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Making the Move to Windows 2000.

Welcome to the second issue of CDW Focus. In this issue we examine the many different sides of networking Windows 2000. Microsoft's latest operating system has some significant improvements in the networking area over NT and 98/95. We at CDW want you to have accurate and complete information, so you can make an informed and deliberate decision how to evolve your Windows desktops and servers in your corporation. So take a look at some of the networking topics we've prepared for you.
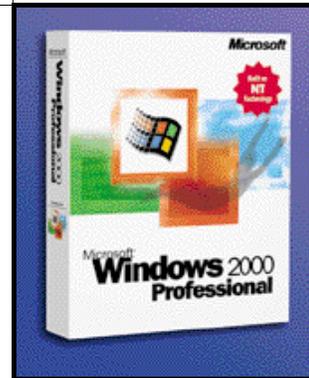
When it comes to networking, Windows 2000 takes the best from Windows 98 and combines it with the features and solid foundations first found in NT. Our article (see page 6) reviews the more notable networking features, including improvements to the file system, enhanced support for IP networks, and telephony features. We also look at some of the security enhancements (see page 2) and improvements for mobile users (see page 4).

But before you can consider a move to Windows 2000, look at the following issues:

— How many of your machines were purchased prior to 1998?

While Windows 2000 will run on fairly slow Pentiums (less than 100 MHz), it is best to use at least a 166 MHz machine with at least 128 MB of random access memory (RAM). Eddie Llamas, an assistant network administrator at CDW, says "if you have the ability to add more RAM or get a faster CPU I would do it. This is especially the case for server installations." Windows Server editions need faster machines with at least 256 MB of RAM, mainly because they run many more processes and services than the Windows Professional edition. Jerry Vogler, who is a senior account manager at CDW and a beta Windows 2000 user, says "if performance is crucial, stay above a Pentium II/350 MHz with at least 128mb of RAM for your server."

Windows 2000 takes up lots of disk space too: you'll need at least a two gigabyte hard disk to contain all of its files and still have some room left over to store your applications.

— Do you need support for new technologies such as Universal Serial Bus (USB) and DirectX?
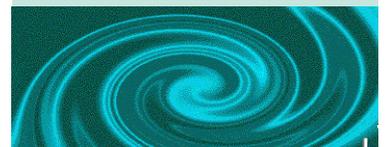
Windows 2000 offers improved USB support and better Plug and Play detection and configuration. Microsoft has an entire web site designed for you to check compatibility with various hardware and peripherals, www.hardware-update.com. However, some devices don't yet have drivers available and you might have some trouble installing the operating system on some of your older computers or the odd clone. Still, Vogler is optimistic and hasn't had too many problems finding the right drivers: "That is one thing that has me excited about Windows 2000, the freelance developers who have spent their own time writing third party drivers for others to use. It really creates a helpful environment."

— Are you planning on deploying Active Directory?

If you are, make sure you spend some time understanding this new technology and what it takes to manage and setup your directory properly. Our guide (page 4) goes into more details here. Llamas says that "getting Active Directory Services

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configured and running the way administrators want will be one of the most common problems" for new Windows 2000 installations.

— Which version of Windows 2000 is most appropriate?

Windows 2000 comes in four different versions, starting with desktop and laptop Professional edition and moving into three different server editions. Our table (page 8) provides more information and recommendations on which one you should use for your particular circumstances. "Server editions shouldn't be used by end users to run their day to day applications and as a general client, mainly because the extra resources needed to run a server make it impractical," says Vogler. Llamas agrees. "There is too much overhead on the Server version for it to run on a user's desktop. The users would not be using the services that come with it and they will see significant slow downs."

— How easy is it to deploy across your enterprise?

Microsoft has a series of tools, just like with NT and 95/98, to help automate the process. While Windows 2000 Professional is compatible with existing NT version 4.0 system policy configuration files, there are some changes. And you need to import these changes into the new procedures, including being able to deploy policy tools using Internet Explorer and web servers. Page 5 describes some of the new procedures to do familiar tasks such as find files and add users.

Overall, Windows 2000 represents an evolution in Microsoft's operating systems. You should carefully consider which version is most appropriate for your particular needs and test any of your existing applications to ensure they will function properly.

> *"THERE IS TOO MUCH OVERHEAD ON THE SERVER VERSION FOR IT TO RUN ON A USER'S DESKTOP."*

● Making Windows 2000 More Secure.

Windows 2000 includes a number of security enhancements that will appeal to corporate networkers. Here are some of the more notable features:

— Active Directory enhancements

Active Directory (see page 4) brings a number of enhancements to the Windows 2000 security model. With a centralized directory there are no restrictions on security groups that span domain partitions. This means that groups can be managed centrally, in a single place. Previous versions of Windows required maintaining user accounts on multiple servers, which was cumbersome. Also in Windows 2000, authentication for domain users is based on user accounts in Active Directory. Administrators manage these accounts using the Active Directory Users and Computers utility, which has an expanded properties sheet for each user that includes permissions for remote access and remote session control.
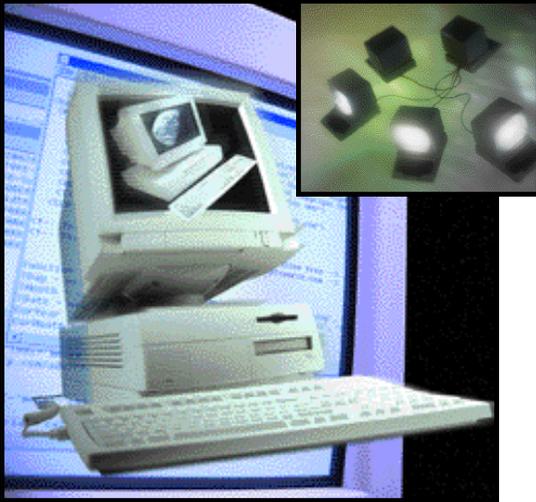
Also, the default permissions have been tightened up somewhat. Members of the Everyone and Users groups do not have broad read/write permission as they did in Windows NT 4.0. Normal users have read-only permission to most parts of the system and read/write permission in their own profile folders. However, normal users can only access domain controllers over the network — interactive logon to domain controllers is not granted to users by default as it was in Windows NT 4.0.

— Certificate management

The basic idea of public key cryptography is that there are two keys that are related. The public key (which is passed openly and freely between parties) can be used to encrypt data that can only be decrypted using an associated private key. These keys are managed via a series of certificate servers and applications, all

of which are included as part of the Windows 2000 Server operating system and managed via the Computer Management utilities. These certificates can be used to encrypt email, create secure web applications, and digitally sign messages.

— Remote access and Virtual Private Network (VPN) support

Windows 2000 includes a two-step process to allow remote users network access. First, the request has to match one of the remote access policies defined for the server as part of the Routing and Remote Access utility. Then, the user's account has to be enabled for remote access, again as part of the Active Directory Users and Computers utility. VPNs can easily be enabled with both tools, and automatically can setup the necessary network security infrastructure.

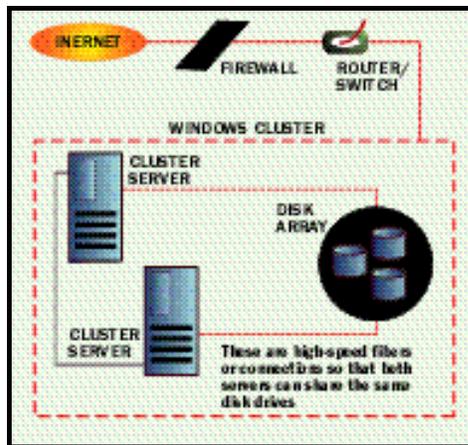## — Internet Protocol Security (IPsec) support

Windows 2000 incorporates IPSec for data protection of network traffic. IPSec is a series of protocols that allow secure, encrypted communication between two computers over an insecure network. IPSec provides end-to-end security, meaning that the IP packets are encrypted by the sending computer, are unreadable en route, and can be decrypted only by the recipient computer. You set up rules to prevent non-IPsec clients from listening in on your encrypted communications, and set up other rules on how clients are authenticated on a certificate servers. This is accomplished via the Domain Controllers Security Policy utility.

Clustering, load balancing, and multiprocessing.

When it comes to network servers, having a cluster means having more than one. The essence of server clustering is a simple idea: take several servers (called nodes) and tie them together with a variety of hardware and software tricks to ensure either high availability or scaleable performance. Ideally, the goal is to have both: a collection of hardware that doesn't fail and doesn't run out of gas as applications grow and consume more processing horsepower. Clustering makes a great deal of sense for database and messaging servers: typically, these are the applications that require both high availability and are the most troublesome to scale for increased demands.

Clustering isn't the same as symmetric multiprocessing (SMP) or network load balancing (NLB). The former involves putting more than one central processor unit (CPU) inside a single node. However, you can combine clustering with SMP hardware to deliver the ultimate in high-reliability and scaleable machines. With SMP, the operating system is aware of the multiple processors and divides its own tasks among the various CPUs. The multiple CPUs share memory, disk, and other machine resources. However, when one of these shared resources fail, the entire machine will stop working. Clustering gets around this problem by offering more

redundant components, typically separate disk drives and processors.

NLB is actually an application which runs on top of clustering and is used to balance incoming Internet Protocol traffic across clusters. NLB is used to spread the workload and increase the response time primarily for web-based applications, and is used in large "server farm" kinds of applications. As your web site becomes more popular and receives more visitors, you can quickly meet these demands by adding new servers and balancing the load among them.

Windows 2000 Advanced and Datacenter Server editions include support for clusters of computers and for NLB among 32 computers. (Clustering is not supported in either the Professional or Server versions.) The former supports two-node failover clusters, while the latter supports up to four-node clusters. SMP support begins at a two-processor version for Professional, a four-processor version for Server, eight processors for Advanced Server, and Datacenter Server supports up to 32 processors. Both clustering and NLB were supported by NT version 4, although they were separate applications that required

"CLUSTERING MAKES A GREAT DEAL OF SENSE FOR DATABASE AND MESSAGING SERVERS."

additional installation and required service pack updates and Microsoft's Distributed Transaction Coordinator software. Windows 2000 improves upon these features in several ways.

First, such services as DHCP, WINS, SMTP, and NNTP are now supported by the Windows 2000 clustering service. This means that these critical network services can benefit from the reliability improvements offered by clustering. Second, both NLB and clustering are easier to setup,

with wizards that can walk you through each process in less than 30 minutes. Third, clustering can be managed just like other Windows 2000 services, via the Computer Management console.

To build a cluster, you'll need to install two network cards in each computer. One network connects to the cluster itself and is used by the clustering service to monitor the machine's "heartbeat" to determine if it still is running and available to the network. The other connection is used as an ordinary external network path. If you want to share an array of disk drives across the cluster, you also need to install support for Fibre Channel SCSI disks.

This white paper from Microsoft explains how to set up clustering and load balancing for both Windows NT and 2000:
www.microsoft.com/ntser   ver/
ntser verenterprise/deployment/
planguide/higha   vail web .asp

What's new for mobile users.

Windows 2000 offers a number of new features designed to make the life of mobile users easier. Here are some of the highlights:

Hot Docking Windows 2000 Professional users can plug mobile computers in and out of a docking station without reboot-ing or changing configuration settings. This also includes modem and networking settings that can be setup specifically for particular circumstances. In previous versions of Windows NT and 98, you had to make changes to modem dialing strings and other connection settings when you moved your laptop from office to hotel to home locations.

Hibernation. This feature allows you to quickly shut the system down without having to first exit all of your running applications. Within 30 seconds of turning the power back on, you can return to your desktop in the exact same state as you left it. Hibernation differs from Suspend mode

in that the latter restarts the computer even quicker — in just a few seconds — but consumes a small amount of battery power while the computer is suspended. Hibernation turns off all power to the computer, and can thus prolong battery life.

Smart Battery. This gives you a detailed picture of a battery's life and settings, enabling you to reduce power to specific functions to extend your battery life.

Offline Files and Folders. This lets mobile users easily take any combination of files, folders, or entire mapped drives offline. Users don't need to employ any separate tools, such as the Briefcase. Instead, they simply right-click any network-based file or folder and click "Make Available Offline" on the menu. When the computer is offline, the files and folders appear in the same directory as they did online — as if they still resided in the same location on the network. This makes them easy to find.

Synchronization Manager. This tool in Windows 2000 Professional allows users to synchronize all network resources, including files, folders, email, and databases, in a single location. For example, users can set certain files and folders to be synchronized every time they log on or off the network. The Synchronization Manager can be set to automatically detect and update any changes. (See page 7 for a mini tour of this feature.)

"USERS CAN PLUG LAPTOPS IN AND OUT OF DOCKING STATIONS WITHOUT REBOOTING."

In addition to these features, Windows Professional also includes support for the latest connection methods including infrared, Firewire (IEEE 1394 or Sony iLink) digital cameras, and Universal Serial Bus devices. It also includes enhancements to Plug and Play architecture to recognize several thousand different devices.

Dealing with Active Directory.

Previous versions of Windows stopped at domains when it came to working with multiple computers and other network resources. With Windows 2000, a new hierarchy called Active Directory is now available to organize your networks and authenticate users. Active Directory uses the Domain Name System (DNS) as a locator mechanism to find network resources. DNS is an Internet standard service that translates computer names (such as mycomputer.microsoft.com) to numeric IP addresses. The difference between them is that DNS stores zones and resource records while Active Directory stores its domains and domain objects.

With the introduction of Active Directory, Windows 2000 domain controllers function as peers. This is a change from the superior/subordinate roles played by Windows NT Server Primary and Backup Domain Controllers. Peer domain controllers replicate Active Directory information among all domain controllers. This means that administrators can make updates to Active Directory on any Windows 2000 domain controller in the domain. In Windows 2000 Server, domains are merely a subset of the larger tree. In the Windows NT Server operating system, only the PDC has a read-and-write copy of the directory. Rather than having to administer many different domains and trust relationships between them, you can now store your network information in the Active Directory.

Active Directory is backward compatible: computers running Microsoft operating system versions prior to Windows 2000 will respond as if they are accessing the domain controller of a Windows NT Server 4.0 operating system. It also allows for flexible querying of network resources: using the Search command, you can query users by first or last name, or look for other resources such as disk shares and printers.

A good place to start learning about Active Directory is on Microsoft's web site:
www.microsoft.com/
windows2000/guide/ser   ver/
features/acti   vedirector   y.asp

● New ways to do familiar tasks

| Task	Old way with Windows 98/NT	New way with Windows 2000
Create a shared folder	Right-click on folder in IE, select Sharing.	Computer Management > Shared Folders > Shares, then right click and choose new and follow wizard.
Add a new user to the domain	Programs > Admin Tools > User Manager, then select new user to add.	Programs > Admin Tools > Active Directory Users, then right-click on Users and select new user to add.
Add new protocol	Control Panel > Networking > Protocols > Properties, then select protocol in properties sheet.	Programs > Accessories > Communications > Network and Dial Up Accounts > LAN Connect, then right click and choose Properties > Install.
Create dial-up connection to the Internet	Programs > Accessories > Communications > Dial Up Networking, then click on "New connection" and follow wizard.	Programs > Accessories > Communications > Network and Dial Up Accounts > New Connection, then follow wizard
Find a File	Find > Files or Folders, then fill out sheet.	Search > Files or Folders, then fill out sheet. More search options available now.
Create bootable startup disk	Settings > Control Panel > Add New Programs > Startup Disk > Create Disk.	No equivalent. Can create an emergency repair disk in Backup wizard.
Change printer driver	Settings > Printers, then right click on printer and choose Properties sheet.	Same, but with added functionality to support Internet-connected printers.
Set policies on users and computers in a site	Use System Policy Editor	Programs > Admin Tools >Active Directory Sites and Services, then set Group Policy (see Note)

NOTE: *In Windows NT 4.0, you use the System Policy Editor to define user, group, and computer configurations stored in the Windows NT registry database. In the Windows 2000 operating system, Group Policy defines a wider variety of components in the user's environment that administrators can manage. These components include settings for registry-based policies, security options, software deployment options, scripts (for computer startup and shutdown and for user log on and log off), and redirection of special folders such as My Desktop or the Start menu.*

Using the new Computer Management application.

Windows 2000 consolidates many of the separate configuration dialogs and settings into a single framework called Computer Management. This had its origins with version 4 of Internet Information Server's Management Console, and its role has expanded to handle tasks that formerly handled elsewhere. For example, in NT administrators had to set up networking components inside the Network Control Panel settings, and manage the disk storage with the Disk Administrator.

These tasks are now taken care in the Computer Manage-ment application.
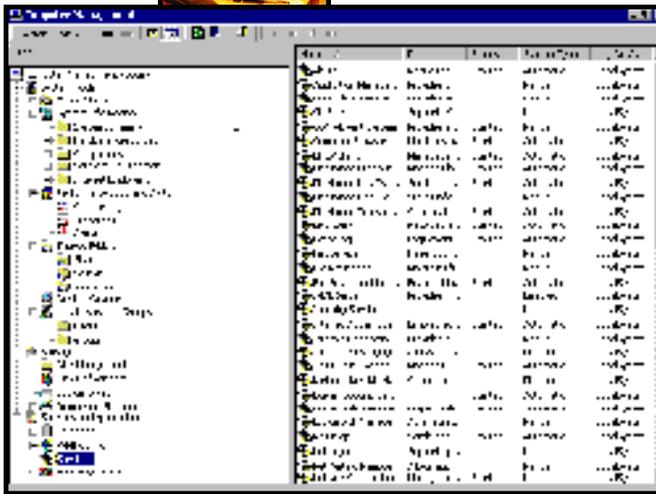
Computer Management has the familiar folders and tree structure; only instead of files and printers it contains tasks and utilities. You can control the device manager (to setup new peripherals) here and also stop and start all of Windows' many services. You can display a list of shared directories and control who has what kind of access to them, along with a display of users (only if the server isn't running Active Directory — that has its own separate management routine not part of Computer Management). You can also defragment your disk drives and view the various event and error logs from within this utility.

Highlights of the networking enhancements to Windows 2000.

Windows 2000 brings several new and enhanced features in the networking area. This includes IP address management, enhancements to support telephony applications, a new version of Microsoft's web server, and enhancements to the underlying file and storage systems.

IP Address Management
Windows 2000 Server and Advanced Server have been enhanced to make Dynamic Host Control Protocol (DHCP) services easier to deploy and manage. New features include:

"MANY SEPARATE ADMINISTRATIVE TASKS HAVE BEEN CONSOLIDATED IN THE COMPUTER MANAGEMENT APPLICATION."

• **Better integration of DHCP with Domain Name Services (DNS).** DHCP servers and DHCP clients may register with DNS.

• **Enhanced monitoring and statistical reporting** has been added to the Windows 2000 DHCP server. This new feature provides notification when IP addresses are running below a user-defined threshold. For example, an alert could be triggered when 90 percent of IP addresses assigned for a particular scope have been assigned.

• **User classes** allow DHCP clients to differ-entiate themselves by specifying what type of client they are, such as a desktop or laptop, for example. Network administrators could set up laptops to have shorter IP address leases, since they will be disconnecting from the network more frequently than desktops.

• **Multicast adresses** can be allocated to streaming media servers and their clients.

• The DHCP server is designed to **prevent unauthorized** DHCP servers from creating address assignment conflicts.

• **Windows Clustering support for DHCP** **and other network services** to improve reliability.

• For Windows 2000-based platforms, if the first attempt to locate a DHCP server fails, the DHCP client can **configure itself with a selected IP address.**

Telephony Enhancements
Microsoft has made major enhancements to Windows 2000 telephony services. First, the Windows 2000 Software Development Kit includes a new Web Telephony Engine to include voice application support using standard Web resources. The Web Engine integrates with other Microsoft program-ming interfaces including Telephony Application Programming Interface (TAPI) version 3.0 and Microsoft Speech API. It uses five extensions to HTML to enable the voice processing capabilities.

The new TAPI 3.0 interfaces provides not only call functionality but also media access, directory access, and access to devices on a computer that can capture and render audio and video. For telephony applications there are Component Object Model (COM) interfaces for call control, media control, and directory control. There are also COM interfaces for telephony service provider programs to support services such as IP telephony and media control. Earlier versions of TAPI were focused on phone numbers as the only

thing that could be dialed by an application. This has been expanded in version 3.0 to include a variety of ways for addressing users, such as by name, machine name, and IP address.

Web server enhancements

A new version 5.0 of Microsoft's web server, Internet Information Server (IIS), is included in Windows 2000 Server and Advanced Server editions. It has four major improvements:

• **IIS can be restarted without having to reboot the entire machine.** To improve reliability, there are a number of other features, including the ability to run applications in a pool separate from the web services, processor throttling and socket pooling features.

• IIS 5.0 **is easier to install and maintain** with simplified installation process, new security task wizards, the ability to account for time used by processes, more flexible remote administration, and the ability to create custom error messages.

• IIS 5.0 **adds support for important industry-standard security protocols** including Digest Authentication, Server Gated Cryptography, Kerberos V5 authentication protocol, Transport Layer Security, and Fortezza. In addition, three new task wizards make it easier for administrators to manage a site's security settings.

• Developers will find that IIS 5.0 expands the Web server's application development environment by building on Active Directory and COM. In addition, **enhancements to Active Server Pages** such as scriptless ASP processing, as well as improved flow control and error handling, let developers write more efficient Web-centric applications.

File System Enhancements

Windows 2000 supports the FAT32 file system introduced by Windows 98, along with other enhancements that make it more robust in supporting large disks. Disks *can have more than four different partitions and partitions can be changed without having to reboot the system,*

a limitation of prior versions of NT. Disk storage management is now integrated in the Computer Management application rather than a separate program in previous Windows versions. Removable media such as CD-ROMs can now support NT file system formats. And a long-requested feature allows an administrator to monitor and control how much disk space a user can occupy on a file system. Quotas can be used to either track or enforce limits on a per-user basis for a specific NTFS volume.

Windows 2000 also improves upon how users access network resources. Using Windows Explorer, users can view *"Computers Near Me,"* a listing of workstations in the same domain or workgroup. You can also create a shortcut in *"My Network Places"* to particular network locations without having to map them first to a particular drive letter. And these shortcuts can be created directly on the client desktop as well for ease of navigation.

Synchronization Feature Mini Tour

Windows 2000 Professional version includes an improved synchronization utility that is expressly designed for laptop users who connect and disconnect to corporate networks. What it does is replicate files according to certain directories that users explicitly setup for this use. When the laptop is reconnected to the network, the files can be updated on the server with a few clicks of the mouse. This feature is not available in the Server versions.

Here are the steps involved in setting this up.
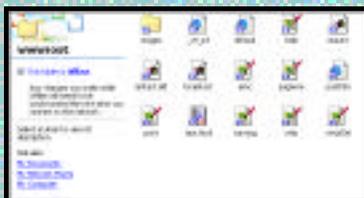
This screen shows you the directory listing and indicates that the files are offline, meaning you are not currently connected to the network. You are free to make changes to these files or create new files in this directory.
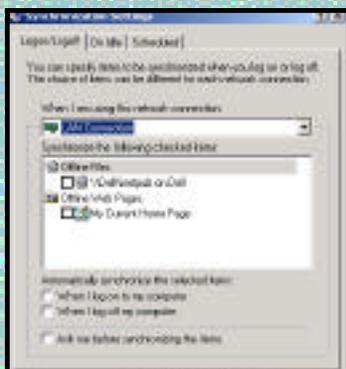
You can set various options for this directory, including the ability to automatically synchronize when you log on or off to the network or schedule the synchronization for specific times.
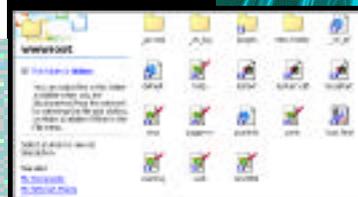
This screen shows you the directory listing and indicates that the files are online and available to the network.
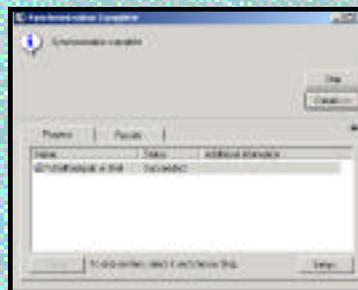
Here you have performed the synchronization by right-clicking on the directory and choosing Synchronize. Windows 2000 copies the files to the server from your laptop.

If you are currently running	Recommended upgrade
Windows 95, 98, NT Workstation 3.51, 4.0, or any laptop users	2000 Professional
Windows NT Server 3.51, 4.0, NT Terminal Server	2000 Server
Back Office Applications (IIS, SQL Server, Exchange Server, etc.), NT Enterprise Server	2000 Advanced Server or Datacenter Server*
Windows 3.1	2000 Professional (new installation)
Windows NT with Citrix Server, or Microsoft Back Office Small Business Server	2000 Advanced Server (new installation)

Note: Unless indicated, upgrades can install the version of Windows 2000 on the same machine, keeping the existing data files intact. However, unlike previous versions of Windows, there is no ability to uninstall Windows 2000 once an upgrade is completed. "New installation" means reformatting the hard disk and installing the operating system from scratch. For more details, visit Microsoft's web site: www.microsoft.com/windows2000/upgrade

*Datacenter Server supports online applications processing and other large-scale processing, including support for up to 64 GB of storage. It will be available later this year. A good rule of thumb is to choose regular Server version for supporting mainly file and print services, Advanced Server for Internet and database services or clustering, and Datacenter for higher-end processing tasks.

How to choose the best version of Windows to meet your needs.