WINDOWS 7 MIGRATION GUIDE

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A Supplement to Dell Power Solutions 2010 Issue 1

MAPPING OUT AN EFFICIENT MIGRATION STRATEGY

FEATURE SECTION
Capitalizing on Mobility Features for Fast, Secure Remote Access

Accelerating Deployments with Client Management Tools

Addressing Windows 7 Application Compatibility Issues

EXPERT NAVIGATION
Dell Services Help Simplify the Path to Migration

EARLY ADOPTERS
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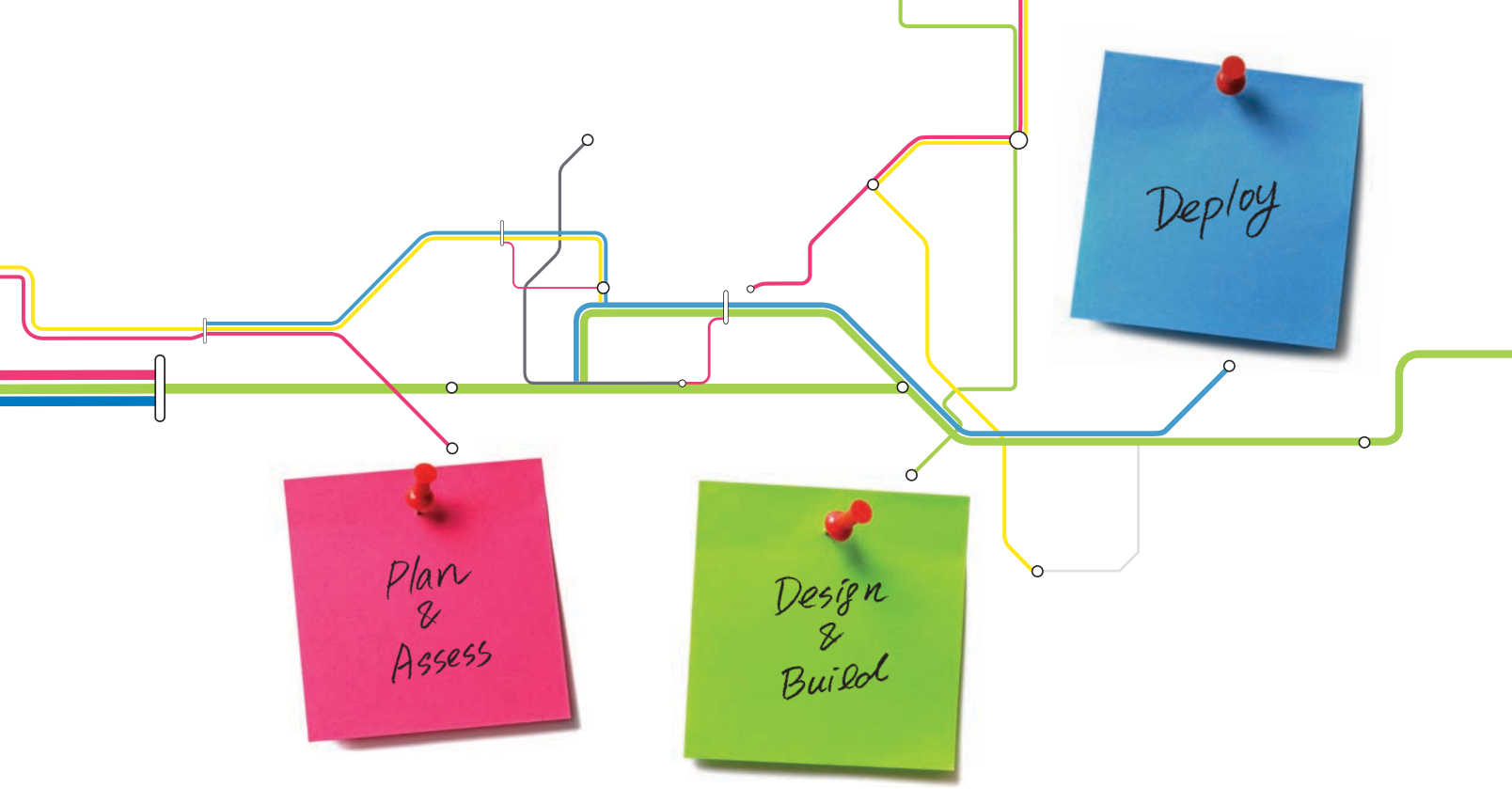

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WINDOWS 7
MIGRATION GUIDE
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MAKING YOUR MOVE

Planning for this *Windows 7 Migration Guide*, a special edition of *Dell Power Solutions* Magazine, began well in advance of the October 22, 2009, launch date for the new Microsoft® Windows® 7 OS. A key planning prerequisite before the first article outline was sketched out: getting several editorial staff members fully immersed in the Windows 7 Enterprise experience. Occasional on-demand test drives on spare development systems would not be enough, so we elected to migrate our day-to-day production Dell™ Latitude™ laptops to Windows 7—initially to Windows 7 Release Candidate, then to Windows 7 Enterprise RTM as soon as it was commercially available.

That move from the Windows Vista® Enterprise OS was over six months ago. After three quarterly magazine issues, two special editions, and over 450 pages of published content, we have never looked back: our editors and creative staff on Windows 7 have had virtually zero downtime, no missed deadlines, and an overwhelmingly positive experience to date. In addition to notable user interface, performance, and stability improvements, we continue to be particularly enamored with Windows 7's prowess for the mobile worker: seamless, secure connections to Wi-Fi®, 3G, and VPN networks; near-instant awakening from sleep mode; smooth docking and undocking; and ease of connecting to projectors.

PLAN & ASSESS

DESIGN & BUILD

DEPLOY

MANAGE & SUPPORT

As you begin or continue planning your own organization's move to Windows 7, we hope you find value in this guide. The editorial content has been architected to map across the four key migration phases: Plan & Assess, Design & Build, Deploy, and Manage & Support. To make it easier to find the guidance you need, a set of check boxes on the opening page of each article indicates the applicable migration phases.

Crafting a magazine from the ground up often involves a large number of unsung heroes behind the scenes, and that certainly rings true for this issue. In addition to the contributing writers noted in the masthead at right, we would like to thank the following individuals for their myriad contributions: Tami Andrews, Kathy Baird, Jeremy Bolen, Greg Bomsta, Shannon Cary, Cynthia George, Mary Kay Hyde, Rebecca Kan, Chip Lawson, David Lord, Dave Melendrez, Anantha Narasimhan, Jefferson Raley, Roberta Rocha, Kristin Storer, Terry Storey, and Ben Tao.

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MAPPING OUT AN EFFICIENT MIGRATION STRATEGY

Before transitioning client systems to the Microsoft® Windows® 7 OS, organizations must first take diligent steps to ensure that a suitable IT infrastructure is in place. Four key phases pave the way to a smooth, cost-effective Windows 7 deployment.

Successful technology rollouts start with a needs assessment designed to ensure that the IT specifications are in lockstep with strategic business and organizational objectives. Migrating to a new OS can be a complex undertaking—so it is essential for IT leaders to build consensus from the outset about how they will plan, assess, design, build, deploy, manage, and support their Microsoft Windows 7 migrations.

PLAN AND ASSESS

Organizations that migrated from Windows XP to the Windows Vista® OS know that applications designed to run with one OS do not necessarily function the same way under a new version. For this reason, the first step when planning a move to Windows 7 should be to develop a comprehensive application inventory. The goal: to remove redundant or unused applications and produce a consolidated list of applications that must be migrated. Using best practices and understanding the options for application remediation are the first steps on the path to a successful Windows 7 rollout.

Mobile worker productivity and remote systems management are also key considerations during the planning process. Together, the Windows 7 and Windows Server® 2008 R2 operating systems can bolster overall efficiency and productivity by enhancing remote access, security, and management for Windows 7 client systems while also helping to optimize the user experience for remote workers, reduce total cost of ownership (TCO), and increase remote client stability. Latest-generation Dell™ systems are Windows 7 ready—and Dell Latitude™ laptops and Dell Precision™ mobile workstations are designed with advanced technology options to fit the requirements of nearly any organization.

Dell offers a variety of services and technologies to help organizations simplify the planning and assessment process. Large organizations may need 12–18 months to complete a migration to Windows 7. During this period, Dell Services can work as an extension of the internal IT department, helping free up skilled personnel to work on other strategic projects.

DESIGN AND BUILD

Determining hardware readiness is the first step toward designing the migration process. Achieving this goal requires a well-documented, repeatable, and results-driven testing process. Automated testing tools can help streamline the task of determining application and peripheral compatibility (although

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a real-world installation test using a production-ready Windows 7 image is the recommended way to determine compatibility). Taking full advantage of key enterprise features of Windows 7 also means that organizations must identify and implement the supporting technologies.

In this phase, organizations need to determine whether application virtualization is required to enable use of incompatible applications even after deploying Windows 7. The two primary options for this purpose are Microsoft Enterprise Desktop Virtualization (MED-V) and Microsoft Application Virtualization (App-V). These technologies can help keep a migration from coming to a halt by providing a temporary platform for applications that are being remediated as well as for fully incompatible applications while replacement options are evaluated. Windows XP Mode (typically recommended only for small business and consumer usage) provides a virtual Windows XP environment that resides on each client system and runs with near transparency in the background, which can also enable employees to continue using legacy applications in the short term while replacements are found.

After completing the design process, organizations can take advantage of the latest Windows 7 tools for building and testing OS images to be deployed on the targeted client hardware platforms. Conducting a pilot program on a scale appropriate for the size of the organization is also highly recommended, and can provide invaluable feedback to help ensure success in later deployments.

DEPLOY

Broad deployments can be expensive, and old processes can be inefficient and incur hidden costs. Containing Windows 7 deployment costs helps to significantly reduce TCO for employee systems—and the time to start planning is now. Best practices and automation can help ensure fast, stable, consistent deployments across the organization and help accelerate return on investment (ROI) for new IT resources. Dell Services also offers advanced technology and best-practice approaches to help automate the client provisioning process and reduce the costs associated with Windows 7 deployments.

Automated OS installation technologies help ensure rapid, accurate system deployment in large environments. By understanding and leveraging the enhancements available for Windows 7, including the Windows Automated Installation Kit (Windows AIK), IT administrators can streamline and standardize deployment processes across the organization to help accelerate ROI.

Dell also offers open, flexible client management tools designed to reduce the complexity and cost of Windows 7 migrations. These tools range from basic, built-in functionality for do-it-yourself Dell client management to Dell management software for large client computing environments and integration with comprehensive third-party management solutions.

MANAGE AND SUPPORT

Of course, the migration process does not end after Windows 7 is installed. Ongoing management and support are key parts of maintaining a healthy infrastructure.

Dell offers several client management options that help optimize ROI, whether organizations prefer to manage client systems themselves, use a Dell management approach, or continue using an existing management infrastructure. Dell Services offerings—based on firsthand experience deploying Windows 7 throughout the Dell global organization using patent-pending Dell deployment methodologies—are also available to help organizations support their Windows 7 deployments.

Although Windows 7 deployments may vary widely, the common denominator is a comprehensive plan for the deployment life cycle. By creating a detailed road map guided by a comprehensive needs assessment, organizations can lay the groundwork for a successful transition to Windows 7.

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PLAN & ASSESS

DESIGN & BUILD

DEPLOY

MANAGE & SUPPORT

MICROSOFT WINDOWS 7 AND WINDOWS SERVER 2008 R2: ADVANCING BUSINESS EFFICIENCY

The Microsoft® Windows Server® 2008 R2 OS offers a powerful feature set that is designed to work specifically with client computers running the Microsoft Windows® 7 Enterprise OS. By running Windows 7 on clients in conjunction with Windows Server 2008 R2 in the data center, IT groups can enhance mobile and remote user productivity while tightening security and streamlining management.

Across a range of industries, organizations need tools that help maximize productivity whether end users are working from a branch location, home office, or hotel lobby. Microsoft Windows 7 Enterprise introduces a range of features designed for an increasingly mobile and remote workforce. By running Windows 7 Enterprise on Dell™ client systems together with Windows Server 2008 R2 on Dell PowerEdge™ servers, IT groups can create a robust infrastructure designed to support enhanced remote capabilities while helping to increase security and simplify IT management. (For more information on how Microsoft applications running on Windows 7 extend user productivity, see the "Microsoft Office 2010: Reaching far beyond the traditional desktop" sidebar in this article.)

DirectAccess and Agile VPN. Providing seamless connectivity for remote and mobile users continues to be a challenge for IT organizations. Depending on the type of virtual private network (VPN) that has been deployed, users may need to install VPN client software on their computers and use that software to establish a VPN tunnel through public networks—typically a VPN connection over the Internet.

In conjunction with Windows Server 2008 R2, the DirectAccess feature available in Windows 7 allows remote client computers running Windows 7 to connect directly to intranet-based resources without the complexity of VPN client software. The DirectAccess feature enables mobile users to experience the same type of connectivity both in and outside of the office (see Figure 1). Unlike a typical VPN connection, a DirectAccess connection can be established even before the user logs on (although mobile users must be logged on to access intranet resources). IT administrators can also manage remote computers that are connected through DirectAccess regardless of whether the user is logged on—for example, by applying Group Policy settings.

Another problem is that typical VPNs are not resilient against connection failures or device outages. When outages occur, the VPN tunnel terminates and the connection must be reestablished—resulting in lost connectivity that can range from a few minutes to hours or more. To help avoid these types of connection outages, Windows Server 2008 R2 provides the Agile VPN feature, which provides multiple network paths between VPN tunnel connection points. In the event of a connection failure or device outage, this feature is designed to automatically use another network path to maintain the existing VPN tunnel.

BranchCache. As organizations seek to reduce cost and complexity through centralized applications, it is essential to avoid performance degradation when workers need to access centrally stored information

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MICROSOFT OFFICE 2010: REACHING FAR BEYOND THE TRADITIONAL DESKTOP

The upcoming Microsoft Office 2010* release builds on the themes of Windows 7 by providing innovative features designed to simplify tasks, foster collaboration among team members, and boost flexibility—enabling mobile and remote employees to get work done virtually anywhere, anytime.

Like Windows 7, Office 2010 helps users simplify tasks. The Office Backstage view in Office 2010 applications replaces the traditional File menu, allowing users to complete frequent tasks such as saving, sharing, printing, and publishing from a centralized workspace. Using PowerPoint® 2010 presentation software, users can customize videos directly in the application—trimming selections, adding effects, and adjusting fades without having to use other software. Meanwhile, the addition of themes, SmartArt® graphic layouts, and picture-formatting tools across Office 2010 applications allows users to incorporate captivating visual elements into business documents quickly and easily.

Figure A. *Microsoft Office Outlook 2010 now sports the ribbon interface and tools such as Quick Steps to help increase e-mail productivity*

With Office 2010, Microsoft is also extending the Office experience beyond the borders of the traditional desktop. Using Office Web Apps along with SharePoint® Foundation services or complimentary Windows Live™ accounts, mobile and remote workers can view, edit, and store Office documents from Internet-connected desktops, laptops, or netbooks.

The Outlook® 2010 interface has been thoroughly overhauled, and it's a standout. This exceptional e-mail program now sports the familiar ribbon interface (see Figure A). Additionally, new tools called Quick Steps provide workers right-click access to tasks such as compressing, categorizing, and filing long e-mail threads, helping to save space and facilitate fast access to information.

Office 2010 helps to make collaborating with remote and mobile workers easier than before. For example, with Office 2010, users can broadcast PowerPoint presentations through the Web. Recipients simply view the presentation through any standard browser. Coauthoring capabilities in Word, Excel®, PowerPoint, and the OneNote® digital notebook also help geographically disparate team members work together on collaborative projects.

Although Office 2010 can be run on Microsoft Windows XP and Windows Vista® operating systems, users can take advantage of key features within Windows 7 to help further streamline the Office 2010 experience. For example, Windows 7 Jump Lists provide fast access to recently used files or common Office tasks. In addition, the Windows 7 taskbar enables workers to move quickly from one Office application to another. Together, Windows 7 and Office 2010 help users get the job done from wherever they are working.

*Features discussed here are based on the Microsoft Office Professional Plus 2010 Beta release and are subject to change.

from branch office locations. To help reduce wide area network (WAN) traffic and boost network application responsiveness, the BranchCache™ feature in Windows 7 and Windows Server 2008 R2 caches frequently used content on the network in remote or branch office locations to enhance productivity—allowing remote users to work with files in an environment that is designed to be identical to the experience of their peers in the central office.

When remote clients attempt to retrieve data from servers located in the central data center, a copy of the retrieved content is stored on the local network at the remote location. Subsequent requests for the same content can be served from

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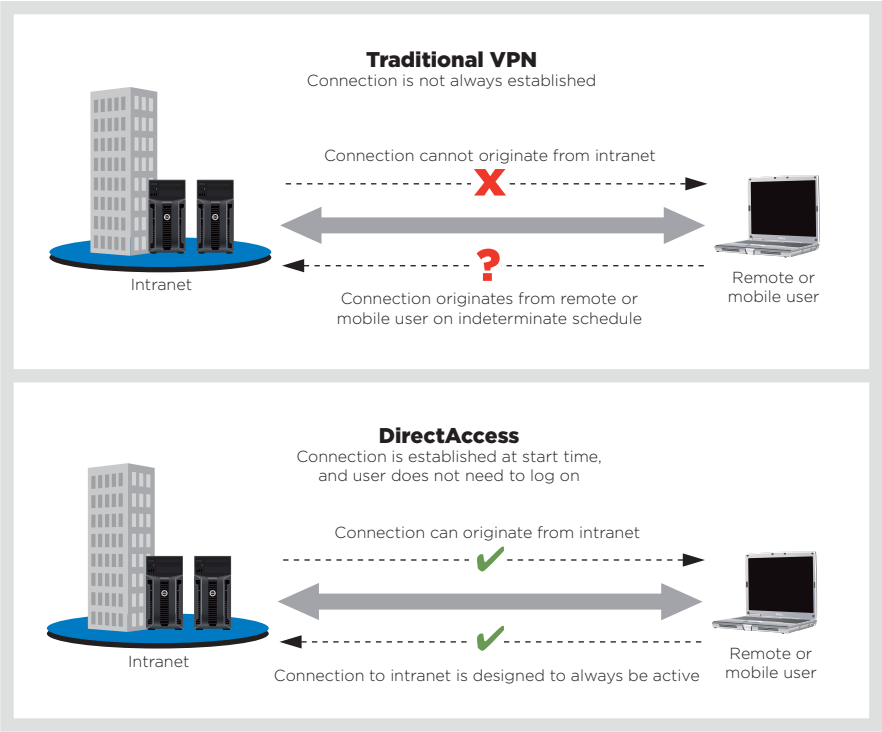

Figure 1. *The DirectAccess feature in Windows 7–based clients establishes a remote connection to intranet resources without the complexities of a VPN*

this local cache, thereby enhancing access times locally and helping reduce WAN bandwidth utilization between the remote or branch location and the central network. BranchCache caches both HTTP and Server Message Block (SMB) content and helps ensure access only to authorized users, because the authorization process is carried out on the data center servers. BranchCache works alongside content encrypted with Secure Sockets Layer (SSL) or IP Security (IPsec) and helps accelerate delivery of that content as well.

Remote Workspace, Presentation Virtualization, and Remote Desktop Gateway. Without a mobile computer provided by their organization, remote workers are typically unable to access intranet-based resources. Providing secure remote access to intranet-based resources from public computers or Internet kiosks, for example, can boost productivity considerably.

Using a combination of the Remote Workspace, Presentation Virtualization, and Remote Desktop Gateway features, client computers running Windows 7 can remotely access intranet-based resources without the installation of additional software. As a result, mobile users can remotely access their desktop images. The desktop on the remote Windows 7 client is designed to provide users with an experience that is identical to the experience they would have when using their desktop computers at the central office location—including the same desktop icons, Start menu items, and installed applications. When the user closes the session, the remote Windows 7 client desktop environment reverts to the previous configuration.

Read-only Distributed File System. Windows Server 2008 introduced the read-only domain controller feature, which allows a read-only copy of the Microsoft Active Directory® directory service to be placed in environments that may be less secure than central data centers, such as branch offices. Windows Server 2008 R2 introduces support for read-only copies of information stored in Distributed File System (DFS) replicas. Read-only DFS replicas help protect digital assets by providing branch offices and remote locations with read-only access to information replicated to those locations by using DFS. Because the information is read-only, this feature helps prevent remote users from modifying or accidentally deleting information stored in DFS replicated content.

RemoteApp and Desktop Connection. The RemoteApp and Desktop Connection feature allows administrators to make RemoteApp programs and virtual desktops easily available to users with client computers running Windows 7. This feature also helps integrate applications and desktops virtualized by using Remote Desktop Services with the Windows 7 user interface, enabling a remote user experience designed to be identical to working locally.

Microsoft Windows 7 is designed to meet the rigorous client requirements of diverse organizations that support a remote and mobile workforce, while Microsoft Windows Server 2008 R2 provides a solid foundation for supporting business-critical workloads and enabling an exceptionally secure operating environment for data centers deploying Dell PowerEdge servers. Together, Windows 7 and Windows Server 2008 R2 advance efficiency and productivity through a robust Windows-based infrastructure that enhances remote access, security, and management for Windows 7 client computers while optimizing the user experience for remote and mobile workers.

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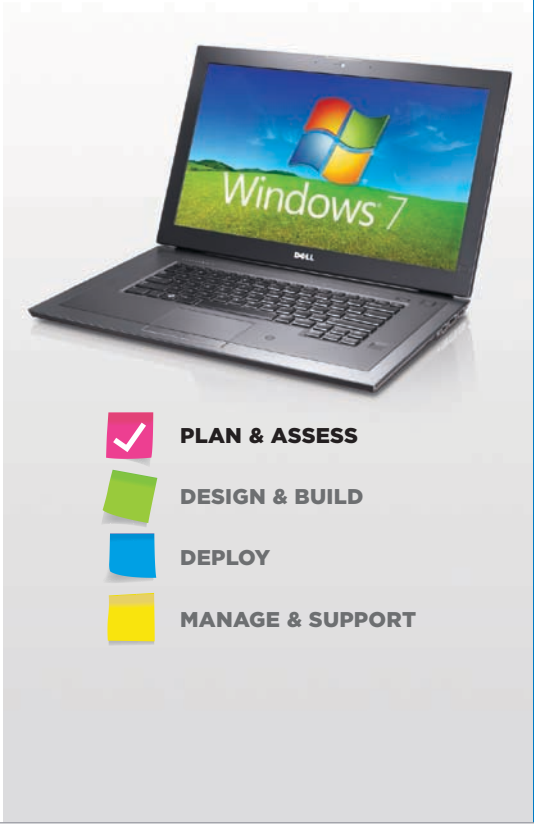
DELL CLIENT SYSTEMS: ALL GEARED UP FOR MICROSOFT WINDOWS 7



An array of Dell™ client systems optimized for the Microsoft® Windows® 7 OS are ready for organizations looking to bolster their infrastructures as they carry out their migrations. Dell OptiPlex™ desktops, Dell Latitude™ laptops, and Dell Precision™ workstations provide the components and configuration options required to capitalize on the comprehensive productivity and efficiency features built into Windows 7.

Microsoft Windows 7 introduces a range of features designed to boost user productivity and advance efficiency. To capitalize on these features, organizations need client systems that have suitable processors and graphics processing units (GPUs) plus sufficient memory capacity and hard drive space. Multiple Dell OptiPlex desktops, Dell Latitude laptops, and Dell Precision workstations are equipped with the required components and offer configuration options that enable organizations to take full advantage of enhancements across the various Windows 7 editions.

BOOSTING USER PRODUCTIVITY

Windows 7 was designed to significantly enhance user productivity by simplifying a range of everyday tasks. For example, enhanced search functions help users find information quickly. The integrated search engine provides a simple interface for locating files and folders on the local system, on networked drives, and even in Microsoft Office SharePoint® workspaces. The addition of Jump Lists provides fast access to recently used files, while the taskbar offers an easy way to get to important applications. Users can also create custom libraries to help them quickly find, share, and organize documents and media within the system and across a network.

Windows 7 also introduces mobility enhancements to help mobile employees get connected and stay connected to networks. In Windows 7, users have one-click access to available networks, including Wi-Fi®, mobile broadband, dial-up, and virtual private networks (VPNs). The VPN Reconnect feature of Windows 7 Enterprise is designed to maintain a persistent VPN connection even when there are network outages, providing workers with consistent VPN connectivity. Windows 7 Enterprise also includes the DirectAccess feature, which is designed to give mobile users seamless access to organizations' internal networks without requiring a VPN. Administrators can grant mobile employees access to file shares, intranet sites, and line-of-business applications while still helping to ensure security using IP version 6 (IPv6) and IP Security (IPsec) encryption.

The introduction of Windows XP Mode, available with Windows 7 Professional and Enterprise editions, enables organizations to retain existing software investments by allowing them to install and run Windows XP–based applications on PCs equipped

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The ultra-thin Dell Latitude 13 laptop delivers everyday productivity and versatility

with Windows 7. Windows XP Mode uses the latest Microsoft virtualization technology, Windows Virtual PC (formerly Microsoft Virtual PC), to create a virtual Windows XP environment. Windows XP–based applications are available to users straight from the Windows 7 taskbar or Start menu. Applications can continue to access many of the system's hardware resources, including the DVD drive, hard drive, and USB-compatible peripherals.

ENSURING CLIENT SYSTEMS MEET HARDWARE REQUIREMENTS

Windows 7 is available in multiple editions. Windows 7 Professional can be a useful option for many organizations that want to enhance worker productivity while simplifying desktop management. To help speed the time to mobile productivity, Windows 7 Professional includes Domain Join, which can facilitate fast and secure connections to domains through an easy-to-use wizard. To help protect data, Windows Backup and Restore capabilities let users or administrators schedule regular backups of important documents and system configurations to networked storage; they can then restore systems to a known state if anything goes wrong.

Other organizations may select Windows 7 Enterprise, which is available to volume-licensing organizations that have opted for Microsoft Software Assurance. In addition to helping simplify mobile connectivity with VPN Reconnect and DirectAccess, this edition also incorporates Microsoft BranchCache™ distributed caching, which helps increase network responsiveness and improve the experience of workers accessing content in branch offices. Windows 7 Enterprise also includes technologies such as BitLocker™ drive encryption to help protect sensitive data on client systems and USB storage devices. Optimizations for running a virtual desktop infrastructure help administrators amplify the benefits of desktop virtualization.

Microsoft has provided several minimum technical requirements for client systems running Windows 7 (see Figure 1). For example, Microsoft recommends using processors with frequencies of 1 GHz or higher; the Intel® Core™2 Duo processors used in several Dell client systems easily meet this requirement. To use Windows XP Mode, systems need processors that include hardware virtualization technology such as Intel Virtualization Technology (Intel VT) or AMD Virtualization™ (AMD-V™) technology. Dell OptiPlex, Dell Latitude, and Dell Precision systems offer processors that meet this requirement.

Secure Dell Latitude E6410 (left) and Latitude E6510 laptops help mobile workers stay connected on the road

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Workhorse Dell OptiPlex 980 desktops provide advanced features designed for maximum business productivity

Even for basic computing tasks, such as Web browsing or word processing, client systems need to provide adequate memory capacity. Client systems can run the 32-bit version of Windows 7 with 1 GB of RAM, but they need at least 2 GB for the 64-bit version; Dell recommends equipping systems with at least 2 GB of RAM even when running the 32-bit version to provide a more robust user experience. Using Windows XP Mode requires an additional 1 GB of RAM. Several currently available Dell OptiPlex, Dell Latitude, and Dell Precision systems can be equipped with sufficient memory for running the 64-bit version of Windows 7 with Windows XP Mode. Some Dell systems also offer a large memory capacity to enable organizations to take advantage of the 192 GB memory limits of the 64-bit version of Windows 7.

Hard drive capacity is likely a concern only for organizations that plan to upgrade existing systems with Windows 7, which requires 16 GB of available hard drive space for the 32-bit version or 20 GB for the 64-bit version. Dell recommends reserving at least 20 GB of space for either version of the OS. Running Windows XP Mode requires an additional 15 GB of drive space.

Windows 7 also requires a graphics card that supports Microsoft DirectX® 9 technology or later as well as Windows Display Driver Model (WDDM) 1.0 or later.

ASSESSING EXISTING CLIENT SYSTEMS

Some IT organizations may be able to determine on their own whether existing client systems can be migrated to Windows 7. Microsoft offers a complimentary, easy-to-use Windows 7 Upgrade Advisor tool to help with this process.[1] An administrator can simply download and install the Windows 7 Upgrade Advisor onto a client system. Within a few minutes, the software can scan the system; identify potential problems with existing hardware, software, and peripherals; and then recommend changes that might be required before upgrading.

Other organizations can benefit from working with Dell Services to assess the readiness of client systems and the data center, devise a comprehensive plan for migrating systems, and help with implementation.

GETTING READY FOR WINDOWS 7 MIGRATION ON DELL CLIENT SYSTEMS

Although migrating some client systems to Windows 7 may require only additional memory or software updates,

	OS version	Processor	Memory	Hard drive capacity	Graphics support
Microsoft recommendation	32-bit	1 GHz	1 GB	16 GB	Microsoft DirectX 9 or later and Microsoft WDDM 1.0 or later
	64-bit	1 GHz	2 GB	20 GB	
Dell recommendation	32-bit	Intel Core 2 Duo (with Intel VT for Windows XP Mode)	2 GB (3 GB for Windows XP Mode)	20 GB (35 GB for Windows XP Mode)	
	64-bit				

Figure 1. *Minimum Microsoft- and Dell-recommended system requirements for Windows 7*

[1] Available at www.microsoft.com/windows/windows-7/get/upgrade-advisor.aspx.

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	Client system	Processor	Memory[a]
Dell OptiPlex Premier desktop	Dell OptiPlex 980	Intel Core i7, Intel Core i5, Intel Core i3, or Intel Pentium® G6950	Up to 16 GB
Dell OptiPlex Mainstream desktop	Dell OptiPlex 780	Intel Core 2 Quad (not with ultra-small form factor) or Intel Core 2 Duo, both with Intel VT	Up to 8 GB (up to 4 GB for ultra-small form factor)
Dell OptiPlex Essential desktops	Dell OptiPlex 380[b]	Intel Core 2 Quad or Intel Core 2 Duo	Up to 4 GB
	Dell OptiPlex 360[b]	Intel Core 2 Duo	Up to 4 GB
Dell Latitude E-Family laptops	Dell Latitude E6510	Intel Core i7 or Intel Core i5	Up to 8 GB
	Dell Latitude E6410		
	Dell Latitude E5510[b]		Up to 8 GB
	Dell Latitude E5410[b]		
	Dell Latitude E4310		Up to 8 GB
	Dell Latitude E4200	Intel Core 2 Duo Ultra Low Voltage (ULV)	Up to 5 GB
Dell Latitude Specialty laptops	Dell Latitude 13[b]	Intel Core 2 Duo ULV, Intel Core 2 Solo ULV, or Intel Celeron® ULV	Up to 4 GB
	Dell Latitude Z[b]	Intel Core 2 Duo SU9600 or higher	2 GB and 4 GB options
	Dell Latitude E6400 XFR	Intel Core 2 Duo	Up to 8 GB
	Dell Latitude E6400 ATG		Up to 8 GB[c]
Dell Precision workstations	Dell Precision T7500	Quad-core Intel Xeon processor 5500 series	Up to 192 GB[c] (with two processors installed)
	Dell Precision T5500		Up to 72 GB[c] (with two processors installed)
	Dell Precision T3500	Quad-core Intel Xeon processor 5500 or 3500 series, or dual-core Intel Xeon processor 3500 series	Up to 24 GB
	Dell Precision T1500	Intel Core i7-870 or higher	Up to 16 GB
Dell Precision mobile workstations	Dell Precision M6500	Quad-core Intel Core i7 Extreme Edition or Intel Core i7	Up to 16 GB[d]
	Dell Precision M6400 Covet	Intel Core 2 Extreme, Intel Core 2 Quad, or Intel Core 2 Duo	Up to 16 GB[d]
	Dell Precision M6400	Intel Core 2 Quad or Intel Core 2 Duo	
	Dell Precision M4400	Intel Core 2 Extreme or Intel Core 2 Duo	Up to 8 GB
	Dell Precision M2400	Intel Core 2 Duo	
Dell Precision rack workstation	Dell Precision R5400	Intel Xeon	Up to 32 GB

[a] A 64-bit OS is required for 4 GB of RAM or more.
[b] Supports 32-bit Windows 7 OS only.
[c] Up to 1 GB may not be available with 32-bit operating systems depending on system resource requirements.
[d] Total available memory may be reduced with 32-bit operating systems depending on system configuration.

Figure 2. *Processor and memory options for Windows 7–ready Dell client systems*

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Robust Dell Precision M6500 mobile workstations deliver exceptional performance for demanding applications

organizations may decide to refresh other systems with the latest Dell clients as part of the migration process. Dell OptiPlex desktop, Dell Latitude laptop, and Dell Precision workstation product lines include multiple models that can be configured to capitalize on Windows 7 enhancements (see Figure 2). The broad range of Dell client systems available for Windows 7 gives organizations the flexibility to select the appropriate mix of client systems for a comprehensive range of usage scenarios.

Dell OptiPlex: Workhorse desktops

Whether organizations are looking for desktops with high performance in a scalable platform, cost-effective workhorses for mainstream office tasks, or something in between, Dell OptiPlex systems can meet these needs. Available in a range of form factors and configurations, OptiPlex systems provide the versatility for a variety of uses. Several OptiPlex systems can be configured to run Windows 7 Professional and Enterprise editions.

Dell Latitude: Secure laptops

Dell Latitude laptops include a broad array of system designs and configuration options for a variety of mobile environments. Equipped with robust wireless options, Latitude systems can work with Windows 7 connectivity features to help mobile workers get connected and stay connected on the road. Designed for tight security and remote manageability, and backed by world-class service and support, Latitude systems deliver robust mobility. Select Latitude E-Family and Latitude Specialty models can be configured to run Windows 7.

Dell Precision: Robust workstations

Dell Precision workstations are designed to deliver exceptional performance for some of the most demanding applications. Organizations can select desktop models for office workers and mobile workstations to help liberate workers from their desks without compromising performance. These powerful Dell client systems help organizations maximize the productivity capabilities of Windows 7.

ADVANCING EFFICIENCY WITH A WINDOWS 7 MIGRATION

Microsoft Windows 7 is designed to offer important tools for enhancing efficiency, productivity, and business innovation. Dell client systems help organizations capitalize on key Windows 7 features while enabling IT departments to take advantage of advanced technology across a comprehensive range of hardware platforms.

> **"Dell client systems help organizations capitalize on key Windows 7 features while enabling IT departments to take advantage of advanced technology across a comprehensive range of hardware platforms."**

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Dell OptiPlex desktops:
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Dell Latitude laptops:
DELL.COM/Latitude

Dell Precision workstations:
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PLAN & ASSESS

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ACCELERATING THE TRANSITION TO MICROSOFT WINDOWS 7 WITH DELL CLIENT MANAGEMENT TOOLS

By Travis Zhao

A comprehensive suite of management tools and utilities helps organizations expedite the transition to the Microsoft® Windows® 7 OS on Dell™ client systems. These exceptional resources are designed to simplify assessment, deployment, and monitoring in addition to facilitating ongoing life cycle management of Dell platforms.

Selecting the most efficient deployment method is a top concern for IT organizations planning their move to Microsoft Windows 7. To that end, Dell offers open, flexible client management tools and services that help reduce the complexity and cost of a Windows 7 migration. The comprehensive solution set includes multiple levels of tools, services, and capabilities designed to address the specific management needs of diverse organizations—ranging from basic, built-in functionality for do-it-yourself Dell client management to Dell management software for large client computing environments and integration with comprehensive third-party management solutions (see Figure 1). Organizations can also take advantage of a range of Dell Services offerings that were developed based on Dell's firsthand experience deploying Windows 7 throughout its own global organization using patent-pending Dell deployment methodologies.

USING BUILT-IN FUNCTIONALITY AND LOCAL CLIENT TOOLS

Dell client systems take advantage of a range of technologies and utilities to enable the basic monitoring and configuration at the core of client management. System Management BIOS (SMBIOS) support makes information about Dell client systems available to administrators. Dell OpenManage™ Client Instrumentation (OMCI) allows IT managers to perform basic management tasks, such as accessing information about client systems and monitoring their status.

The Dell Client Configuration Utility (DCCU), which runs locally on client systems, allows administrators to modify BIOS configurations and update BIOS firmware. It also creates executable files that can be distributed to multiple systems. Select Dell client systems are available with either Intel® vPro™ processor technology or Broadcom TruManage, which provides out-of-band client access, hardware alerting, setup, and provisioning features. Both Intel vPro technology and Broadcom TruManage allow administrators to access a Dell client system even if its OS is down.

Streamlined management with Dell downloads

The complimentary Dell Client Configuration Toolkit (CCTK) provides a command line–based scripting utility that runs on client systems to allow BIOS configuration changes. Administrators can script their BIOS configuration changes and then either execute those scripts during imaging or distribute the scripts using the existing infrastructure for configuration management.

Dell Client System Update (DCSU) is a local tool that allows authorized users to scan BIOS and driver revisions on a local system using a graphical user interface (GUI). It then compares that information to BIOS and driver updates on the Dell support Web site and recommends required updates. Dell Client Driver Pack

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	Tools and utilities	Dell management tools	Partner management tools
Out-of-band remote access	Intel vPro and Broadcom TruManage	Dell Management Console for Clients (complimentary download) and Dell KACE systems management appliances	Microsoft System Center and LANDesk Management Suite
Hardware updates	Dell Update Packages (for BIOSs and drivers) and Dell Client System Update		Microsoft System Center Configuration Manager and LANDesk software
BIOS configuration	Dell Client Configuration Toolkit and Dell Client Configuration Utility		
Hardware monitoring and inventory	Dell OpenManage Client Instrumentation		Dell Client Management Pack for Microsoft System Center Operations Manager and LANDesk software
Deployment	Dell Client Driver Pack CAB files	Dell Client Management Plus and Dell Client Management Suite (fee-based downloads) and Dell KACE systems management appliances	Dell Client Deployment Pack for Microsoft System Center Configuration Manager
Backup and recovery	Dell Backup and Recovery Manager		Microsoft System Center and LANDesk software
Software distribution, patch management, software usage metering, asset management, and power management			

Figure 1. *Client management tools and utilities for Windows 7 migrations*

CAB files, also available as complimentary downloads, provide simple file directories with the driver files required for Dell OptiPlex™ desktops, Dell Latitude™ laptops, and Dell Precision™ workstations.

Dell software for Windows 7 migration

Built-in functionality and local tools can assist administrators with a Windows 7 migration. First, administrators can use OMCI and the DCSU tool to verify that the client components and software are ready for Windows 7. For example, BIOS settings may need to be changed to set up a Trusted Platform Module (TPM) for the Windows 7 BitLocker™ security feature.

Downloading the Dell .cab file with plug-and-play drivers for the specific platform helps significantly simplify the image deployment process by avoiding the need to search the Web for the appropriate drivers. Administrators can also download the DCCU tool to script BIOS configurations, and then run the script to make the changes. Building on these capabilities, administrators can automate the Windows 7 migration process using the tools of their choice. For small deployments of just a few clients, the Dell Upgrade Assistant can help guide users through the Windows 7 installation process in a simple and thorough fashion.

CENTRALIZING TASKS WITH THE DELL MANAGEMENT CONSOLE

For organizations managing a growing number of client systems or looking to integrate the management of desktop and laptop systems within the overall IT infrastructure, the Dell Management Console Powered by Altiris™ from Symantec™ provides a comprehensive framework. Organizations can use the Dell Management Console to centralize, remotely control, and automate tasks like OS deployment and updating through a single GUI (see Figure 2). The console integrates with underlying Dell instrumentation, and can automatically download and distribute instrumentation not already on the client systems.

Reduced costs with an incremental, phased approach

The Dell Management Console offers basic centralized hardware management and the ability to use plug-in solutions to support advanced functionality. The Dell Management Console for Clients (formerly Dell Client Manager) is a complimentary download that provides basic centralized hardware management, including discovery and inventory of client systems, one-to-many BIOS updates, power management, and client hardware health monitoring. The download also provides basic out-of-band management with Intel vPro and Broadcom TruManage support. The Altiris Deployment Solution™ for Dell Thin Clients plug-in is another complimentary download that adds advanced software tools for thin-client management of the Dell OptiPlex FX160.

Dell Client Management Plus is a fee-based module that adds software management capabilities such as migration of user data and settings, automated deployment, client software distribution, advanced out-of-band support, and inventory of OS and software configuration settings. Dell Client Management Suite is a fee-based module that adds advanced software management tools, including OS patching, software license metering, remote control of clients over a LAN, and enforcement of system configuration and software policies.

The Dell Management Console and Windows 7 migration

The Dell Management Console for Clients allows administrators to discover and inventory client systems and distribute BIOS updates and configuration in a one-to-many fashion before migrating to Windows 7. With the addition of Dell Client Management Plus, administrators can use the Dell Management Console for

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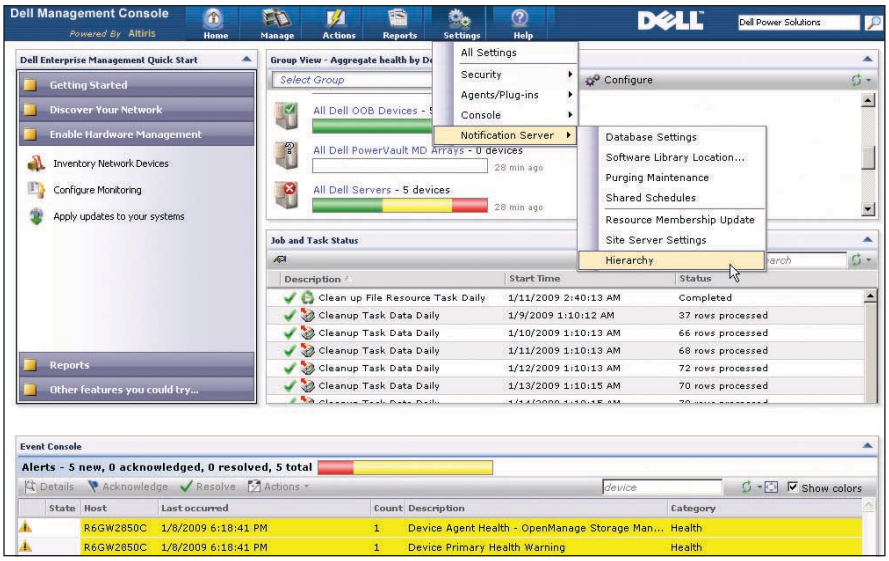

Figure 2. *Dell Management Console GUI for centralized management of clients, including Windows 7 deployments*

automated deployment of Windows 7, including allocation of drivers and distribution of images to networked clients.

Dell KACE management appliances

With Dell's planned acquisition of leading systems management appliance company KACE, the Dell KACE family of products provides a cost-effective, "pay as you grow" management approach for organizations, educational institutions, and state and local governments. Designed for ease of installation and use, Dell KACE appliances can be particularly effective in organizations where limited resources require IT staff members to perform multiple roles. Incorporating hardware, software, and OS management capabilities, these appliances can help significantly simplify Windows 7 migration tasks.

BENEFITING FROM THIRD-PARTY INTEGRATION

To unify comprehensive management functionality, Dell has integrated its tools with management solutions from a broad range of partners, including Microsoft, Symantec, and LANDesk. By leveraging OMCI and other Dell enablement technologies, IT administrators have the flexibility to build management functionality in step with size and organizational requirements.

Organizations implementing the Dell Management Console have a natural progression path through the various client management modules. For Windows 7, administrators can take advantage of Altiris Deployment Solution integration in Dell Client Management Plus and Dell Client Management Suite to automate bare-metal Dell client configuration and deployment across the organization.

Alternatively, organizations can use Dell tools to leverage their existing Microsoft System Center Configuration Manager (SCCM) and System Center Operations Manager (SCOM) deployments. Dell offers three Microsoft System Center extensions for Dell client management: the Dell Client Management Pack for monitoring clients through SCOM, the Dell Client Deployment Pack for OS and application deployment through SCCM, and the Dell Business Client Update Catalog for driver and BIOS updates through SCCM.

Administrators can use the Dell Client Deployment Pack and Dell Business Client Update Catalog together with SCCM to automate the bare-metal configuration and deployment of Windows 7 organization-wide. The Dell Business Client Update Catalog is designed to automatically download and update Dell client BIOSs and drivers through SCCM.

SIMPLIFYING CLIENT MANAGEMENT FOR WINDOWS 7 MIGRATIONS

A key goal for Dell is to provide open manageability that enables administrators to use the most suitable tools for their organizations' size and needs regardless of client hardware platform. Dell helps simplify the task by providing several client management options that do not force organizations into a proprietary paradigm. As a result, organizations can optimize return on investment whether they prefer to manage client systems themselves, use a Dell management approach, or continue using an existing management infrastructure.

In addition, many organizations aiming to capitalize on technology advancements in Microsoft Windows 7 can benefit from Dell's firsthand experience in deploying Windows 7 throughout its own global operation by taking advantage of Dell deployment methodologies and Dell Services options. By engaging early in the Windows 7 development cycle, Dell has gained key insights into the new OS, particularly as it functions together with advanced Dell client technologies for Windows 7 migration and management.

Travis Zhao is a senior product manager focusing on client system management within the Dell Enterprise Product Group.

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Dell TechCenter community:
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Introducing

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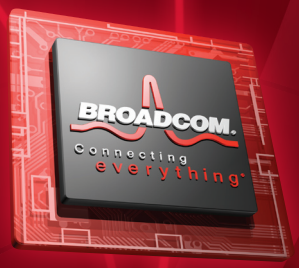
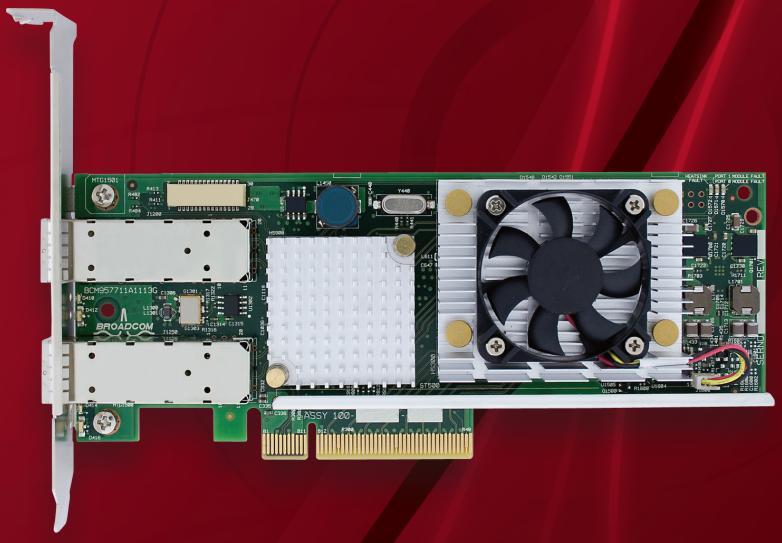
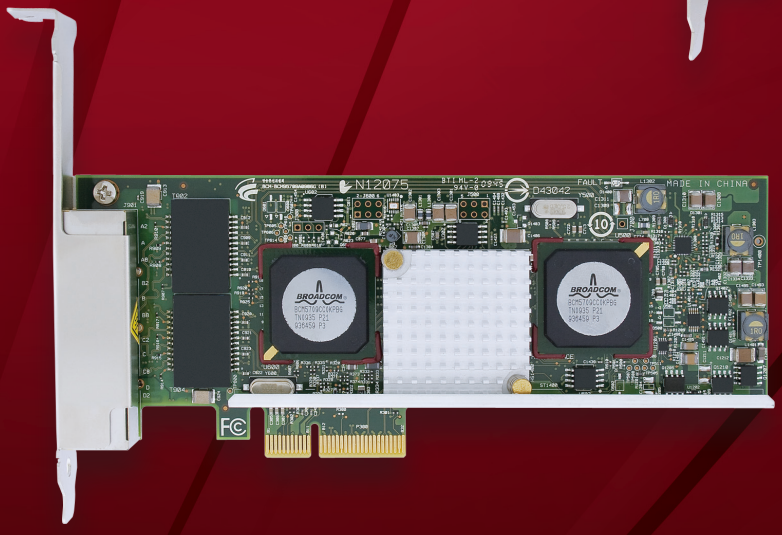




Broadcom NetXtreme II® 57711
Dual Port SFP+ and Copper Direct Attach 10Gb Ethernet PCI-Express Network Interface Card with TOE and iSCSI Offload



Broadcom NetXtreme II® 5709
Quad Port Gigabit Ethernet PCI-Express Network Interface Card with TOE and iSCSI Offload

Broadcom Converged Network Interface Controller (C-NIC) technology network interface cards enable convergence of the networking communications for data network (LAN) and block storage (iSCSI) connections. All this with lower CPU utilization and optimized throughput at multiple speeds for Dell PowerEdge™ and DCS solutions for enterprise, data center and cloud computing environments.

For further information, go to: http://bit.ly/7cKpFJ
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PLAN & ASSESS

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CAPITALIZING ON MICROSOFT WINDOWS 7 MOBILITY FEATURES FOR SECURE REMOTE ACCESS

By Ed Cline, Jason Paul, and Tom Kolnowski

As legions of mobile workers connect to their organizations' internal networks, IT leaders must find ways to enhance efficiency and simplify management of remote systems. Recent innovations in Dell™ client solutions and the Microsoft® Windows® 7 OS enable faster, easier mobile access to networks than ever before—helping to reduce total cost of ownership and increase remote client stability.

A widespread and growing mobile workforce is expanding the scope of traditional IT infrastructures. As the borderless office model becomes increasingly prevalent, many organizations face growing demands to enhance their support for geographically dispersed workers and remote employees, who require secure, easy-to-use mechanisms that enable remote access to internal networks.

For IT managers, supporting this remote and mobile workforce means addressing multiple challenges. In addition to secure network access for a variety of mobile devices, users look to their IT departments to provide a seamless, high-quality computing experience that fosters productivity in the field as well as in the office. At the same time, organizations are looking for ways to enhance the stability of the mobile computing infrastructure and reduce IT management costs associated with growing mobility.

Running Microsoft Windows 7 on Dell Latitude™ laptops and Dell Precision™ mobile workstations helps organizations to meet these challenges by taking advantage of the latest performance, manageability, and productivity advances for client systems. Dell worked extensively with Microsoft to build many common device drivers directly into the Windows 7 kernel.

MANAGING REMOTE SYSTEMS EFFECTIVELY

Dell offers a variety of leading technologies to help simplify remote management while reducing total cost of ownership. Simplified management starts with the built-in hardware monitoring and configuration capabilities that form the core of Dell client management instrumentation and utilities.

Running on top of this built-in Dell instrumentation, the Dell Management Console Powered by Altiris™ from Symantec™ offers a "single pane of glass" view of IT infrastructure and enables administrators to add clients, configure or update the BIOSs of multiple systems simultaneously, monitor system health, and deliver basic provisioning. The Intel® vPro™ technology available in many Dell clients enables out-of-band management as well.

Windows 7 enhances these capabilities with a variety of remote management features. For example, Windows 7 helps strengthen manageability by allowing IT administrators to service remote systems on a regular basis and help ensure that mobile systems stay up-to-date with organizational policies. With the DirectAccess feature in Windows 7, IT administrators can manage mobile systems by updating Group Policy settings and distributing software updates whenever the mobile system has Internet connectivity, even if the user is not logged on to the network.

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Safeguarding remote client stability can be simple and effective with the Windows 7 AppLocker™ feature. When users download unauthorized software, they can inadvertently introduce application conflicts and malware. AppLocker allows IT administrators to specify which applications and versions may be installed. Administrators can manage an application regardless of whether it is accessed internally from a local area network (LAN) or externally from either a wide area network (WAN) or the Internet. This feature helps simplify IT by giving administrators a single tool and interface to manage applications and by helping reduce the number of application versions they need to manage.

Windows 7 also helps accelerate problem resolution. When problems arise with a remote client, the Problem Steps Recorder tool in Windows 7 expedites the support process. This tool documents the steps needed for resolution by capturing screen shots of the desktop and additional details about the user interface elements and OS.

Dell Latitude E-Family laptops were built from the ground up to help maximize mobile productivity, security, and manageability

PROVIDING FAST, EASY NETWORK ACCESS

Capabilities in Dell client systems together with Windows 7 help simplify and accelerate the user experience compared with previous versions of Windows. For example, single-click access to networks and plug-and-play connections with 3G mobile cards help advance user efficiency.

With Windows 7 running on Dell laptops, the process of pulling up a mobile broadband application, making a connection, and accessing a virtual private network (VPN) is designed to be significantly faster than on systems running the Windows XP or Windows Vista® OS. Windows 7 provides a single interface designed to display available networks and make the strongest connection, whether that is through Wi-Fi® or broadband connectivity (see Figure 1). Also, the Windows 7 DirectAccess feature helps to free users from loading and activating a VPN, because this step is integrated into the remote access connection process.

Helping to further simplify remote access, the Microsoft mobile broadband utility includes integrated drivers for broadband cards from various providers. Instead of loading the software from a card provider and then hoping it is compatible with the client OS and hardware, users can rely on built-in compatibility. Windows 7 can recognize the card type, automatically load the appropriate drivers already integrated within the OS, and provide a familiar Windows interface for users to customize settings.

Figure 1. *A single Windows 7 interface displaying available Wi-Fi and broadband networks*

Dell Latitude ON™ connectivity technology contributes to fast access and user productivity by helping to reduce system startup time. Provided as an integrated module for Latitude E4200 and Latitude E4300 laptops, this technology is designed to give users near-instant access to calendars, e-mail, contacts, the Internet, and other frequently used applications. Well suited for mobile users who need to quickly check e-mail or appointments on the go, Dell Latitude ON enables bidirectional remote access to Microsoft Exchange data with the single touch of a button, without booting or waking the entire laptop.

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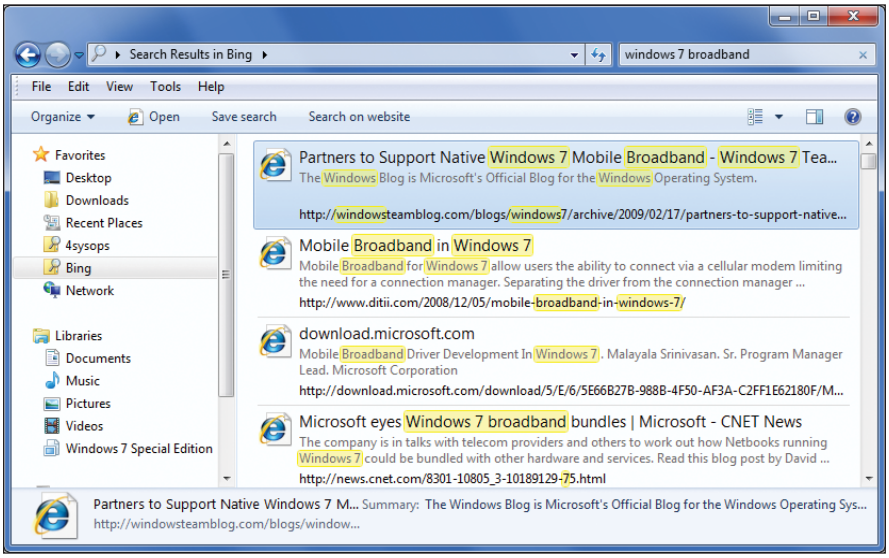

Figure 2. *Windows 7 federated search displaying information from multiple remote repositories within a single view*

EXTENDING MOBILE PLATFORM BATTERY LIFE

With long-lasting battery life (up to 22.5 hours in select mainstream models[1]), Dell Latitude laptops are designed to support all-day computing. Dell Latitude ON extends this battery life by conserving power when it bypasses a full system boot.

Windows 7 helps extend battery life as well. First, Windows 7 has a comparatively light processing footprint compared with the previous OS version. While the Microsoft Aero® interface offers an intuitive and aesthetically pleasing user experience, in Windows Vista it required intensive graphics processing that could slow system performance and drain battery power. Retooled Aero code in Windows 7 is less processor intensive than it was in Windows Vista, drawing less power and helping to extend the life of laptop batteries.

The display on a mobile PC typically consumes more battery power than any other part of the computer. Windows 7 addresses this factor by automatically reducing display brightness after a period of inactivity to help conserve power and prolong battery life. The feature intelligently adapts to user activity—for example, if the screen dims after 30 seconds and the user immediately moves the mouse to brighten the display, Windows 7 waits 60 seconds before dimming the display again.

BOOSTING USER PRODUCTIVITY

Besides helping save battery power, the lighter processing footprint for the Aero interface under Windows 7 also enhances user productivity compared with Windows Vista. Migrating an existing Dell client from Windows Vista to Windows 7 can boost performance and the responsiveness of business productivity applications running on the same hardware. In addition, users updating to Windows 7 may be less likely to require add-on graphics coprocessors to run demanding software such as design, digital editing, and computer-aided manufacturing applications.

A federated search feature in Windows 7 helps boost productivity by removing barriers to information. The feature is designed so that workers can access relevant information in remote network and Internet repositories through a simple user interface (see Figure 2). For example, users can configure the interface as a federation of selected Microsoft Office SharePoint® sites, data servers, and Internet sites and avoid sifting through volumes of stored data or trying to remember which SharePoint site contains a needed document. The feature is integrated with the Microsoft Internet Explorer® browser, and is standards based to enable it to work with other browsers as well.

Fast connection of Windows 7 clients to projectors enables smooth, productive presentations on the road. The Windows 7 driver display utility helps make it easy to plug in a projector and display presentations without delay. A pop-up navigation window enables users to switch through multiple display settings, such as clone, extend, or external only. Also, users do not need to adjust the resolution because Windows 7 optimizes the projected image.

Using a keyboard and mouse is not always convenient for mobile users, and Windows 7 introduces support for multitouch technology that can help reduce or avoid the need for these peripherals. Users can simply touch the screen to perform tasks such as scrolling, resizing windows,

> **"Migrating an existing Dell client from Windows Vista to Windows 7 can boost performance and the responsiveness of business productivity applications running on the same hardware."**

[1] Based on Dell lab testing on a Dell Latitude E6400 with solid-state drive. Actual battery life will vary based on configuration, operating conditions, and other factors. Maximum battery capacity decreases with time and use.

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> **"Windows 7 introduces or enhances OS features that, together with capabilities built into Dell mobile computing platforms, can improve access, productivity, and security for mobile users."**

playing media, and panning and zooming images or pages. Workers can also browse the Web with Internet Explorer 8 and use a finger to scroll down a Web page. Using Windows Touch functionality requires a touch-screen monitor or laptop with a touch screen; selected Dell business systems, such as the Dell Latitude XT2 XFR, are ready to support Windows Touch out of the box.

Location-aware printing is another feature that helps save time and effort. Windows 7 allows users to designate several default printers in different locations, so there is no need to reset the default printer or remember the printer name. Windows 7 automatically switches the default printer for a laptop when it detects that the user has moved from one network location to another. Connecting to a new printer in a remote location can be simplified by virtue of having most drivers already built into the Windows 7 kernel.

ENHANCING SECURITY FOR MOBILE DEVICES

Several enhanced security capabilities supported by Dell and Microsoft help prevent unauthorized access and protect data in mobile systems. Enforcing user accounts to adopt a strong password is the first step in protecting access to Dell clients running Windows 7. For an additional layer of protection, especially in the field, selected Dell models come equipped with built-in biometric security in the form of a fingerprint scanner.

With Windows 7, Microsoft provides enhanced integration between the OS and fingerprint-scanning hardware, including enhanced driver support. Windows 7 includes a control panel that helps make it easy to enter user fingerprint data and configure fingerprint reading. Potential uses include identifying workers before allowing them to log on to Windows and authenticating users for other applications or Web site access.

Available with Windows Vista as well as Windows 7, BitLocker™ drive encryption helps protect sensitive data from being accessed by unauthorized users who come into possession of lost or stolen laptops. The BitLocker To Go™ feature extends BitLocker data protection to USB drives and other removable media, enabling them to be encrypted and restricted with a passphrase or smart card.

Dell also provides Trusted Platform Module (TPM) 1.2 hardware that can be used to implement BitLocker drive encryption. TPM provides integrity authentication to help ensure a trusted boot pathway. The key used for the drive encryption is sealed by the TPM chip. When a user attempts to access the drive, the key is released to the OS loader code only if the early boot files appear to be unmodified, helping ensure that only authorized users access the drive.

STREAMLINING MOBILE ACCESS WITH WINDOWS 7

Organizations that deploy Dell Latitude laptops and Dell Precision mobile workstations for remote workers can optimize innovative mobility features in Microsoft Windows 7. Windows 7 introduces or enhances OS features that, together with capabilities built into Dell mobile computing platforms, can improve access, productivity, and security for mobile users.

These mobility features can also enhance manageability and reduce total cost of ownership of mobile platforms for IT managers. Dell Latitude laptops and Dell Precision mobile workstations are Windows ready and designed with advanced technology options that can fit the requirements of nearly any environment. Organizations can have Windows 7 factory installed by Dell when they refresh their mobile computing environments, or can migrate existing laptops to Windows 7 using Dell tools and services.

Ed Cline is the technology specialist for mobile computing in the Dell Advanced Solutions Group. He has over 25 years of experience in various product and market development roles, serving with Atari, Philips, Motorola, Compaq, and AMD before coming to Dell, where he has worked for over 10 years.

Jason Paul is a senior client technologist in the Dell Advanced Solutions Group. Before joining Dell, he had over 15 years of experience articulating the business value of emerging technologies for Microsoft, Adobe, and EDS. Jason has a degree in Economics from the University of Washington.

Tom Kolnowski is editor-in-chief and publisher of *Dell Power Solutions* Magazine.

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HOW DELL SERVICES HELP SIMPLIFY THE MIGRATION PATH TO MICROSOFT WINDOWS 7

By Terry Lake and Jim Ginger

Software migrations can be daunting without an expert partner to help map out the transition strategy. Dell has worked closely with Microsoft and early adopters of the Microsoft® Windows® 7 OS to develop reference architectures and streamline the migration process through workshops, expert assessments, design, proof-of-concept testing, and implementation.

The toughest part of any software migration can be simply figuring out where to start. Organizational readiness is about much more than hardware and application compatibility; it also requires the right technology foundation, deployment strategy, and staff training. Evaluating hardware readiness is a logical first step. What needs to be upgraded and replaced, and what works as is? Peripherals compatibility can be important as well—this aspect caught many users of the Microsoft Windows Vista® OS by surprise, and should not be overlooked when planning a move to Windows 7.

The next step is studying application compatibility. Often, the most significant challenge organizations face during a migration is ensuring that their applications work in the new operating environment. Following a well-documented, repeatable, and results-driven testing process can be the key to achieving this goal.

Organizations should also consider their technology foundation: taking advantage of key Windows 7 features often requires identifying and implementing supporting technologies in the data center. They can next define their deployment strategy, including establishing a deployment timeline that takes into account the scope of necessary application testing and remediation efforts. Finally, they should educate front-line staff in advance so that issues can be handled quickly as they arise. By taking advantage of Dell expertise to streamline the migration process, organizations can focus on how the enhancements in Windows 7 can benefit the organization as a whole.

GUIDANCE FROM A SMART TECHNOLOGY PARTNER

Fortunately, IT organizations do not have to navigate the path to Windows 7 alone. As an early adopter of Windows 7 within its own global infrastructure, Dell offers comprehensive expertise based on firsthand experiences during the migration process. Engaging with Microsoft early in the Windows 7 development cycle also provided Dell with exceptional insight into both technology platforms and the best practices that help ensure application compatibility and streamline deployment processes through patent-pending Dell deployment methodologies.

Dell Services participated jointly with Microsoft in supporting mutual customers through the Windows 7 Technology Adoption Program (TAP). In addition, Dell is a member of the Microsoft Consulting Services Preferred Services Partner Program in the United States.

Dell also provides organizations with enhanced product validation of Microsoft solutions on Dell™

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platforms. This solution and product validation is performed jointly through Microsoft Product Development and Dell Enterprise Solution Centers, where a dedicated Dell team focuses on solution testing, verification, and certification of the Microsoft solution stack.

DELL SERVICES METHODOLOGY

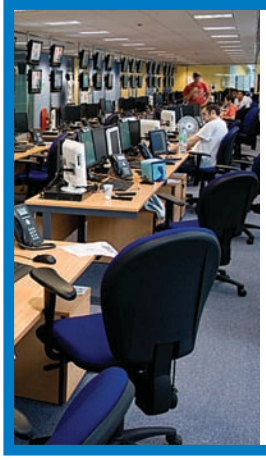
Dell estimates that large organizations may need 12–18 months to complete a migration to Windows 7. During that time, Dell Services works as an extension of the existing team within an organization—which helps to free up valuable human resources to innovate and focus on strategic projects. Dell helps to simplify migration to Windows 7 by breaking the process down into five key phases.

Phase 1: Workshop

Workshops help IT professionals understand the potential of Windows 7 and the Dell consulting process. As part of each workshop, Dell determines the objectives and the current state of the organization's IT infrastructure relative to specific scenarios. Expert Dell consultants provide knowledge transfers and discuss design points, concluding with a brief planning exercise.

Dell ProConsult Windows 7 workshops offer a collaborative forum to share ideas, best practices, and the field-tested Dell process for planning Windows 7 migrations. Dell also provides workshops that focus on application and image consulting as well as optimized deployment planning.

CASE IN POINT



"Our partnership with Dell gives us the opportunity to enhance our IT infrastructure and improve operations by deploying emerging Microsoft technologies. The network of expertise we can access through Dell is invaluable."

—Ian Burgess
Head of Microsoft and data center platforms at Betfair
October 2009

Phase 2: Assessment

To help realize the full benefits of Windows 7, organizations must ensure that their computing environments are prepared for the upgrade. The assessment phase provides a detailed technical and operational overview and a validation of the current infrastructure and dependent services.

Designed to identify application compatibility, hardware compatibility, and migration readiness, the Dell ProConsult Windows 7 Readiness Assessment comprises a three-week engagement that includes both on-site and off-site analysis. Dell teams use a variety of tools and surveys to gather data on the current IT infrastructure, and then present recommendations based on the initial application compatibility findings.

A comprehensive Windows 7 Application Compatibility Reporting (ACR) Assessment offers analysis of applications in use throughout the organization. Application compatibility is one of the biggest perceived challenges to migration, and rightly so—many applications require some remediation through the packaging layer before a migration to Windows 7. The ACR Assessment helps identify which applications can be remediated and which require replacement, upgrade, or another approach (see Figure 1).

The Windows 7 Application Compatibility Factory (ACF) teams Microsoft with service partners to help organizations migrate their applications to Windows 7. Dell, as a Microsoft ACF partner, offers comprehensive global coverage.

As part of the ACF methodology, Dell analyzes the application suite in use within the organization—including commercial

CASE IN POINT

"Thanks to Dell ProConsult, we have a very good model in place where we can deploy and upgrade across the agency seamlessly. We could not have done this without Dell's support."

—Wade Morgan
National IT manager at Euro RSCG
December 2009

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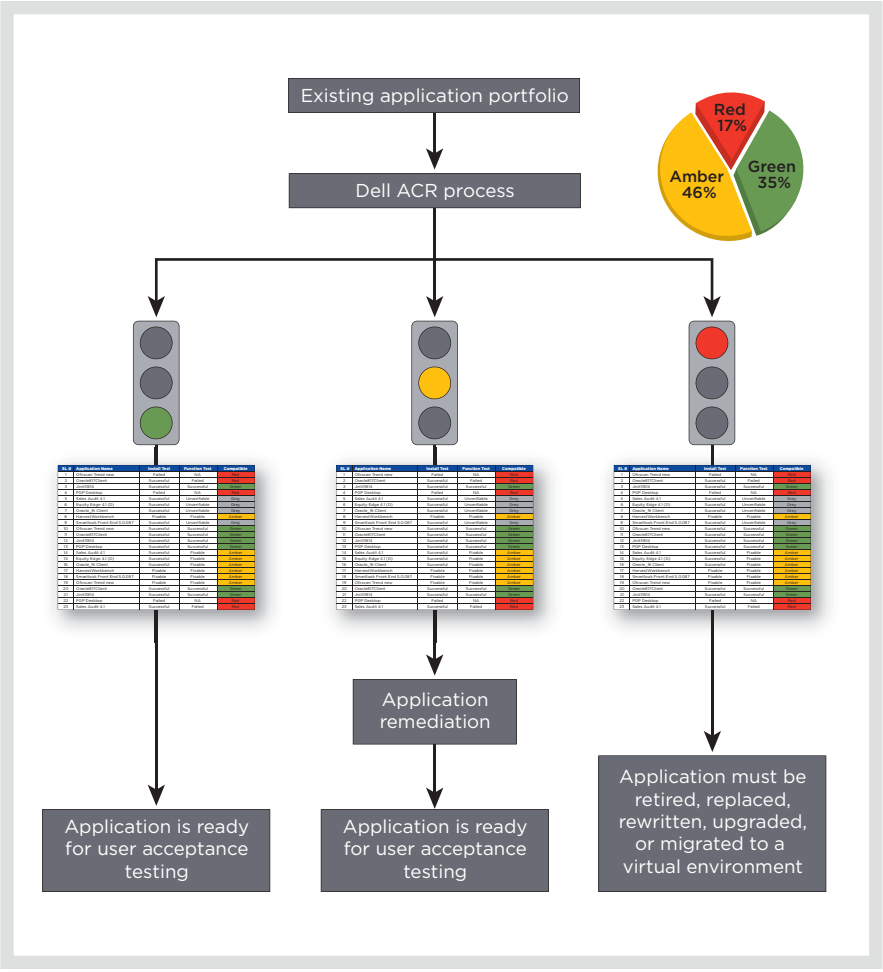

Figure 1. *A typical Dell ACR assessment for Windows 7 identifies a significant proportion of applications that can be remediated through packaging*

and custom-developed applications—to determine which applications require work to migrate to Windows 7. The Dell Software Inventory and Usage Management service complements the ACR and ACF offerings by automating asset discovery and monitoring usage. Engine-based analysis through the Dell Titling Engine Service enables the Dell team to avoid redundant, obsolete, or unsupported applications through a process of organizing software data into concise inventory reports.

In addition, Dell Image Assessment Services enable organizations to select appropriate tools for designing, building, and testing system images to help reduce the chances of rework. And the Dell ACF – Proof-of-Concept service for Windows 7 offers comprehensive compatibility and remediation services to help overcome common problems during OS migrations.

Following compatibility testing, the Dell best practice is to first remediate the applications by packaging or repackaging the failed group into compatible Microsoft Windows Installer (MSI) files. This service involves applying a standard software development engineering process to help efficiently resolve issues discovered during testing. In addition to packaging or repackaging, the remediation process includes making decisions regarding retirement, consolidation, redevelopment, and virtualization of the applications.

Phase 3: Design

The design phase helps to simplify the migration process by giving organizations a road map to follow as they make the move to Windows 7. It helps to facilitate a rapid, seamless migration by enabling the infrastructure to be prebuilt and by providing a tested implementation plan through the pilot stage.

Dell Services can map out the entire process of deploying Windows 7 using tested delivery and staging processes to handle each phase—from order consolidation and preinstallation testing through application remediation, coordination of deployment resources with equipment delivery, removal of packaging, final handover, and project closure.

CASE IN POINT

"Dell ProConsult saved us months of testing time and helped ensure a smooth migration to Windows 7."

—Keith Price
CTO for Hoover City Schools
January 2010

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Phase 4: Implementation

In this phase, Dell consultants help ensure that Windows 7 is deployed according to the design specified. Dell experts can perform application packaging, virtualization, user testing, and knowledge transfer for technical resources and deployment specialists. Typical tasks may include hardware and software installation and migration of users or data. The services can address a comprehensive range of Windows 7 migration elements but are also modular, enabling organizations to choose the ones that are appropriate to their needs. To enhance flexibility while helping to increase quality and reduce costs, Dell offers application services through its global application factories or at organizations' own sites.

Dell Image Management Services help IT organizations streamline the process of securely creating, deploying, and managing Windows 7 software builds on Dell hardware—allowing them to boost productivity while reducing total cost of ownership. In addition, the Dell Automated Deployment (DAD) solution is designed to automatically perform the complex tasks associated with a typical deployment, including deploying OS images, installing applications, migrating end-user data and settings, and more. The DAD process is based on specific organizational objectives and guidelines coupled with specific profile build data, and supports defined custom data points to help maximize flexibility. By using automation to help ensure consistency, efficiency, and accuracy, DAD helps to minimize manual intervention, reduce costs, and accelerate project completion—including helping to dramatically reduce the time to deploy a typical system.

Phase 5: Management

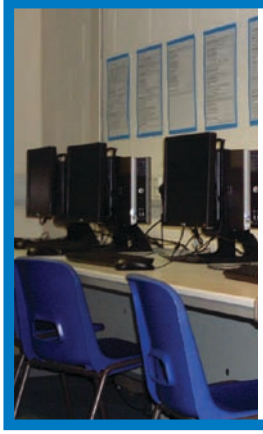
After the migration to Windows 7 is complete, organizations must continue actively managing the infrastructure. Using standardized methodologies, Dell consultants help organizations implement automatic application distribution and deployment mechanisms that do not require user intervention. These tools are designed to ensure that new applications do not conflict with existing installed software.

Dell ProSupport provides a thoroughly configurable suite of professional support services designed to promote proactive problem avoidance, as well as customized support levels and response times. Maintenance services for pay-as-you-go application packaging offer remediation and software virtualization to help prepare applications for deployment in accordance with specified application packaging standards. In addition, Dell Image Management Services can provide fully functional images ready for system deployment, built by Dell imaging consultants according to organizational specifications.

WINDOWS 7 MIGRATION, SIMPLIFIED

Hardware and application compatibility, peripheral compatibility, staff training, and the planning and deployment timeline are all key issues to consider before beginning a Windows 7 migration. But organizations need not complete the process alone. Dell has worked closely with Microsoft to help organizations simplify the transition to Windows 7. With a methodology that comprises workshop, assessment, design, implementation, and management phases, Dell Services offers expert navigation for a successful migration.

CASE IN POINT



"Dell helped us build our first Windows 7 image and ensured that the deployment was a simple process. Dell's know-how and experience were fundamental to the project's success."

—Stephen Peverett
Network manager at Lodge Park Technology College
December 2009

Terry Lake is the senior solution architect for end-user computing with Dell Global Infrastructure Consulting Services. In this role, he is responsible for the initiative to integrate Windows 7 into the Dell end-user computing services portfolio. He also has responsibility for driving the implementation of the Windows 7 early-adopter programs.

Jim Ginger is the global practice leader for end-user computing with Dell Global Infrastructure Consulting Services. He has over 25 years of experience in consulting and services, and is currently responsible for the global build-out of Dell consulting services that enable organizations to efficiently migrate to Windows 7, manage their application portfolios, and implement virtual desktop technologies.

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ADDRESSING MICROSOFT WINDOWS 7 APPLICATION COMPATIBILITY

Microsoft® Windows® 7 application compatibility is often a top concern for organizations planning an upgrade. By following best practices, understanding the available application remediation options, and taking advantage of comprehensive Dell™ services throughout the migration process, IT groups can lay the foundation for a successful rollout.

Most large organizations do not deploy a brand-new technology as soon as it is released. Upgrade and migration projects can be a huge undertaking—especially for complex, distributed workplaces that employ numerous custom applications.

Microsoft Windows operating systems are no exception. As many organizations learned when migrating from Windows XP to the Windows Vista® OS, applications that are customized to work in a particular OS do not necessarily work smoothly in a new one. Dynamic-link libraries (DLLs), registry settings, and function calls that differ even slightly from the legacy OS can cause applications to freeze or shut down, leading to end-user frustration, increasing numbers of help-desk calls, and reduced overall productivity.

Major OS upgrades can affect IT infrastructures, computing hardware, software, workflow processes, and end users, but application compatibility often tops the list of concerns for organizations considering a Windows 7 upgrade. To help stay ahead of the competition, IT organizations should begin working on their migration strategy now—taking inventory of current applications, assessing compatibility, and identifying appropriate remediation options so that they can begin taking advantage of the powerful enhancements that Windows 7 can offer to both IT and business operations.

INVENTORY AND ASSESSMENT

The first step during an OS upgrade is to gain a comprehensive understanding of the application library under management—not always a simple task. In a well-run environment that follows best practices, the IT department is in charge of rolling out and managing all software tools, but expedience often trumps best practices. In many cases, individual departments and user groups purchase, download, and install their own applications on an ad hoc basis. Even if the organization sets standards and policies, a branch office may deviate from them until a thorough audit is conducted—which, given budgetary constraints and the practicalities of IT operations, may happen only rarely, if ever. This makes the job of assessing and documenting current applications that much more difficult.

To carry out the inventory, administrators should first scan the network and discover all applications in the environment. The scan should capture all executable (.exe) files and filter them through a database that can identify which files represent installable, licensable applications. (Dell, for example, maintains a database of over 95 million executables for this purpose.) A thorough scan is crucial to avoid missing business-critical applications, and to avoid including files that are not truly applications. An incomplete list can easily result in surprise delays and disruption during the rollout.

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The resulting list is likely to include a host of software items that are not used for work purposes, which can be eliminated immediately. Administrators should also identify and remove duplicate applications, redundant software (where, for example, two departments are using different accounting tools to accomplish the same task), and out-of-date software that is ready for retirement. Removing these stragglers and standardizing the application library ahead of time can help significantly smooth the upgrade.

When administrators have created a final application list, they now know what must be restored after the upgraded OS is loaded. The next step, therefore, is identifying whether these applications can run under Windows 7.

COMPATIBILITY TESTING

Testing tools are available that can automate the process of determining application compatibility and help in planning and scoping. Although these tools can provide a high-level estimate of how many applications require remediation, a real-world installation test—using each application and a production-ready image, running on Windows 7 and adhering to all relevant group policies—is the recommended way to determine compatibility. Administrators should keep in mind that although an application may run in Windows 7, Microsoft Windows Installer (MSI) files for custom application packages often require remediation.

After performing the testing, administrators can group applications based on compatibility status. During a Dell Application Compatibility Reporting (ACR) Assessment, for example, each application is assigned one of three status "colors":

- "Green" application packages run natively in Windows 7 without intervention.
- "Amber" application packages can run in Windows 7 after some form of remediation or repackaging. For example, the installation process may attempt to access parts of the system registry that are off-limits or slightly different in Windows 7, and an adjustment to the packaging layer can redirect those instructions. The same applies when an application requires a DLL that is not native to Windows 7: a remediation plan could include that DLL in the image and thus restore the functionality.
- "Red" applications are fundamentally incompatible with Windows 7. These applications must be retired and replaced, rewritten (if they were developed in-house), upgraded to a compatible version, migrated to run in a virtual environment, or packaged for an application streaming solution.

Dell begins the remediation process by packaging or repackaging the failed group of applications into compatible MSI files, and uses a standard software development process to help efficiently resolve issues. The remediation process also includes making decisions regarding application retirement, consolidation, redevelopment, and virtualization.

VIRTUALIZATION SOLUTIONS

Virtualization provides a key way for IT organizations to proceed with a Windows 7 deployment while still enabling use of incompatible applications. The two primary options for this purpose are Microsoft Enterprise Desktop Virtualization (MED-V) and Microsoft Application Virtualization (App-V). Another technology, Windows XP Mode, can also help remediate some compatibility issues. However, because Windows XP Mode in Windows 7 is employed as a local virtual machine (VM) running an instance of Windows XP, organizations considering using this feature should also take steps to ensure the local VM is properly managed.

These technologies can help keep a migration from coming to a halt by providing a stopgap measure for "amber" applications while they are being fixed, and for "red" applications while retirement and replacement options are considered. It is important to note that these features are not permanent solutions—they can work in the short term as part of a phased migration strategy, but in the long term, organizations should plan to upgrade their applications to versions that can take advantage of latest-generation hardware and Windows 7 performance enhancements.

Another important consideration is that these technologies require that virtualization support be built into the processor. These solutions also have implications for application and patch distribution: for example, MED-V and Windows XP Mode contain legacy Windows XP images that must be kept up-to-date. As such, even the stopgap measures may require upgrades to existing PCs and management infrastructure, which organizations may want to consider as a necessary expenditure.

Microsoft Enterprise Desktop Virtualization

MED-V provides a centralized management console that enables administrators to deploy and control Windows XP Mode on individual PCs. This option is designed for midsize and large environments where tasks such as virtual image delivery, policy-based provisioning, and centralized management are necessities, not luxuries.

MED-V lets IT staff perform such tasks as deploying virtual Windows XP Mode environments to individual end users, customizing the application environment, and automating first-time setup. Two drawbacks are that the management layer does not offer the same type of full-featured control as traditional VM consoles, and that each MED-V instance works only with installations of fewer than 5,000 nodes. For environments with more than 5,000 nodes, administrators would need to run additional instances and duplicate their management tasks on each.

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MED-V typically has a performance impact on the PCs running it. Patching and distributing applications to the Windows XP VM may also require special processes or updates to PC management tools. As such, MED-V should serve only as a temporary solution while IT staff work through compatibility issues with the "red" applications and create an application environment that embraces Windows 7.

Microsoft Application Virtualization

App-V involves hosting an application centrally, with each end-user PC accessing it as a virtual service; this way, the application does not reside on the individual PCs. Virtualized applications can be a smart idea for some companies from the standpoint of enterprise and operational efficiency.

App-V enables end users to work with the centralized application in a *sandbox*, an area that helps reduce conflicts with other applications and with Windows 7. Most of the OS compatibility issues that App-V helps resolve can also be addressed in the packaging layer. In other words, this solution may help with some "amber" applications, but often cannot resolve the core compatibility issues with "red" applications. With a virtualized application, the navigation features of Windows 7 are functional, IT administrators can enforce policies centrally using the Microsoft AppLocker™ feature, and Microsoft BranchCache™ technology can enable employees in distributed locations to access their applications over a wide area network without requiring remote or branch office servers.

App-V can be complex, because it involves acquiring and managing a central application hosting server. For many organizations, however, hosted or virtualized applications are a smart move—helping to cut down on unnecessary license fees, ease IT management burdens, and enable the implementation of best practices and policies for all users accessing the application.

Windows XP Mode

Windows XP Mode provides a virtual Windows XP environment that enables incompatible applications to run in a VM. This VM resides on each PC and runs with near transparency in the background. Windows XP Mode comes as a separate download and works only with the Windows 7 Professional, Ultimate, and Enterprise editions.

The advantage of this feature is that it enables legacy applications to continue working, and is a feasible temporary choice—especially for small organizations—while resolving issues with "red" applications. The disadvantages are that it requires local installation on each system and virtualization support on the chipset, and that, like MED-V, it can cause significant performance degradation. Another potential drawback is that the IT department must now manage the Windows 7 and the Windows XP environments: IT staff members must continue performing legacy patching and management routines—perhaps modified to work with VMs—to maintain the Windows XP applications, while also putting new routines and protocols in place to manage Windows 7. Windows XP Mode is typically recommended only for small business or consumer usage.

WINDOWS 7 EXPERTISE FROM DELL

Dell offers a comprehensive set of services and the expertise and experience to enable a smooth migration to Windows 7—from planning and testing to imaging and final rollout, including application compatibility testing and remediation. The Dell ProConsult Windows 7 Readiness Assessment can help determine whether current hardware can support the OS, while a comprehensive Windows 7 ACR Assessment can inventory applications and determine whether they are ready to work with Windows 7. Dell can also perform software rationalization to discover applications in the environment and identify those that should be retired before migration—helping organizations to reduce costs during the migration and gain control over their application libraries and standards.

For applications that fall into the "amber" category based on the ACR results, Dell can provide application remediation services to repackage and tweak the software as needed based on each organization's specific requirements, certifications, and validations. For organizations whose migration plans include application virtualization, Dell can provide the necessary hardware and software in a configuration that can meet the requirements of their individual environments, including virtualization software tools from Microsoft, VMware, and Citrix through Dell Flexible Computing Solutions.

Although compatibility is often a major concern for organizations considering a move to Windows 7, these and other Dell services are designed to help IT staff overcome the challenges of identifying and remediating incompatible legacy applications. By taking advantage of these services, following best practices when preparing for a migration, and understanding the available remediation options, IT administrators can help ensure a smooth and successful transition and begin realizing the benefits of Windows 7.

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AUTOMATING PROCESSES TO OPTIMIZE MICROSOFT WINDOWS 7 DEPLOYMENT

Best practices and automation are the keys to a smooth, simplified migration to the Microsoft® Windows® 7 OS—helping to reduce the costs associated with a major deployment, accelerate project completion, and minimize risk.

Microsoft Windows 7 includes multiple enhancements that can be valuable in a variety of IT environments—including the DirectAccess feature, which is designed to simplify connectivity for mobile users; the BitLocker™ and BitLocker To Go™ features, which are designed to secure data on hard drives and removable USB drives; and the AppLocker™ feature, which is designed to provide granular control over end-user applications. Additionally, Windows 7 offers energy-saving features as well as enhanced protection against malicious software through the User Account Control (UAC) feature.

The need to replace an aging fleet of legacy client systems, the potential cost savings when using Windows 7, and the eventual end of Windows XP support mean that IT departments should begin planning their Windows 7 deployments now. Organizations still running Windows XP can expect support from Microsoft and independent software vendors to gradually decline, and Microsoft extended support for Windows XP with Service Pack 3 (SP3) is expected to end in April 2014, with no updates or patches offered after that date. Assuming a 12- to 18-month timeline to prepare for and execute a major OS migration, IT departments that do not start planning soon risk running out of time before their migration to Windows 7 is complete.

Many IT departments may not have managed a major client OS refresh in over six years. During that time, applications, user data requirements, and IT complexity have grown significantly. The good news is that automation has also improved dramatically—and that IT departments can therefore avoid the old paradigms of manual deployment or simply waiting for systems to be replaced. Both of these approaches can incur hidden costs and inefficiencies, especially if IT staff and end users must invest a significant amount of time in the deployment process.

Following best practices and automating many of the migration steps can help organizations significantly reduce the cost of a Windows 7 deployment. However, many organizations are unsure about the steps to conduct a migration and how they can achieve these deployment cost savings. For this reason, they are turning to organizations like Dell, which offer deployment services and real-world expertise that combine best practices and optimized processes.

DEPLOYMENT CHALLENGES

A large Windows 7 deployment can involve hundreds or even thousands of client systems, with some in distributed and remote locations. Ideally, the entire migration should take place within a short period of time to help minimize the cost and complexity of managing multiple client operating systems. These factors introduce challenges across multiple areas:

- **Management:** Mass client and OS deployments are outside the scope of normal operations, so organizations may not be familiar with the intricacies of these projects. In addition, collecting the asset data necessary to support planning is challenging for organizations that do not already have a systems management infrastructure in place.

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- **Staging and logistics:** In many deployments, organizations must stage images and applications near the destination clients—a process that requires planning, infrastructure, and labor—and must manage the rollout to help ensure that it occurs in an orderly manner. Strong logistics, similarly, demand careful planning, scheduling, and management. Bringing in outside expertise and help can greatly increase the efficiency of these processes. For example, some methods can eliminate the need for staging altogether, thereby helping reduce cost and complexity.
- **Image installation:** Organizations traditionally store images on a network and install them from there, but this approach may not be efficient for a large deployment. Synchronizing the image repositories can be an ongoing challenge, and downloading multigigabyte images across a network to hundreds of clients can saturate the infrastructure even at primary locations. The problem is compounded in branch offices, among remote workers, and at global locations.
- **Application installation:** Creating an application inventory, resolving compatibility issues, and repackaging legacy applications are intricate processes. Determining which applications should be installed on a particular system—and validating license entitlement—can be complicated, and automating their installation is an intensive process that often requires specialized tools and expertise. All of these elements can benefit from an experienced project management organization.
- **User state migration:** User data and system configurations must be carried over to the upgraded OS—otherwise, end users are likely to make frequent calls to IT staff for help in restoring settings, resulting in lost productivity and increased support demands. Migrating user settings therefore helps increase end-user satisfaction and post-deployment productivity while also helping reduce support costs. However, migrating user state data to a network share presents challenges similar to image installation, including significantly increased storage costs, the introduction of data security risks, and consumption of bandwidth needed to run day-to-day operations. Latest-generation automation tools can help ensure that user state data is migrated successfully while also helping eliminate most or all storage and network bandwidth requirements.
- **Post-deployment user support:** Support incidents generally increase significantly during a deployment project. Users are unfamiliar with the new computing environment, and often need the help of support technicians before returning to normal levels of productivity.

Process design	Provisioning	Project management
■ Consolidate schedules to help increase technician efficiency ■ Deploy after normal hours to help reduce impact on the organization and enable technicians to operate efficiently ■ Set up exchange rooms where end users can bring laptops for upgrade ■ Determine processes for transferring user data and applications ■ Provide augmented post-deployment support	■ Maximize technician multitasking ■ Reduce network traffic ■ Automate manual steps ■ Monitor problems in real time and track problem resolution	■ Adopt a central view of the deployment and a single point of coordination ■ Develop site readiness plans based on time to deployment ■ Have an on-site technical project manager ■ Communicate the plan to end users and managers ■ Plan staging and logistics to help ensure adequate space is available for new systems ■ Manage existing user data and application migration

Figure 1. *Dell best practices for Windows 7 deployments can help reduce costs, accelerate project completion, and minimize risks*

DEPLOYMENT BEST PRACTICES

When taking these challenges into consideration, it becomes clear that client deployments can be complex, costly, and disruptive, requiring multiple labor-intensive tasks. These tasks can often benefit from automation and adherence to best practices. To help reduce the costs associated with Windows 7 deployments, accelerate project completion, and minimize risks, Dell recommends multiple practices that it has developed from its past deployment work, including those shown in Figure 1.

The Dell approach is based on four fundamental principles:

- **Project management process:** Enables organizations to focus on results that meet defined goals, helping to mitigate risks and control changes in scope
- **Project management system:** Helps to control and monitor governance and progress of project activities
- **Phased project approach:** Helps ensure that risks and issues are identified, addressed, and reassessed at key points throughout the project
- **Project organization and responsibilities:** Identifies project team members and provides a clear understanding of their roles and responsibilities in achieving project objectives

ELEMENTS OF AN OPTIMIZED DEPLOYMENT

With an optimized strategy in place, organizations next need a way to carry out the deployment. To that end, Dell Services has developed patent-pending technology and processes that automate the client provisioning process. Using these services can greatly reduce the overall costs associated with Windows 7 deployments.

The Dell™ Automated Deployment (DAD) solution maps to an organization's specific requirements and is based on best practices for program and project management. DAD can perform the complex tasks that occur during a deployment, helping to minimize technician intervention and time spent on the installation

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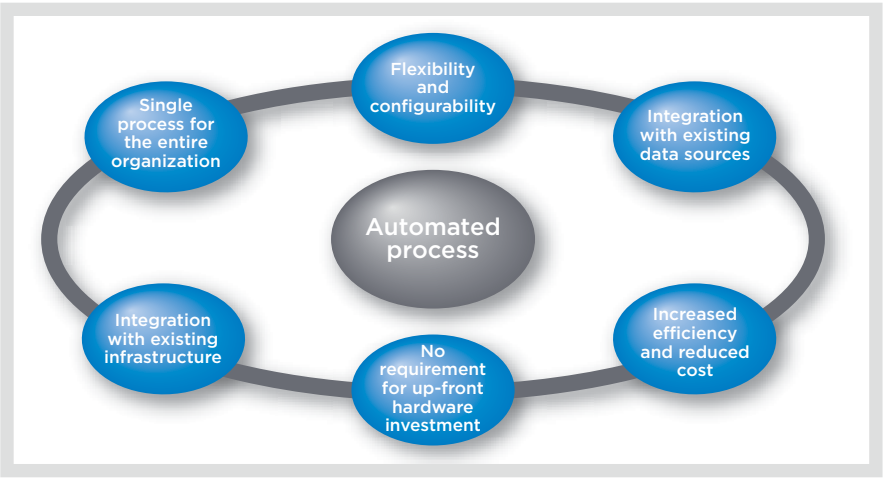

Figure 2. *Dell Automated Deployment helps optimize Windows 7 migrations through a single process*

process; for systems that are not being replaced, the need for a technician visit can be eliminated altogether. Based on each organization's deployment objectives and guidelines, Dell can deploy an OS image, configure the OS, join the domain, install the required applications, securely migrate user data and settings, and perform other necessary tasks within a single process (see Figure 2).

Some of the key DAD design principles can enable significant cost savings through decreased use of technician labor, accelerated deployment times, little or no infrastructure investment, and simplified logistics. Specifically, DAD does the following:

- Enables multitasking through streamlined automation to help lower overall deployment costs
- Reduces network dependencies to help minimize unnecessary infrastructure costs
- Allows customization late in the process to help simplify logistics and scheduling
- Automates manual steps to help ensure a high-quality process
- Migrates data and settings securely to help ensure a consistent user experience
- Supports both local and remote users
- Collects and provides access to real-time deployment data to track deployment progress and status of work still to do
- Supports in-place upgrades and migrations

The bottom line is that DAD is designed to address the most important factors that determine the success of a deployment, including the challenges related to management, staging and logistics, image installation, application installation, user state migration, and post-deployment user support. By addressing these factors, DAD helps ensure a rapid and effective adoption of Windows 7.

COMPREHENSIVE DELL SERVICES

Dell offers a blend of hardware, OS software, and expert services that can make planning and carrying out a Windows 7 deployment smooth and successful for IT organizations of all sizes. Refreshing legacy client systems offers a key way to deploy Windows 7 while also gaining the productivity, performance, and efficiency advantages of latest-generation hardware. The Dell line of desktop systems includes models that can deliver the power needed by high-end users as well as models that can provide cost-effective computing for typical office workers; Dell laptops, meanwhile, provide the connectivity and features needed by today's mobile workforce.

Organizations can take advantage of Dell's real-world experience in deploying Windows 7 using its patent-pending deployment methodologies. From its work with the Microsoft Windows Vista® OS, Dell offers a solid knowledge base about Windows migration, application compatibility, and best practices. Additionally, its partnership with Microsoft and knowledge of the business applications software market allows Dell to provide help with application compatibility testing and remediation.

Dell offers additional services that can help across all phases of a Windows 7 migration and deployment. These services cover inventory and assessment, image development and management tools and services, application compatibility testing and problem remediation, and custom factory installation services. Dell Services has also created an engagement framework for organizations that want to leverage its optimization model for Windows 7 deployment. This engagement framework is designed to speed the adoption of new technology and simplify the ongoing maintenance and support of existing technology.

Reducing the cost of deployment can help significantly reduce total cost of ownership—especially in combination with cost-saving features in Windows 7. The optimized Dell deployment strategy offers a comprehensive approach to assessing the environment, designing solutions to transform processes and technology, implementing the deployment, and managing the environment once deployed to help accelerate and simplify Windows 7 adoption.

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PLAN & ASSESS

DESIGN & BUILD

DEPLOY

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7 STEPS TO A SUCCESSFUL MICROSOFT WINDOWS 7 MIGRATION

By Christine Ewing and John Stahmann

Developing a thorough migration strategy, following best practices, and taking advantage of Dell™ and Symantec™ migration and management tools can help organizations carry out a smooth and successful transition to the Microsoft® Windows® 7 OS. The seven steps in this article provide a starting point for IT administrators planning the move in their own environments.

Migrating to a new client OS can be intimidating. Organizations want to take advantage of the productivity, security, and control enhancements in Microsoft Windows 7—but at this scale, how can they keep the migration efficient, cost-effective, and sustainable while helping ensure end-user productivity?

Symantec and Dell can help meet this challenge—and capture the opportunity. The seven-step process outlined in this article can provide organizations with a basis for developing their own thorough strategies to help ensure a successful migration. By following best practices and taking advantage of joint migration and management solutions like the Dell Management Console for Clients (formerly Dell Client Manager), they can streamline processes to help reduce the expense, delay, and disruption of a migration and keep IT administrators in control. And when these savings are applied to solutions for security, virtualization, data protection, and management, organizations can help secure not only the onetime rewards of a smooth migration, but also the long-term reliability, productivity, and security of an up-to-date, efficient, manageable IT environment.

GETTING STARTED

Before IT administrators can assist their organizations with a successful Windows 7 migration, they must understand what lies ahead and then formulate an appropriate plan. As they prepare, they should work to ensure that their team is ready by considering the following factors:

- **Communicating:** A successful migration involves coordination across the organization. Organizations can begin by assembling a team that represents key stakeholders, such as IT operations, security operations, application testing and packaging, network administration, and procurement.
- **Setting expectations:** Even a good process can be considered a failure if expectations are not met. As administrators formulate their migration plan, they should work with key stakeholders to understand their objectives and set achievable goals.
- **Identifying targets of opportunity:** Administrators should look for ways to take advantage of the migration. They may find ways to enhance and automate processes or address current objectives, such as standardization or compliance. Some enhancements to consider include standardizing software versions, consolidating software licenses, resolving security vulnerabilities, implementing information management technologies to back up data, and evaluating software delivery alternatives such as application virtualization and streaming.
- **Staying focused:** Migrations present natural opportunities to improve, but administrators should

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beware of out-of-scope distractions like network upgrades. Staying focused on migration-related projects helps avoid rising costs and scope creep, which can jeopardize success.

PHASE 1: PLANNING AND ASSESSING

In this initial phase, administrators assess resources and plan their migration strategy. This phase provides the foundation for the deployment plan, including the evaluation of hardware and software in the environment.

Step 1: Assessing the environment and planning the deployment

Gathering real information about the hardware, applications, and network in the environment helps administrators determine when to perform the migration and identify required resources. During this first phase, administrators assess the environment and outline the case for deployment and migration.

The assessment plan should include real information about the systems in the environment as well as key details about those systems, such as hardware and applications. Therefore, administrators should first discover devices across the network and run an inventory scan. This step helps identify the potential costs and risks of migration; otherwise, it can be difficult to prioritize or time the migration appropriately, and can be difficult to gather the necessary resources for a smooth and effective migration.

The next step is to assess hardware and software readiness. Organizations often use an OS migration as a time to evaluate the hardware, applications, software, and other aspects of their environment, as well as to plan for the future. Using preconfigured reports to identify hardware that requires replacement and evaluating what software is necessary are critical planning steps. Several of these reports are available as complimentary downloads for the Dell Management Console for Clients (see Figure 1).

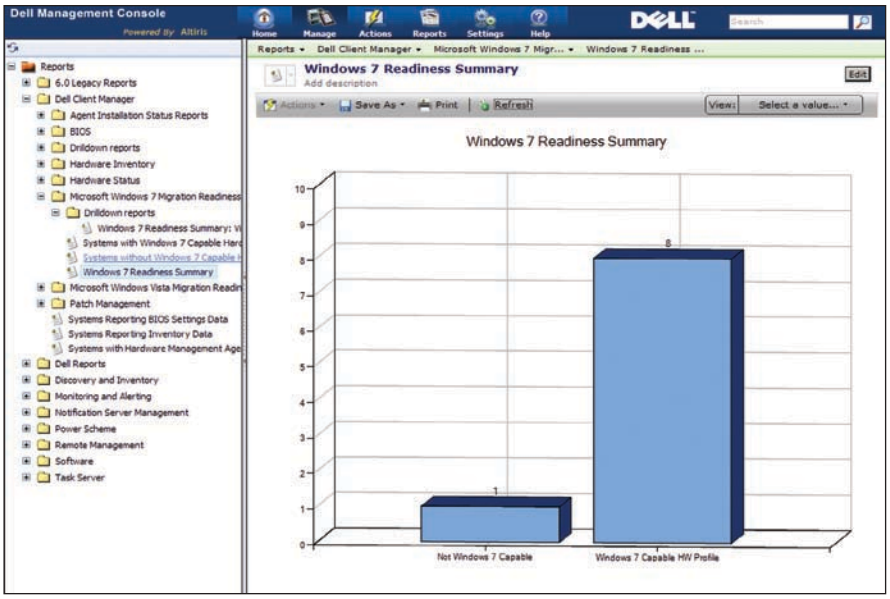

Figure 1. *Windows 7 Readiness Summary report in the Dell Management Console*

After identifying applications that require migration, administrators must prioritize applications to test and migrate—beginning by identifying the applications that can run on Windows 7, which can be essential for system stability, security, and overall productivity. Because organizations may have hundreds or even thousands of applications, categorizing the applications by rank (critical to not important) and type (commercial, legacy, or custom) lays the foundation for testing priority. Administrators should begin with business-critical applications and work down to the least important. They can then map out a strategy for updates or replacements that may be required. Organizations should also familiarize themselves with options such as application virtualization that may be appropriate for some applications.

Having gathered the list of required hardware, software, and tasks required to complete the migration, administrators can then analyze overall migration costs and dependencies, starting with creating a time estimate for each task. The actual list of tasks is specific to each organization, but the steps described in this article can provide a good starting point. When identifying conditions specific to the organization's environment, administrators should create a plan for dealing with these conditions as well as possible side effects from workarounds. Handling some dependencies could require additional time and resources, so advance planning can help reduce frustration and lost work later.

Finally, administrators should identify potential risks. The key elements affecting migration success are scope, time, and money, so before performing a full rollout, they should perform an analysis to identify risks that may affect these elements. These risks typically fall into one of four categories; Figure 2 shows some examples of possible risks that administrators should be aware of when planning a migration.

PHASE 2: DESIGNING AND BUILDING

During the second phase, administrators prepare for the migration by building standard images, preparing and testing applications, capturing user settings and personalities, and assembling and automating the migration process.

Step 2: Building standard images

Deploying a standard hard disk image is typically the fastest and most consistent way to install an OS. Symantec software

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Technical, quality, and performance factors	Project management factors	Organizational factors	External factors
■ Unforeseen environmental dependencies ■ Data loss ■ System outages	■ Unmet timelines ■ Inadequate project plan	■ Lack of resources ■ Inconsistent objectives or project scope ■ Poor prioritization	■ Power outages ■ Legal issues ■ Labor issues ■ Changing priorities or expectations

Figure 2. *Examples of possible migration project risks*

enables administrators to use the Symantec Ghost™ format or the Microsoft Windows Imaging (WIM) format, depending on the needs of the specific environment. Administrators can also choose to create a single hardware-independent image or to build and maintain a small set of base images.

When building a base image, administrators should start with the most common type of system on the network. They may also wish to use a virtual machine that has the ability to make snapshots and revert to those snapshots easily: during many of the planning and testing steps, it can be helpful to revert to a previous snapshot without needing to create and deploy image files. If desired, this base image can be built in a manner that allows it to be hardware independent.

As a best practice, administrators should typically keep images as small and generic as possible. In the base image, they should include only those applications that must be installed on all systems, and then install other applications in the same job but separately from the OS image. Certain applications may need to be installed on all client systems and therefore should be installed in the base image. However, administrators should keep in mind that because the base image is deployed to all systems, it could cause license compliance problems if a limited number of software licenses are available.

After installing all applications to be included in the base image, administrators should take another snapshot of the client system. They should not overwrite or replace the first snapshot that was taken—instead, they should keep two snapshots, one with only the OS installed and one with all base software installed. The second snapshot can be useful when testing other software installation packages to be installed after image deployment. It can also be used if there is a need to re-create the generic image.

Step 3: Preparing and testing applications

Applications that are not installed on the base image must be installed after the imaging process. Some of these applications may be installed as part of the migration process, while others may be installed later as users request them. Altiris Deployment Solution™ integrated migration software from Symantec works with Wise Package Studio™ and Symantec Workspace Virtualization software to package and virtualize applications.

Administrators should be sure to identify applications supported on Windows 7. In particular, a key step in the migration is to identify the business-critical applications that will be used in the Windows 7 environment that are not included in the master image, but will be deployed to each new Windows 7-based system.

To help identify applications that must be prepared for installation on Windows 7, administrators should classify the applications in their environment by first ranking them in order of importance—for example, critical, important, useful, or not important. They should also classify applications by type; Figure 3 shows an example of this kind of classification. Classifying each application is useful when determining steps for remediating application issues.

Many commercial applications have updates that are fully compatible with Windows 7; however, some software that has not been updated may have compatibility issues. After administrators have identified which applications they will need to install on Windows 7, they can begin testing those applications for compatibility. Software incompatibility is usually caused by one of the following:

- OS requirement
- Hard-coded path
- Requirement of administrator rights
- Class identifier (CLSID) registration in the registry
- File copy (rights or access control lists)
- Platform-specific drivers

Some applications may install and function correctly only when they are the sole application installed on a clean system, so it is important to test groups of

Commercial applications	Legacy applications	Custom applications
■ Have broad distribution and current development by an independent software vendor (ISV) ■ Are well represented in the Microsoft community	■ Were developed by ISVs ■ Are often business-critical ■ Are not as well represented as commercial applications in the Microsoft community	■ Were developed in-house ■ Are typically business-critical and represent unique challenges ■ Are not represented in the Microsoft community ■ May include hard-coded paths (Temp, My Documents, Documents and Settings, and Applications, with platform-specific drivers)

Figure 3. *Examples of applications classified by type*

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applications that would commonly be used together on a single system to help identify potential risks. These issues are typically much easier to deal with at this stage rather than later in the migration process.

Step 4: Capturing user settings and personalities

During a migration, administrators should not forget that end users often dislike change. They want to start up their computers and see exactly what they expect—the same printer and network settings, background pictures, Internet favorites, and everything they have personalized in their most-used applications. A successful Windows 7 migration should minimize disruption to end users: the transfer of each user's network, OS, application, and data settings along with other customizations can make or break a migration. Capturing these settings and applying them to the Windows 7 environment is necessary to maintaining productivity and accelerating acceptance.

Creating a personality template can help with this process. Altiris Deployment Solution from Symantec contains a Template Builder feature that enables administrators to define a common template that captures global settings, application settings, and data files (see Figure 4). The template specifies which settings to capture. It also provides a list of desktop and network settings, displays a list of over 60 common application components that transfer application settings and data files, and provides the ability to capture files and folders on the source system.

Step 5: Assembling and automating the migration process

After they have built and tested the required files and tasks, administrators must encapsulate them into a job sequence to help ensure that when one task completes, the next is triggered automatically. The automated migration process should include capturing personality settings (using the template created in step 4), deploying the OS image (using the image built in step 2), installing the required applications (using the applications prepared in step 3), and restoring the personality settings.

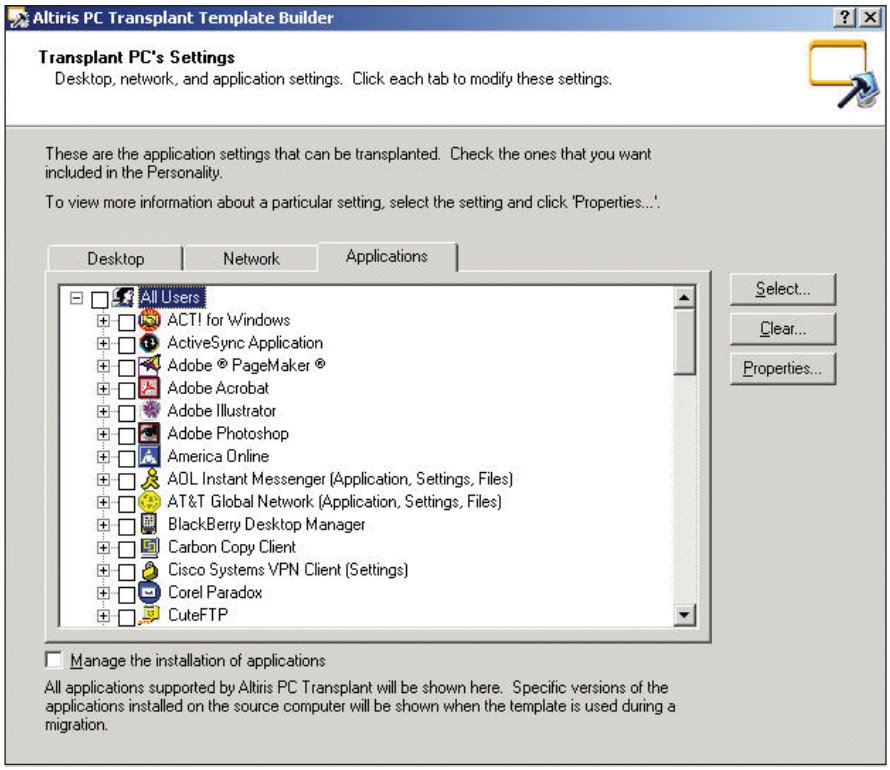

Figure 4. *Template Builder in Altiris Deployment Solution*

PHASE 3: EXECUTING AND REPORTING

An OS upgrade can be exciting for any organization—but if the anticipation leads to an attempt at immediate adoption without first testing the deployment process, that haste can cause significant problems. If the process encounters complications or other issues, then going straight to implementation becomes not a shortcut but a shortfall.

This final phase leads to the production rollout. It begins with a small-scale test and pilot. Administrators then implement the migration infrastructure designed in phase 1. Finally, they perform the production rollout and create migration reports.

Step 6: Migrating systems

Now that the planning has been completed, it is time to test and adjust the processes for deployment. The first step is to identify pilot or test candidates. Administrators can choose from several approaches to identify these candidates, and can also use these approaches to determine the pilot phases and subsequent migration rollout. Common migration approaches are shown in Figure 5.

Next, administrators should document the test cases. They can start by identifying the expected outcome of the migration job, including considering questions such as the following:

- Which applications should be installed?
- Which personality files and settings should be migrated?
- Which operating systems should be able to migrate using this process?
- Which computer models should be able to migrate using this process?

Based on these objectives, administrators can then create and document test cases to verify the success of each migration scenario. They can organize these cases

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Mass migration	Batch migration	Gradual migration
■ Moves everyone in the organization to a common standard ■ Is highly manageable, but does not allow customization based on departments or configurations ■ Can be expensive for the organization in time and resources	■ Maintains a small set of standard configurations ■ Can be based on departments or similar job functions ■ Incorporates a combination of hardware refresh and re-imaging ■ Can provide a good balance between cost and manageability	■ Migrates on a hardware refresh schedule ■ Typically has lower up-front costs compared with mass and batch migrations ■ Can be challenging to manage

Figure 5. *Common approaches to OS migration*

into a test matrix to use for project approval and tracking.

After thoroughly testing the entire migration process on a single computer, administrators should next conduct a phased pilot migration, which gives an opportunity to test overall processes. They should start with a small group of carefully selected users as the target group. Best practices recommend running the first pilot on a small IT group that has been involved with the overall migration project, which provides a group that can understand when there is a problem and rapidly provide feedback to the project team.

When this first phase is complete, administrators should verify that data and settings have migrated as expected. Assuming the migration is successful, they can then move to the second phase of the pilot, which involves migration of the remainder of the IT department. Specific systems may need to be removed from the target list because those systems support critical applications or other critical systems.

The third and final phase of the pilot is to select a department that can be migrated. If this third phase is successful, the pilot phase ends and the full migration rollout can begin. Depending on the total number of managed clients and the complexity of the environment, this rollout may need to be performed in phases. There are various methods of phasing a large-scale deployment, so administrators should use the techniques appropriate to their environment.

The deployment process takes multiple steps, and complications can arise at each stage. A common approach is to start by migrating a small number of local systems in a single subnet or network, and complete the entire migration process on those systems. If a problem occurs, administrators may need to break apart the tasks that are contained in the migration job and run them separately on the systems being migrated, which enables them to analyze and identify the cause of the migration failure before increasing the number of systems migrated in the next group.

Step 7: Measuring and reporting

Effective reporting enables the organization's executive team to track the migration from a distance while also helping IT administrators analyze different aspects of the migration. Key stakeholders may want to know the total number of clients running the new OS—or, more important, they may want to know which systems have not been migrated and what is being done about them.

Upper management is likely to value a formal return-on-investment study, which offers a prime opportunity to illustrate how proper planning, standardization plans, and automation helped accelerate the project and save money. Some key questions in this type of study include the following:

- What were the costs for rolling out an OS before this project?
- What tools provided the best help to automate the process?
- How much did the organization save in terms of capital expenditures and reduced resources?
- Were all issues identified at the beginning of the project resolved?

ENABLING A SUCCESSFUL MIGRATION

Symantec and Dell provide an integrated set of solutions to help streamline a migration, including the Dell Management Console for Clients (which enables administrators to quickly assess their ability to migrate to Windows 7) and Altiris Deployment Solution from Symantec (which helps them to automate and streamline the migration for optimal savings and long-term benefits). Taking advantage of these tools, adhering to migration best practices, and using the seven steps in this article as the basis for a thorough migration strategy can help ensure a successful migration while enabling organizations to begin gaining the long-term benefits offered by the Windows 7 platform.

Christine Ewing is the director of product marketing in the Symantec Endpoint Management Group, and has more than 12 years of experience in IT software product management and marketing.

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AUTOMATED DEPLOYMENT TOOLS FOR MICROSOFT WINDOWS 7 AND WINDOWS SERVER 2008 R2

By Syama Poluri

The Microsoft® Windows® 7 and Windows Server® 2008 R2 operating systems introduce multiple enhancements for automated OS installations—helping administrators to ensure fast, stable, consistent deployments across the organization and accelerate return on investment for new IT resources.

Rapid, accurate deployment of new systems can be essential to accelerating return on investment for IT assets while controlling costs under tight budget constraints. To help ensure that they can meet deployment goals, many IT organizations turn to automated deployment solutions that enable them to remotely deploy and manage large numbers of servers.

The Microsoft Windows Vista®, Windows 7, Windows Server 2008, and Windows Server 2008 R2 operating systems have introduced new ways of creating, modifying, and leveraging unattended installation processes compared with the previous Windows 2000 Server and Windows Server 2003 operating systems. Administrators can take advantage of features such as a consolidated answer file, the Windows System Image Manager (Windows SIM) tool, and the Windows Automated Installation Kit (Windows AIK) to automate OS installations and help ensure fast, stable, consistent deployments across the organization. (For more information on Windows AIK, see the "Getting started with Windows 7 image deployment" sidebar in this article.)

INSTALLATION TYPES AND CONFIGURATION

Traditionally, the Windows 2000 Server and Windows Server 2003 operating systems used 16-bit text-mode environments for the initial setup phase, with later setup processes using a graphical user interface (GUI) mode. Windows Server 2008 and Windows Server 2008 R2 deprecated the text-mode phase in favor of the Windows Preinstallation Environment (WinPE), a minimal Microsoft Win32® deployment environment. Nearly all Windows Server 2008 R2 setup tools run in WinPE.

In Windows Server 2008 and Windows Server 2008 R2, Windows Setup now includes several features designed to provide faster and more stable installations compared with previous versions:

- **Accelerated installations and upgrades:** The image-based setup (IBS) technology in Windows Setup is designed to help administrators install and upgrade operating systems faster and more easily than they could previously. They can perform a clean installation by deploying the OS image to a destination system, or perform rapid, simplified upgrades by installing a new image onto an existing installation while maintaining existing settings.
- **Enhanced stability and consistency:** The IBS technology uses Windows Imaging (WIM) files to help increase the stability and consistency of OS installations.
- **Simplified image management:** Windows Server 2008 R2 images are now stored in a single WIM file, each of which can store multiple OS instances. The ability to store different OS versions in a single image, rather than keeping them as separate files, is one of the major enhancements in Windows Server 2008 R2, helping to reduce setup times and facilitating automated OS deployments.
- **Streamlined installation:** Windows Setup is optimized for the manufacturing and deployment scenarios used by original equipment manufacturers

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(OEMs) and large organizations, and is designed to take less time and require fewer tasks to complete compared with previous OS versions.

- **Consolidated answer file:** The Windows 7 and Windows Server 2008 R2 setup architecture consolidates the unattend.txt, winbom.ini, cmdlines.txt, and sysprep.inf files used in Windows XP, Windows 2000 Server, and Windows Server 2003 into a single XML file, typically named unattend.xml. Previously, each answer file was used to automate certain setup phases; with the unattend.xml file, different sections of the file are parsed during different configuration passes.

Windows Setup supports two installation types: custom and upgrade. The key difference between the two is that an upgrade requires an existing server installation and saves the preferences and settings from that installation, while a custom installation does not. Both types use the following basic setup phases:

1. **WinPE or downgrade OS:** Partitions the disk, copies the image to the disk, and processes the answer file
2. **Online configuration:** Processes configuration settings to make an installation specific to that hardware
3. **Windows Welcome:** Applies additional answer file settings from the oobe.xml file (a content file that can be used alone or in conjunction with an unattend.xml file) and launches Windows Welcome

The online configuration phase includes seven configuration passes:

1. **windowsPE:** This pass configures WinPE options and basic Windows Setup options, which can include setting the product key and configuring a disk. If drivers are needed to enable WinPE to access the local disk or a network, administrators can use this configuration pass to add drivers to the WinPE driver store and to reflect boot-critical drivers required by WinPE to the WinPE driver store.
2. **offlineServicing:** This pass applies updates and packages to an OS image, including software fixes, language packs, and security updates. During this pass, administrators can also add drivers to an image before that image is installed and begins processing the out-of-box device drivers during Windows Setup.
3. **specialize:** This pass creates and applies system-specific information such as network settings, international settings, and domain information.
4. **generalize:** This pass enables administrators to minimally configure the `sysprep /generalize` command as well as other settings that must persist

GETTING STARTED WITH WINDOWS 7 IMAGE DEPLOYMENT

The Microsoft Windows Automated Installation Kit (Windows AIK) is a logical place to start for IT administrators tasked with developing automated processes and images for Windows 7 deployments on new or existing systems in the field. The version of the kit tailored for Windows 7 (see Figure A) is delivered as an ISO image; to install the kit, administrators must first burn the image to a blank DVD. If they are working from an existing Windows 7 client, the ability to burn ISO images is already natively built into the OS—so there is no longer a need for a third-party tool.

After the kit is installed, administrators can access a comprehensive range of documentation and sample files as well as the Windows System Image Manager tool (see Figure 2). The documentation provides step-by-step details to enable development of a network-installable Windows 7 image, including building an answer file, building a reference installation, creating bootable Windows Preinstallation Environment (WinPE) media, migrating the installation files to a network share, and testing the deployment process over the network.

The Windows 7 version of Windows AIK is available for download at go.microsoft.com/fwlink/?linkid=136976.

Figure A. *Microsoft Windows Automated Installation Kit setup*

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on the reference image. The `sysprep /generalize` command removes system-specific information such as unique system identifiers (SIDs) from the image. This pass runs only if the `sysprep /generalize` command is run.

5. **auditSystem:** This pass processes unattended settings while the OS is running in the system context, before a user logs in to the system in audit mode; it runs only if the system is booted into audit mode.
6. **auditUser:** Processes unattended settings after a user logs in to the system in audit mode; as with the auditSystem pass, this pass runs only if the system is booted into audit mode.
7. **oobeSystem:** This pass applies settings before Windows Welcome starts.

Figure 1 shows the relationship between the configuration passes and the valid passes for different executable files.

IMAGE-BASED SETUP AND MANAGEMENT

The IBS technology in Windows 7 and Windows Server 2008 R2 provides a unified process designed to work across virtually all deployment scenarios. It can perform clean OS installations and upgrades for both client and server systems, and allows hardware abstraction layer (HAL)–independent image deployment and offline image servicing.

Windows Setup and System Image Manager

Windows Setup is based on IBS and works with unattended installation answer files to automate online OS installations and customizations. The OS installation DVD can automatically launch Windows Setup, or administrators can explicitly specify an answer file by using the `setup.exe /unattend:`*`filename`* command to start an automated setup process, where *`filename`* is the local or Universal Naming Convention (UNC) path for the answer file.

Administrators can use the Windows SIM tool to create, open, and manage answer files and add components and packages to specific configuration passes (see Figure 2). This tool is designed to help administrators create answer files quickly, view all configurable components, and add third-party drivers and applications to a specific answer file. Administrators can also use the tool to validate answer file settings against an existing image.

In Windows Vista and Windows Server 2008, administrators needed to create one OS reference image per OS edition, and then test those images with each possible hardware configuration. In Windows 7 and Windows Server 2008 R2, administrators can now change a lower edition of an OS image to a higher edition through either an offline or online process—enabling them to create a single lower-edition reference image that can be deployed across the organization as either the lower edition or as a higher edition. For example, a Windows Server 2008 R2 Standard image can be dynamically changed to Windows Server 2008 R2 Enterprise or Datacenter using the appropriate product key.[1]

Virtual machines with native boot

Previously, Microsoft virtual hard disk (.vhd) files could be used only to boot an OS in the hypervisor environment as a guest OS. In Windows Server 2008 R2, .vhd files can now run directly on the designated hardware without other virtual machines or hypervisors.

Administrators can take advantage of the diskpart.exe and diskmgmt.msc disk management tools to create and mount the .vhd images, and the bcdboot.exe and bcdedit.exe setup tools to configure boot configuration data to allow a boot manager to boot a .vhd image. Administrators who are managing multiple OS images can use the same image-management tools to create, deploy, and maintain .vhd images to be installed on designated hardware or on a virtual machine.

Windows Recovery Environment

The Microsoft Windows Recovery Environment (WinRE) is an extensible recovery platform based on WinPE that enables administrators to repair an OS installation in case of corruption or boot failure. In Windows Server 2008, WinRE was included only on the OS DVD media, but in Windows 7 and Windows Server

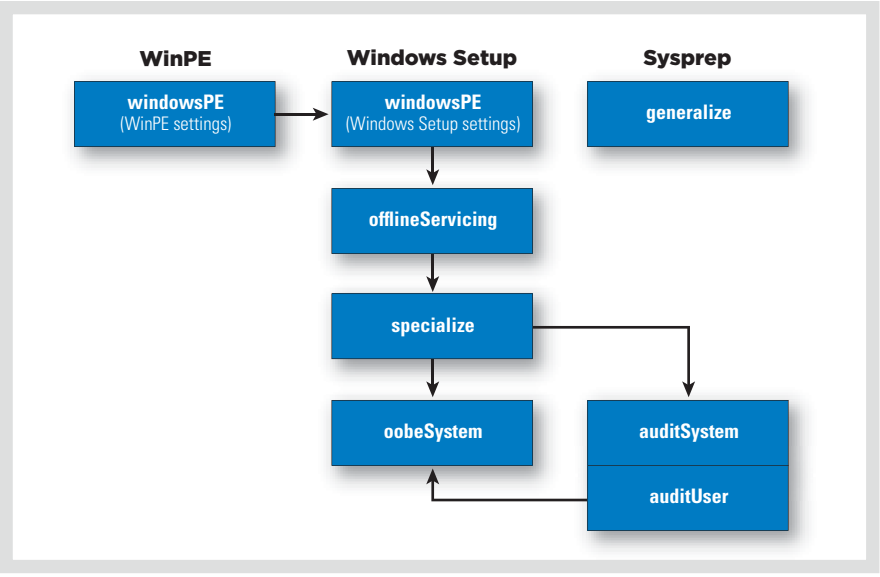

Figure 1. *Windows Setup configuration passes for different executable files*

[1] For more information, refer to the Deployment Image Servicing and Management (DISM) tool's Set-Edition command option.

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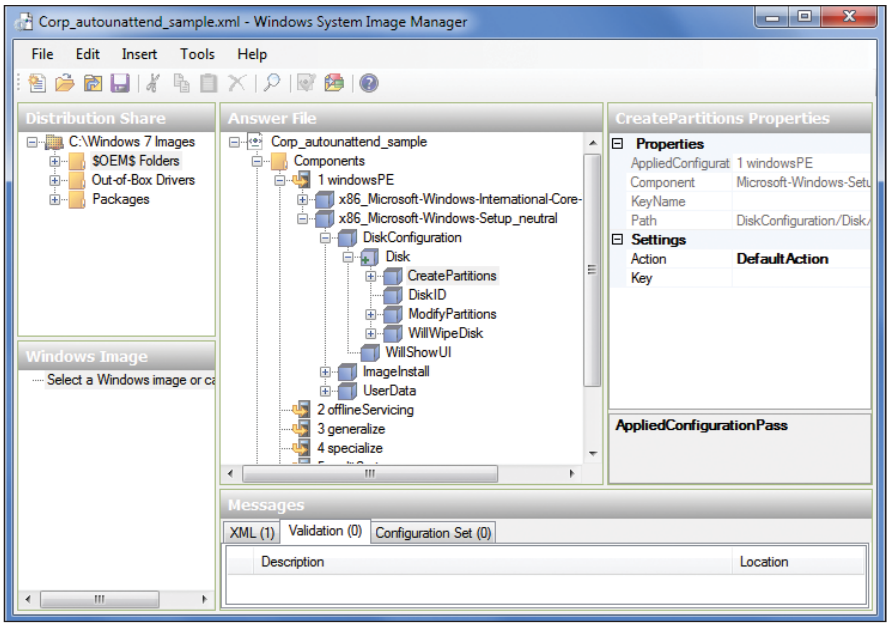

Figure 2. *Microsoft Windows System Image Manager interface*

2008 R2, it can be preinstalled on a system's hard drive as well as on the installation media. If WinRE is preinstalled on the hard drive and the system fails to start, the system can automatically fail over to the WinRE environment. The WinRE repair tool can then automate the diagnosis and repair processes.

AUTOMATION AND UNATTENDED INSTALLATIONS

The unattended installation answer file—typically named unattend.xml—is a key component in the Windows 7 and Windows Server 2008 R2 setup automation process, enabling administrators to specify disk configurations, default OS settings, and the addition of drivers, software updates, and other applications. Administrators can use Windows SIM to create and validate answer files. Each OS component includes settings that can be used to create an answer file, and each setting in a given component is listed in its own individual topic; if an element contains a value, all valid value types are described. The file is organized by setup phase and OS component.

Answer file search order

Because reboots are required during setup, a copy of the answer file is cached on the system. If administrators have not specified an answer file, then at the start of each configuration pass Windows Setup searches for the file in several places, including the location of a previously cached answer file and the root of a drive. If an answer file is found in one of the valid locations but includes no settings for the current configuration pass, the file is ignored.

Windows Setup identifies and logs available answer files based on an implicit search order, and then uses the file with the highest precedence. After identifying an answer file, Windows Setup validates the file and caches it on the system. Valid answer files are cached to the $Windows.~BT\Sources\Panther directory during the windowsPE and offlineServicing passes. After the OS installation is extracted to the hard drive, the file is then cached to %WINDIR%\panther.[2]

Sysprep

The sysprep tool prepares OS installations for imaging, auditing, and delivery. Imaging, also called duplication, enables administrators to capture customized images for reuse throughout an organization. Administrators can also use sysprep to remove system-specific data such as an SID from an image; after removing this information, they can then capture that image and deploy it on multiple systems. In the Windows Server 2008 R2 sysprep architecture, each OS component can define sysprep actions to enable component settings to be specialized for specific systems during the IBS process.

RAPID, ACCURATE SYSTEM DEPLOYMENT

Automated OS installation offers a key way to ensure rapid, accurate system deployment, particularly in large environments. By understanding and utilizing the enhancements available in Microsoft Windows 7 and Windows Server 2008 R2—including the consolidated answer file, driver deployment tools, and Windows SIM interface for unattended installations—administrators can streamline server deployment processes across the organization to help accelerate return on investment for new IT resources.

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Dell and Windows 7:
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Microsoft Windows Server 2008 R2:
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[2] For more information on answer file search order, visit technet.microsoft.com/en-us/library/cc749415(WS.10).aspx.

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A SMART UPGRADE

By deploying the Microsoft® Windows® 7 OS on existing Dell™ desktops and laptops, Australian marketing communications and advertising agency Euro RSCG expects to save nearly 30 percent on total cost of ownership.

CHALLENGE

Euro RSCG needed to upgrade its desktop and laptop OS and increase overall performance without making an additional investment in hardware.

SOLUTION

With assistance from the Dell ProConsult team, the agency made a smooth migration from Microsoft Windows XP to Windows 7 on its existing Dell desktops and laptops.

BENEFITS

- The Dell ProConsult team delivered a rapid, seamless deployment.
- Standardization helps increase productivity and enhance the end-user experience.
- Running Windows 7 on existing Dell systems and avoiding the need to upgrade all of the agency's desktops and laptops helps reduce total cost of ownership by an estimated 30 percent.

Euro RSCG is an award-winning marketing communications and advertising agency in Australia that relies on the most up-to-date IT to give it an edge in the marketplace—but also places managing cost high on its priority list. A long-standing Dell customer, Euro RSCG was running Microsoft Windows XP on approximately 80 percent of its computers. When Dell approached Euro RSCG to suggest deploying Windows 7, the agency agreed. "The opportunity to work with skilled IT personnel who had expert knowledge of migrating from Windows XP to Windows 7 was a plus," says Wade Morgan, national IT manager at Euro RSCG. "We knew we could rely on Dell to address any issues we would encounter in making the upgrade."

The Euro RSCG IT department selected a mix of desktops and laptops for a pilot program, and the results helped the team draw some important conclusions. "Going into the pilot, we fully expected our Dell computers to operate comfortably," says Morgan. "What we did not expect was just how well they would operate."

The team found that the desktops and laptops in the pilot—including legacy systems—performed even better than they did with Windows XP. In fact, based on preliminary calculations, Morgan estimates the agency will save almost 30 percent in total cost of ownership compared with upgrading all of its desktops and laptops. "The pilot demonstrated that we did not have to go beyond our budget to upgrade to Windows 7," says Morgan. "This realization resulted in huge savings."

How users would react to the upgrade was critical—and what surprised Morgan and his team was the overwhelmingly positive feedback. "By all indications, they enjoyed themselves and were more engaged with their laptops and desktops since the upgrade," says Morgan. "They find the Windows 7 environment more intuitive, and appreciate the ease of connecting through our VPN."

Euro RSCG attributes the successful transition to solid support from the Dell ProConsult team. "The Dell team was extremely professional during the entire process," says Morgan. "They took our feedback seriously and worked within the test environment we set up." Euro RSCG is looking to follow the pilot's success with a phased Windows 7 deployment, starting with its branch offices. Adds Morgan, "Thanks to Dell ProConsult, we have a very good model in place where we can deploy and upgrade across the agency seamlessly. We could not have done this without Dell's support."

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JUST A WALK IN THE PARK

Lodge Park Technology College becomes one of the first UK schools to use the Microsoft® Windows® 7 OS, and saves approximately £4,000 per year with Windows Server® 2008 R2 Hyper-V™ virtualization.

CHALLENGE

Lodge Park Technology College wanted to upgrade its infrastructure to help reduce the server footprint, lower power and cooling costs, and increase IT flexibility.

SOLUTION

The Dell ProConsult team helped the school first deploy Microsoft Windows Server 2008 R2 with Hyper-V virtualization on Dell™ PowerEdge™ servers, and then make the move to Windows 7.

BENEFITS

- Dell had Windows Server 2008 R2 with Hyper-V up and running in just two days.
- Virtualized Dell servers help to streamline maintenance, reduce the server footprint by an anticipated 50 percent, and save an estimated £4,000 per year on hardware.
- The Windows 7 BitLocker™ and AppLocker™ features help increase security and control for the IT team, while increased performance and usability enhancements such as the Aero® Peek and Aero Snap features have been popular with students and staff.

The 1,250 students at Lodge Park Technology College need the school's IT infrastructure to be as ambitious as they are. The school has been a Dell Technology Trust Partner for two years—so when network manager Stephen Peverett decided to upgrade the infrastructure, he approached the Dell ProConsult team first.

Dell and Lodge Park decided that Microsoft Windows Server 2008 R2 with Hyper-V virtualization would be a good fit, and began looking at deploying Windows 7 as well. "We saw that Dell could also help us get on the Windows 7 early adopter program," says Peverett. "Many of the Windows 7 features we were interested in, such as BitLocker and AppLocker, depend on Windows Server 2008 R2."

It took just two days to get Windows Server 2008 R2 and Hyper-V up and running. Peverett had few concerns about the next step, moving to Windows 7: "Dell has been involved in the development of Windows 7 at a very early stage, and the Windows Server 2008 R2 deployment went so well, we had every confidence that this would be a smooth process."

Dell worked with Peverett's team to design the first Windows 7 image, checked that all the school's technology was compatible, and obtained the appropriate drivers when necessary. "Dell's know-how and experience were fundamental to the project's success," says Peverett.

The response from students and staff has been gratifying, Peverett says: "The students love Windows 7—the Aero Peek and Aero Snap features are particularly popular, and teachers have responded to the faster access to files and folders that Windows 7 affords when linked to Windows Server 2008 R2." BitLocker and AppLocker have helped increase security and control for the IT team, and the virtualized Dell servers have brought significant benefits—helping to streamline maintenance, reduce the server footprint by nearly 50 percent in the next five months, and save an estimated £4,000 per year on hardware. "We've achieved all the benefits we hoped we would achieve," says Peverett.

So far, the environment has required very little maintenance and has helped dramatically simplify image deployment. Says Peverett, "With a virtualized environment and Windows 7, we can start from a virtual machine image, install everything, and then test it, which saves us about a day per image—and we create up to 30 images a year. This is time we can spend on new applications to improve the student experience."

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IN WITH THE NEW

Working with Dell helps Hoover City Schools save months of testing and dramatically accelerate its migration to the Microsoft® Windows® 7 OS on existing Dell™ desktops, netbooks, and tablets.

Hoover City Schools, the third-largest city school system in Alabama, is embracing the latest technology to provide students with the richest possible educational experience. Even before the official release of Microsoft Windows 7 Enterprise, the district was already working with Dell to migrate its 6,500 Dell OptiPlex 755 and OptiPlex 760 desktops, Latitude 2100 netbooks, and Latitude XT tablets to the new OS.

As a Global Application Compatibility Factory partner for Microsoft, Dell provided application compatibility testing before the migration. "Dell ProConsult saved us months of testing time and helped ensure a smooth migration to Windows 7," says Keith Price, CTO for Hoover City Schools. "They helped identify which applications weren't directly compatible with Windows 7 out of the box, and helped us find solutions for making them work. This allowed us to leap forward in our deployment of Windows 7, and saved us the expense and hassle of replacing those applications."

So far, the report card for Windows 7 is all A's. "Running Windows 7 on Dell Latitude XT tablets has brought tremendous advantages," Price says. "It uses less memory, so applications run faster. Students and teachers are experiencing rapid response times, so instead of waiting on machines, they're able to respond in natural ways to the OS." The IT staff, meanwhile, is excited about the potential security benefits, particularly the extended granularity of Group Policy control and the BitLocker drive encryption. "The features in Windows 7 have far exceeded our expectations," Price says.

Dell ProManage Laptop and Desktop Deployment Services help the school system meet stringent deadlines. "Dell Deployment Services is the key for us when we have to cover 375 classrooms in less than 30 days and have everything ready when the teachers come back," Price says. "We estimate the Dell team completed the most recent project in approximately 90 percent less time than we would have been able to complete it ourselves. As a result, the teachers were able to focus on instruction from day one and not worry about how to set up the systems."

The district's partnerships with Dell and Microsoft are helping it to quickly put the latest technology into classrooms. "We really saw Dell and Microsoft as the industry leaders in not only providing the technology, but desiring to see those technologies used in an education environment," Price concludes. "Migrating to Windows 7 is an important step in ensuring that our classrooms remain very relevant for the modern day."

CHALLENGE

Hoover City Schools wanted to update its 6,500 Dell client systems—a mix of OptiPlex™ 755 and OptiPlex 760 desktops, Latitude™ 2100 netbooks, and Latitude XT mobile tablet devices—to the latest Microsoft OS. But the district needed to be sure that the applications it depended on would work in the new environment, and that learning would be enhanced by the migration, not disrupted.

SOLUTION

With help from the Dell ProConsult team, the district was able to quickly roll out Windows 7 across its fleet of client systems.

BENEFITS

- Dell ProConsult saved the district months of compatibility testing and helped ensure that legacy applications work in the Windows 7 environment.
- Dell ProManage™ Laptop and Desktop Deployment Services completed the most recent project approximately 90 percent faster than the district would have been able to on its own.
- Extended Group Policy control and BitLocker™ drive encryption help increase security.

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MANAGING A VAST TECHNOLOGY INFRASTRUCTURE

The Microsoft® Windows® 7 OS enables Dell to reduce software imaging time by 50 percent, increase security for portable drives, and potentially reduce support costs by up to 25 percent.

CHALLENGE

The Dell Client Infrastructure Engineering team sought to streamline software image management, increase security, and deliver high performance to end users.

SOLUTION

After deploying Microsoft Windows 7 to a group of early adopters, Dell plans to roll out the OS across its fleet of 100,000 desktop and portable computers, including 15,000 running the Windows Vista® Enterprise OS and 85,000 running Windows XP Professional.

BENEFITS

- Software imaging work takes half the time that it did with Windows XP, while the ability to quickly create and change images helps ensure that client systems have the latest updates.
- The BitLocker To Go™ and User Account Control (UAC) features help protect company data, particularly for employees using portable USB drives.
- The Windows Troubleshooting Platform could help reduce support costs by up to 25 percent.

As one of the world's leading computer manufacturers, Dell knows how critical client systems are to productivity and success. Its own infrastructure includes 100,000 desktop and portable computers, with 15,000 running Microsoft Windows Vista Enterprise and 85,000 running Windows XP Professional.

Managing such a large environment presents diverse challenges. The Dell Client Infrastructure Engineering team was looking to reduce the work involved in updating and testing software images, and had become concerned about security as employees increasingly used portable USB drives to transport data. And, of course, Dell employees have a penchant for performance.

When Microsoft made the beta version of Windows 7 available, Dell moved quickly to evaluate it. The company initially deployed the OS to a group of early adopters, and plans to upgrade all 100,000 client systems. Key features such as the Deployment Image Servicing and Management tool helped accelerate and simplify the rollout. "The software imaging work for Windows 7 will take half the time that it previously did with Windows XP, plus we can make changes to the image on the fly," says Christopher Minaugh, systems engineer on the Dell Client Infrastructure Engineering team. "We can create an image in an hour and change it as often as we want. This enables us to keep applications up-to-date and computers protected with the latest security updates."

Numerous other enhancements also help smooth the migration and simplify management. Windows XP Mode provides a virtual environment that can run legacy applications. The Problem Steps Recorder enables end users to record steps leading to an application failure. And the Windows Troubleshooting Platform could help reduce support costs by up to 25 percent, based on eliminating one out of four calls that involve repetitive, manual actions.

BitLocker To Go encryption and User Account Control (UAC) help increase security as well. "Having a scalable encryption solution included in the OS is valuable," says Takis Petropoulos, IT manager at Dell. "And with UAC, we know that malicious code is not getting executed on our computers."

Dell has been impressed with Windows 7 performance, even on legacy hardware. "Memory and CPU utilization are outstanding," says Minaugh. "Also, the ability to run Windows 7 on netbooks is important, considering the increased demand for these platforms. We sell many kinds of computers, and we want to make sure the latest operating systems run on all of them."

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