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**Windows NT Workstation 4.0 - The Easiest Upgrade to Windows 2000
Professional**

White Paper

October 1998

Microsoft Windows NT Workstation

Upgrading to Windows 2000 Professional

This document gives an overview of the key steps and considerations when upgrading to Microsoft® Windows 2000 Professional.

Windows 2000 Professional has been designed to be the mainstream operating system for all users in businesses of any size. It will have the ability to upgrade to Windows 2000 Professional from all of the following, including for the first time, an upgrade from the Windows 95® or Windows 98® operating systems:

- Windows NT Workstation 4.0
- Windows NT Workstation 3.51
- Windows 98
- Windows 95

IMPORTANT: Windows NT Workstation 4.0 will provide the easiest upgrade to Windows 2000 Professional. This is because Windows NT Workstation versions 4.0 and Windows 2000 Professional both have a common heritage and share the following core features:

- same registry database and structure
- same file system and folder architecture
- same security architecture
- same operating system kernel architecture
- same device driver model

Another vital consideration is that all Windows NT Workstation 4.0 user and IT knowledge can be utilized with Windows 2000 Professional

This paper does not provide recommendations on the choice between upgrading, purchasing a new machine, and formatting a hard drive and loading a new image onto the drive.

- For the latest information on Microsoft Windows NT Workstation 4.0, visit <http://www.microsoft.com/ntworkstation>
- For the latest information on Microsoft Windows 2000 Professional, visit <http://www.microsoft.com/windowsnt5/workstation>

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OVERVIEW

Windows 2000 Professional is the premier desktop operating system for organizations of all sizes designed to replace Windows 95 as the standard on business desktop and laptop computers.

The upgrade process can be automated and in most cases will run smoothly. However, it is important to note that each upgraded operating system will require a different amount of planning and preparation in order to help ensure a smooth upgrade.

To upgrade from Windows 95 or Windows 98 (Windows 9x collectively):

- Test and ensure that applications run on Windows 2000 Professional.
 - *A list of simple tests to perform is included at the back of this document*
- Verify that hardware devices have appropriate drivers for Windows 2000 Professional
 - *An updated list of device drivers is available on the web at: <http://www.microsoft.com/windows/winlogo>*
- Run the setup program which migrates as much information as possible from the Windows 9x registry to Windows NT registry and installs Windows 2000 Professional

It is a core goal to include the application migration functionality for the most common applications from within Windows 2000 Professional. However, many applications install differently on Windows 9x-based machines than they do machines running Windows NT Workstation 4.0 or Windows 2000 Professional, mostly because of the System Registry differences and differences in the way that application authors structure their Setup procedures. As a result, businesses upgrading to Windows 2000 Professional have three choices for applications that have already been installed on Windows 9x-based machines and which are not migrated during the upgrade process:

- Re-install the applications after the upgrade, which could be costly and complicated. This step is only applicable to those applications that are compatible with Windows NT Workstation.
- Create a new Windows NT Workstation-based standard configuration with compatible versions of the applications and apply this 'image' onto multiple machines. (*see "System Preparation Tool" on page 2*)
- Obtain the necessary migration code ('Migration DLL') for each application (*See page 5*)

OVERVIEW (CONTINUED)

In contrast, businesses upgrading from Windows NT Workstation 4.0 need only to

- Verify that appropriate drivers are present for the few devices that need new drivers and replace and/or upgrade software (such as anti-virus software) that may rely on specific file systems.
- Run the setup program which upgrades Windows NT Workstation 4.0 files

The upgrade from Windows NT Workstation 4.0 is straightforward because Windows NT Workstation versions 4.0 and Windows 2000 Professional share a common architecture in many key areas such as registry, file system, security, and operating system kernel structures. This also applies to the upgrade from Windows NT Workstation 3.51.

Large enterprises considering deploying Windows 2000 Professional can speed roll out by taking advantage of several tools in development today such as:

- **System Preparation tool.** When used in conjunction with disk imaging copying tools, the System Preparation tool will enable IT professionals to deploy fully configured PCs that contain Windows 2000 Professional with applications and settings chosen by the company.
 - *Note that the System Preparation Tool is also available for Windows NT Workstation 4 (subject to certain customer qualification criteria)*
- **Setup Manager.** Provides a wizard that walks you through the process of creating automatic, “hands free” installation scripts.

Windows NT Workstation 4.0 is the easiest upgrade to Windows 2000 Professional.

The upgrade from Windows NT Workstation 4.0 will require significantly less planning and preparation than an upgrade from Windows 9x because of the similarities between Windows NT Workstation version 4.0 and Windows 2000 Professional already outlined in this paper.

For more detailed information about the upgrade process and technical considerations involved for Windows 95 and 98 and Windows NT Workstation 3.51 and Windows NT Workstation 4, please refer to pages 4 and 6 respectively.

THE BEST UPGRADE IS A WELL PLANNED UPGRADE

Creating the Test Environment

Regardless of which desktop operating system(s) are currently deployed in a business, it is strongly recommended that a test lab is set up in order to verify the upgrade to Windows 2000 Professional for all possible scenarios. This is a key exercise to ensure a high degree of success with actual deployments.

In many cases, it may also be necessary to build multi-disciplined project teams that can take responsibility for specific technical and operational aspects of the planned upgrade.

The project team should also be responsible for delivering a "Testing Plan" against which the success of the upgrade can be assessed together with clear ownership for the resolution of any exceptions that may occur during the upgrade testing process.

Trial Runs

The setup procedure for Windows 2000 Professional includes an "Upgrade Check-Only Mode" which can be used to 'trial run' the upgrade ahead of the real exercise. This mode produces a report that flags potential issues that are likely to be encountered during the upgrade including hardware that is not yet supported by Windows 2000 Professional and any software requiring changes to ensure compatibility. This allows for a structured problem resolution plan to be implemented before these issues have a chance to surface on production systems.

The "Upgrade Check-Only Mode" also supports scripting that allows compatibility data to be stored by each user on a centralized network location for IT analysis.

Pilot Upgrades

The advance work conducted in the lab will allow for the identification and elimination of many issues prior actual deployments. However, it is important to also test the full upgrade process on a representative sample of typical corporate desktops.

As with the "Upgrade Check-only Mode" option discussed above, the actual setup process includes functionality that will examine a systems hardware and software for potential incompatibilities by comparing the findings with a database of compatible hardware and rules. Note that in certain circumstances, such as when critical hardware device drivers (i.e. hard disk controllers) are not available for Windows 2000 Professional, the Setup process will abort until such drivers are installed.

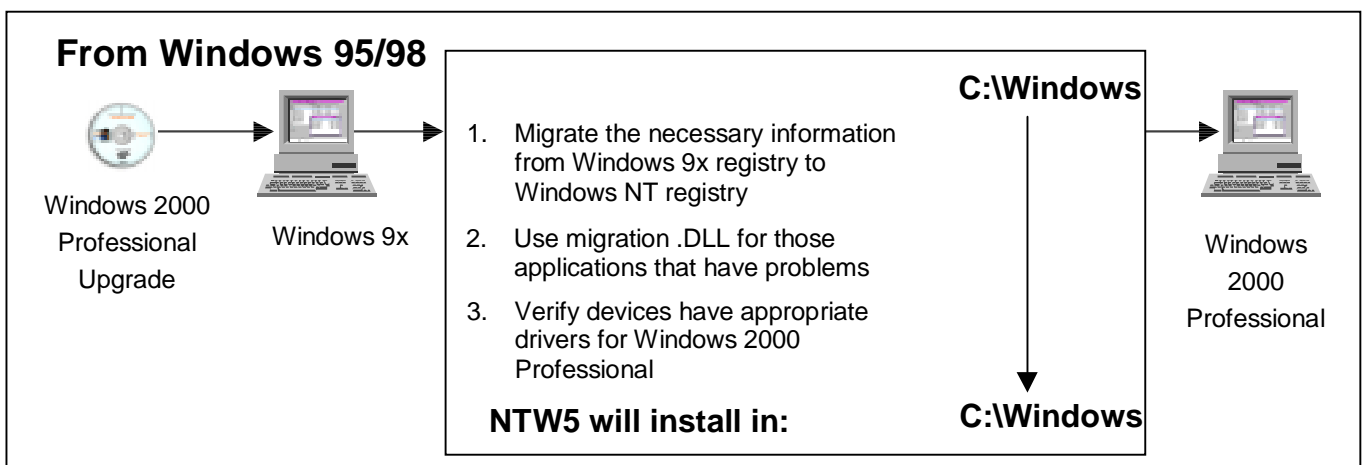
THE WINDOWS 9X UPGRADE PROCESS

As previously discussed, the registry structure, file locations, and system function calls differ between Windows 9x and Windows 2000 Professional based systems.

As a result:

- Businesses with customized line-of-business applications and third party system utilities may require significant preparation to ensure a smooth upgrade
- Straightforward or standardized corporate desktops should upgrade relatively smoothly. Businesses or departments primarily using Microsoft Office or other major commercial off-the-shelf applications will upgrade smoothly without additional work

The upgrade process itself involves preparation of files that help ensure software compatibility, appropriate drivers, and additional Windows NT user information.



Software Compatibility

Because of the differences between operating systems, many applications install themselves differently depending on which operating system is on the installation machine. Applications that were originally installed on a Windows 9x-based machine may not run properly on machines running Windows 2000 Professional without modification to ensure compatibility.

There are three ways to overcome this:

- Uninstall applications on Windows 9x and re-install after operating system upgrade, which is often costly and complicated. As previously noted, this may not work for applications that do not run on Windows NT Workstation.
- Create a new Windows NT Workstation-based standard configuration with compatible versions of the applications and apply this 'image' onto multiple machines using 'cloning' tools previously described on page 2. This approach is only suitable where identical hardware configurations are already in place.
- Write or obtain a migration DLL file from original software vendors for each application

THE WINDOWS 9X UPGRADE PROCESS (CONTINUED)

Migration DLL's do three things:

- Replace and/or upgrade Windows 9x specific files with Windows NT Workstation compatible files
- Move Windows 9x application and user specific settings (that Setup did not already know about) to their proper location in Windows 2000 Professional
- Map Windows 9x specific registry keys to the appropriate Windows 2000 Professional locations

Businesses with internally developed line of business applications may want to evaluate writing migration DLL's for their in-house applications¹. While this may at first seem to require a lot of work, in many cases it will be possible to utilize a single migration DLL to upgrade multiple language versions of one product.

Hardware Compatibility

Device Drivers

Some devices and peripherals that worked with Windows 9x will need new drivers to work with Windows 2000 Professional. The driver update is needed because some hardware drivers written for Windows 9x and for 16-bit Windows 3x-based applications running on Windows 9x were based on the older virtual (VxD) driver model. The VxD driver model is not supported in Windows 2000 Professional.

More recently written drivers based on the Windows Driver Model (WDM) are compatible with Windows 2000 Professional and will work without modification².

Many updated drivers will ship on the Windows 2000 Professional CD. However, when critical device drivers, such as hard drive controllers, are not compatible with Windows 2000 Professional and cannot be found on the CD or elsewhere, the Setup program will abort the upgrade, until updated drivers have been obtained.

File System Support

Windows 2000 Professional will continue to provide support for existing file systems. Specifically, FAT16 and FAT-32 file system users will have the option to convert to the Windows NT File System v5 (NTFS5). However, compressed Windows 9x drives cannot be upgraded, and will need to be uncompressed prior to performing the upgrade.

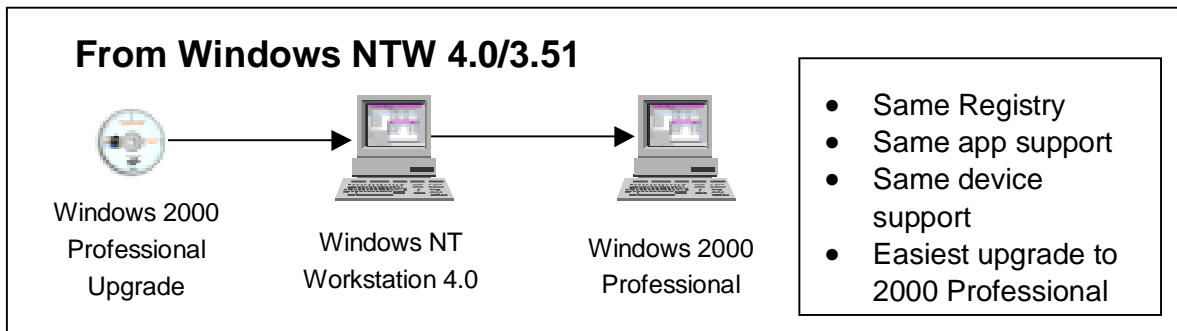
¹ Microsoft supplies the Migration Extension Interface to help developers easily create migration DLL's. Developers should visit <http://www.microsoft.com/msdn/news/feature/110397/migration> to access the toolkit.

² Developers can visit <http://www.microsoft.com/hwdev/desinit/wdmview.htm> for more information.

THE WINDOWS NT WORKSTATION UPGRADE PROCESS

Because Windows NT Workstation versions 4.0 and Windows 2000 Professional share a common registry, file system, security, and operating system kernel structures, nearly all applications that run on Windows NT Workstation 4.0 will run without modification on Windows 2000 Professional.

The upgrade process itself is straightforward and in most situations will not require significant preparation outside of standard lab upgrade testing previously discussed.



Software Compatibility

A few minor incompatibilities exist between versions 4.0 and Windows 2000 Professional. One example is Anti-virus software, which will need to be upgraded because of its use of file system filters. A large majority of Windows NT Workstation 4 file system filters will not work on Windows 2000 Professional because of updates to NTFS in Windows 2000 Professional.

It may also be necessary to obtain upgrades for third party network components (such as TCP/IP stacks) written for Windows NT Workstation 4.0.

Hardware Compatibility

Device Drivers

Almost all peripherals and devices that worked with Windows NT Workstation 4.0 will work today with Windows 2000 Professional. A small set of third party devices that worked with Windows NT Workstation 4.0 may require new/updated drivers to be written by their original suppliers to work with Windows 2000 Professional.

File System Support

NTFS v4 will be transparently upgraded to NTFS v5 during the upgrade process.

CONCLUSION

Windows 2000 Professional has been designed to be the mainstream business operating system of the future. In this respect it has been designed as the replacement to Windows 95.

A key design goal has been to radically simplify the setup process to enable its rapid deployment across the organization. These advances are the most evident in the upgrade from Windows NT Workstation 3.51 and 4.0.

The best way to prepare for Windows 2000 Professional is to deploy Windows NT Workstation 4.0 today on all new machines, as this will provide the fastest and smoothest upgrade. This also allows the organization to develop advance skills in Windows NT Workstation 4.0, which will be invaluable to ensure an easy and rapid deployment of Windows 2000 Professional later.

Organizations that have not deployed Windows NT Workstation 4.0 today should consider doing so in order to capitalize on it's many benefits.

- Up to 35% Total Cost of Ownership reduction
- Up to 30% faster than Windows 95 and Windows 98
- 3 times more reliable than Windows 95 and Windows 98
- Nearly 30% reduction in helpdesk calls
- Provides the highest protection against the risk of data theft, fraud and unauthorized access to confidential information on the local hard disk

Appendix - BASIC TEST PLAN

The following pages detail a list of suggested basic compatibility tests that can be performed on applications. These are not exhaustive and should be used in conjunction with your own testing matrix.

Setup

- If Autorun-enabled does the setup program start the when CD is inserted?
- Can setup be run from Control Panel's add/remove programs applet? (Application Manager)
- Can application be executed from the Taskbar's Start, Run ?
- Can setup be executed Execute from a Cmd Line?
- Where does installation put program shortcuts? Is a program folder created in the Start.Programs menu? Are all entries there that should be?
- Explorer - double click on the setup program in Explorer
- Abort Setup: what happens if you exit the app's setup before it's complete? Are temp directories removed? Can you exit cleanly?
- Can you change the name of install directory ?
- Can you Install to a compressed directory?
- Fontmover - if your app installs a lot of fonts, check to see they're visible
- Install options: choose "full" or "complete" to make sure everything installs
- Detection of bits already installed: if you already have installed the app, is the previous installation detected.?
- Does the setup enumerate available Disk space correctly? not enough, both real & incorrectly computed
- Does the application Uninstall gracefully?
- Admin Install: many applications have options for installing to a server, from which users can install to their local workstation
- How does Setup function when logged on as Administrator, power user, general user
- Can Setup be run from removable media?

Invoking the application

- Start program/shortcut
- Start, Run
- Desktop icon/shortcut
- Cmd line
- File Assoc (set in context menu you get when you right-click on an executable; after that you should be able to launch app by double-clicking on a file with the associated file extension)
- Explorer
- From removable media
- For 16 bit, try launching after checking "Run in Separate Memory Space" in the Start-Run dialog
- Put shortcut into start up group, reboot NT -does app launch OK with shortcut to executable? To associated file?
- Start from embedded object. For example, insert an Excel object in a Word document, save the document, close; when you open the Word document, can you launch Excel by double clicking on the Excel object?

Using the application

- Open sample document that ships with the application, or make one and use it in future testing.
- Print to PCL, PS, to FAX, in Color, to locally created printer
- Display of driver installed fonts
- File I/O:
 - save files with long file names, long directory names, extended ASCII characters;
 - write to and read from DFS volume
 - write to and read from encrypted drive
 - write to and read from NTFS, FAT, FAT32
 - write to and read from NTFS compressed
- Editing - App specific (graphic primitives etc. for graphics apps; font and format for word processors; etc.)
- Toolbars:
 - Launch apps from toolbars
 - Customize toolbars
 - Add/Remove toolbars
 - Docking & Undocking of toolbars
 - Resizing command dialogs
 - Help F1 - Context sensitive & index, explore for customizing
- Appearance
 - Maximizing , resizing & tray
 - Multi-monitor (if the application supports this)
 - "send to" functionality
 - Internet access, binaries update
 - Importing & Exporting
 - don't import type b into type a then export that file as type b (generally not supported)
 - Print imported files
 - Run in background
 - Run Multiple instances
 - Multiple Document Interface (MDI) - Tile, Cascade
 - Large files
 - If app is scanner-aware, scan documents into application
 - Copy, Paste, Paste Special
 - OLE operations (drag and drop between windows or other applications, link tracking)
 - Hardware support (et. tape drives) - Intellimouse, modems (dial out), sound in/out, video
 - Export to HTML
 - Concurrent user access (multiple access of database)
 - Compile database Queries
 - App Specific Functions
 - Fonts
 - Keyboard menu & controls access (Hotkeys)
 - Function keys
 - Context Menus