login, they will see the standard desktop that was configured by the administrator as part of the vDesk master workspace. Users can customize their vDesk workspace as they would a standard PC by installing applications, changing settings (wallpaper, themes, plug-ins) and creating their own data files (documents, presentations, spreadsheets). Based on the policies defined by the administrator, the user may be able to use any combination of the PC, Drive, Network or VDI deployment methods to access their personalized desktop.

## **Features**

### ***USABILITY: MobileSync and Deployment Methods***

vDesk MobileSync enables users to synchronize their vDesk Workspace between any of the four vDesk deployment options (PC, Drive, Network, VDI) and work offline. While offline, users become truly mobile by being able to access their virtual workspace anytime, anywhere.

### ***NETWORKING: Network Virtualization and Isolation***

vDeskNet provides network virtualization and isolation of network traffic between the host PC and the vDesk virtual workspace. The separation of network traffic both enables VPNs to run inside the virtual workspace and prevents the malware on the host PC from viewing traffic coming from the vDesk virtual workspace.

### ***SECURITY: Integrated Encryption and Security***

vDesk integrates 3<sup>rd</sup> party encryption tools to protect against data loss and provides native host security scanning capabilities to ensure that the host PC is secure prior to launching a vDesk virtual workspace.

### ***MANAGEMENT: Provisioning and Policy Enforcement***

vDesk provides automated provisioning and enables IT administration to distribute updates to thousands of vDesk workspaces by updating one master workspace. Administrators can also enforce security policies assigned to vDesk workspaces.

## **Benefits**

### ***Lower Desktop Management Costs and Licensing***

vDesk enables IT organizations to dramatically lower the cost of desktop management by accelerating desktop provisioning, simplifying backup and increasing user productivity.

### ***High Performance and Lightweight Execution***

vDesk provides a virtual desktop that performs at 99% of a host PC's native performance with a virtualization layer that requires only 40-60MB of disk space and 45MB of RAM. In comparison, a local virtual machine or VDI deployment performs at roughly 70% of a host PC's native performance with a virtualization layer that requires 2-4GB of disk space and 512MB-2GB of dedicated RAM.

### ***Increased User Mobility and Productivity***

vDesk enables users to become truly mobile by being able to move their personalized desktop between a desktop PC, a laptop, VDI and a portable drive to provide access to their desktop from any PC, whether they are online or offline.

### ***Business Continuity and Disaster Recovery***

vDesk automatically backs up every workspace to a network file share. If a user loses their PC or portable drive containing their vDesk workspace, they can login to the vDesk User Portal to download an up-to-date copy of their personalized workspace and be up and running in minutes without the help of their IT organization.

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## **Workspace Virtualization Technology**

Sitting in the architectural middle-ground between application virtualization and hypervisor-based virtualization (virtual machines) is workspace virtualization. Workspace virtualization is an approach that encapsulates and isolates an entire computing workspace. At a minimum, the workspace is comprised of everything above the operating system kernel – applications, data, settings, and any non-privileged operating system subsystems required to provide a functional Windows desktop computing environment. For deeper workspace virtualization, the virtualization engine implementation virtualizes privileged code modules and full operating system subsystems through a kernel-mode Workspace Virtualization Engine (WVE).

Virtualization Characteristics	RingCube WVE	Type II Hypervisor (Local Virtual Machines/VDI)	Application Virtualization
Performance (compared to host PC's native performance)	~99%	~70%	~99%
Workspace/VM Size with Windows XP	~40MB	~4096MB	Varies by application
Memory Utilization	45MB	512MB-2GB	Varies by application
OS License Required	NO	YES	NO
Unique Network Identity and Network Traffic Isolation	YES	YES	NO
Separate User Space (AD Domain Join, GINA)	YES	YES	NO
Virtualized Security Services	YES	YES	NO
Kernel Driver Support	YES	YES	NO

**Figure 3. Comparison of Virtualization Approaches**

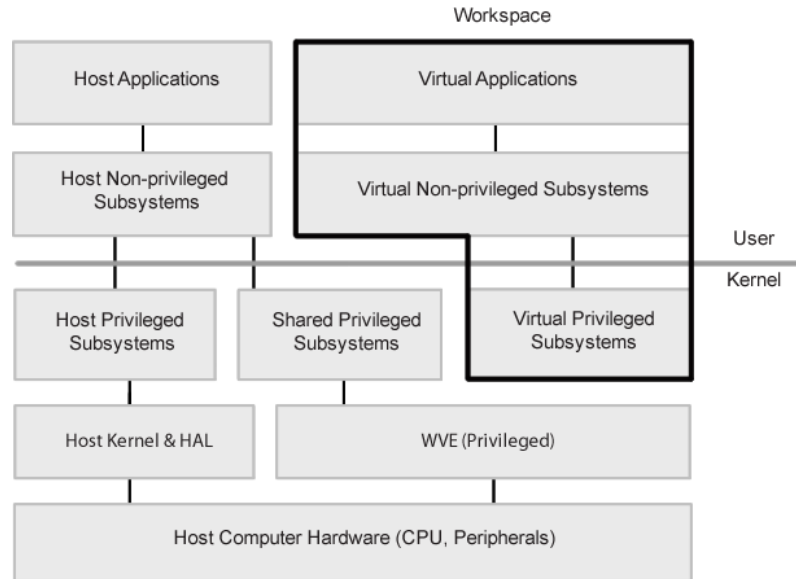
***Key components of the RingCube WVE:***

- **Virtual Networking**, called vDeskNet, allows the virtual workspace to separate and isolate network traffic from the host PC including VPN clients running within the virtual workspace.
- **Virtual User Management** allows the virtual workspace to have a unique set of user accounts separate from the host PC. Also, vDesk users within the virtual workspace can add/join an Active Directory domain independent of the user authentication and authorization rights of the host PC.
- **Virtual Security Store** provides a separate protected storage area within the virtual workspace where items like certificates are kept isolated from the host PC.
- **Virtual Windows Services** allows greater process and application isolation from the host PC. Virtualized services within the virtual workspace include LSA (Local Security Authority), Microsoft TCP/IP networking, and NTFS volumes. These virtualized services help to increase the number of kernel-mode applications that can be supported within the virtual workspace.
- **Generic Driver Support** provides a virtualized framework for the installation of drivers within the virtual workspace which includes a virtualized Plug-and-Play

service. The generic driver framework increases application support particularly when new drivers are required.

### **How Does RingCube Workspace Virtualization Engine (WVE) Work?**

The RingCube WVE encapsulates and isolates a complete computing workspace by virtualizing both user space and kernel components of the Microsoft Windows operating system. WVE virtualizes LSA and Winlogon that enable each workspace to have separate user

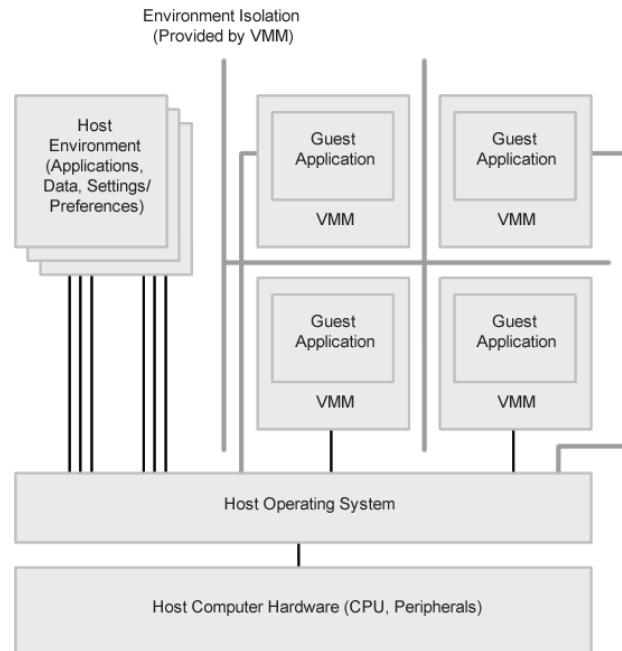


**Figure 4. RingCube Workspace Virtualization Engine Architecture**

accounts, a Graphical Identification and Authentication (GINA), join enterprise domains, support Group Policy Objects (GPOs) and provide cryptographic services. In order to support critical applications such as VPNs and endpoint security, WVE provides full virtualization of the native Windows kernel API and device drivers. To isolate network traffic and provide a unique network identity, WVE includes a virtualized network subsystem called vDeskNet that partially virtualizes the Windows Network Driver Interface Specification (NDIS). In order to achieve the highest possible performance and most efficient use of hardware resources, RingCube specifically designed WVE to pass through the session manager (SMSS), Graphics Device Interface (GDI), the graphics subsystem and memory management components to the host operating system. RingCube's Workspace Virtualization Engine provides an ideal desktop virtualization architecture that achieves high-performance, broad application support and strong isolation between the vDesk workspace and the host PC.

## How Does Application Virtualization Works?

Application virtualization is designed to encapsulate only user mode applications rather than the entire desktop or lower level applications that require services or kernel components. Application containers use interception and sequencing technology to virtualize the file system and named objects. The registry is typically redirected or emulated while the Service Control Manager (SCM) is passed-through or rewritten rather than



**Figure 5. Typical Application Virtualization Engine Architecture**

virtualized. This type of virtualization is useful for distributing user mode applications so that they can be used without installation but is not suitable for a complete desktop virtualization solution. In addition, critical applications commonly used in an enterprise environment that install services or drivers will either fail to install or not run properly once virtualized.

Types of Virtualization (Windows Components)	Types of Applications	Application Virtualization
User-mode applications (registry, file systems)	Web browsers, IM clients	Yes
User-mode services (SCM: MSI, RPCSS, COM, DCOM, COM+, spooler)	PDF distiller	Partially
user-mode subsystems (CSRSS)	Font management, Runtime DLLs	Partially
Kernel-mode drivers (Plug-n-Play)	Printers, Encryption, CD/DVD	No
File system volumes (NTFS volumes)	Commercial licensing	No
Security subsystems (LSA, protected storage)	PC Management tools, Databases, VoIP clients	No
Network subsystems (TCP/IP networking)	VPNs, Firewalls, IPS, VoIP clients	No

**Figure 6. Supported Applications with Application Virtualization Technology**

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## Summary

Organizations have tried to implement desktop virtualization for years but had limited success in finding a viable alternative to traditional PCs both in terms of cost savings and user experience. VDI, local virtual machines and application virtualization are useful to solve individual desktop computing problems but also have barriers that prevent their adoption for large segments of users. Rather than piecing together existing desktop virtualization approaches, organizations should consider a new approach to desktop computing that eliminates the native barriers by leveraging the existing windows desktop infrastructure to reduce the cost of deploying desktop virtualization, provides the performance of a traditional PC and delivers the mobility and personalization that users expect.

vDesk is a high-performance enterprise desktop virtualization solution that simplifies the creation, access and management of Windows desktops through workspace virtualization. The vDesk solution increases user productivity, lowers desktop management costs and eliminates the performance and resource overhead of legacy virtualization technologies. RingCube's innovative desktop virtualization platform, Workspace Virtualization Engine (WVE), is the industry's first workspace virtualization solution to deliver a lightweight and complete virtual desktop that can join an enterprise domain, has an isolated network stack and supports applications such as endpoint security, databases, and PC management software that require drivers and security services. Today, vDesk is the only desktop virtualization solution that meets the enterprise cost, management, mobility, performance and security requirements to deploy desktop virtualization throughout the entire enterprise.

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## About RingCube

RingCube is the leading provider of workspace virtualization. The company's innovative virtualization solution, vDesk, enables users to securely access their complete desktop computing experience from any Windows PC anywhere in the world. With vDesk, organizations can increase user productivity, lower desktop management and support costs, and eliminate the performance and resource overhead commonly found with legacy virtualization approaches.



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