CHAPTER 1

Introducing Windows 2000 Deployment Planning

The *Microsoft® Windows® 2000 Server Resource Kit Deployment Planning Guide* is a tool for you to use as you design, plan, and develop your deployment of Microsoft® Windows® 2000. As you read through this book, you will gain insight about how to plan your deployment on both a project management and a feature level. This book addresses planning information that will help you get started, such as how to run a test lab and a pilot project, and provides important technical discussions that will assist you in deploying Windows 2000 technologies.

You begin the planning process in this chapter. It includes an introduction to this book, followed by a brief overview of Windows 2000 and its features. Next, you are introduced to case studies that illustrate how four companies started their deployment planning process. Finally, the chapter provides a feature overview from an IT business perspective. You can use this overview to begin your deployment planning process.

In This Chapter

Chapter Goals

This chapter will help you develop the following planning documents:

- Windows 2000 product list for your organization
- A plan for mapping Windows 2000 features to your business needs

Related Information in the Resource Kit

- For more information about how to begin your deployment planning process, see “Creating a Deployment Roadmap” in this book.
- For more information about deployment planning, see “Planning for Deployment” in this book.

Starting Your Plan

Deploying a new operating system such as Windows 2000 in an enterprise environment is a task that requires executive approval and funding as well as a substantial planning effort. As you begin your planning effort, you need to understand the Windows 2000 product family. Then, you need to gain an understanding of the features and how you can take advantage of them to increase productivity and reduce total cost of ownership (TCO) in your organization. The following two sections provide an overview of the planning process described in this chapter and an introduction to using this book.

Effectively Using This Book

This book will help you design, plan, and implement your Microsoft® Windows® 2000 Professional and Microsoft® Windows® 2000 Server deployment. It provides guidelines and caveats for solving critical business needs by deploying the main features of Windows 2000. Also included are step-by-step instructions for automating Windows 2000 Server and Windows 2000 Professional installation by using utilities such as unattended Setup tools, scripting, and Microsoft® Systems Management Server. The information is presented in a logical flow that you can use as you begin your deployment.

To accomplish these goals, this book contains three different types of chapters:

- Planning chapters that provide you with information that will help you be successful as you begin planning your rollout, such as testing and planning chapters.
- Technical design chapters that provide you with information that will assist you in implementing specific features of Windows 2000, such as Active Directory™ directory service, and in designing your Windows 2000 network to meet the needs of your organization.
- Automated installation chapters that provide step-by-step instructions for installing Windows 2000 Server and Windows 2000 Professional by using tools such as Systems Management Server.

Table 1.1 lists the six parts of this book and the chapters that fall under each part.

Table 1.1 Deployment Planning Guide Chapters

No.	Part/Chapter Title	Type
	Part 1: Planning Overview Provides information that will assist you in the planning aspects of your deployment and includes information on testing and piloting.	
1	Introducing Windows 2000 Deployment Planning	Planning
2	Creating a Deployment Roadmap	Planning
3	Planning for Deployment	Planning
4	Building a Windows 2000 Test Lab	Planning
5	Conducting Your Windows 2000 Pilot	Planning
	Part 2: Network Infrastructure Prerequisites Provides information that will assist you in assessing your current network and in planning your network upgrade.	
6	Preparing Your Network Infrastructure for Windows 2000	Technical design
7	Determining Network Connectivity Strategies	Technical design
8	Using Systems Management Server to Analyze Your Network Infrastructure	Technical design
	Part 3: Active Directory Infrastructure Provides information that will assist you in planning your deployment of specific technical features.	
9	Designing the Active Directory Structure	Technical design
10	Determining Domain Migration Strategies	Technical design
11	Planning Distributed Security	Technical design
12	Planning Your Public Key Infrastructure	Technical design
	Part 4: Windows 2000 Upgrade and Installation Provides information on upgrading and installing servers, member servers, and terminal services.	
13	Automating Server Installation and Upgrade	Automated installation
14	Using Systems Management Server to Deploy Windows 2000	Automated installation
15	Upgrading and Installing Member Servers	Automated installation
16	Deploying Terminal Services	Technical design

(continued)

Table 1.1 Deployment Planning Guide Chapters *(continued)*

No.	Part/Chapter Title	Type
	Part 5: Advanced Management Provides information that will help you plan for using more advanced features.	
17	Determining Windows 2000 Network Security Strategies	Technical design
18	Ensuring the Availability of Applications and Services	Technical design
19	Determining Windows 2000 Storage Management Strategies	Technical design
20	Synchronizing Active Directory with Exchange Server Directory Service	Technical design
	Part 6: Windows Professional/Client Deployment Provides information that will help you plan for and deploy Windows 2000 Professional clients.	
21	Testing Applications for Compatibility with Windows 2000	Technical design
22	Defining a Client Connectivity Strategy	Technical design
23	Defining Client Administration and Configuration Standards	Technical design
24	Applying Change and Configuration Management	Technical design
25	Automating Client Installation and Upgrade	Automated installation

How to Begin Planning

Planning for an operating system installation or upgrade requires many steps and in-depth planning. This chapter provides information that will help you get your planning process started. Figure 1.1 illustrates the planning steps presented in this chapter.

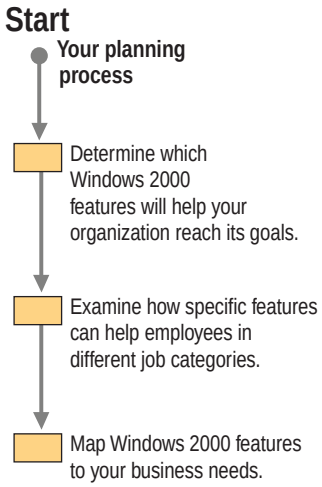

Figure 1.1 How to Begin Planning

Overview of the Windows 2000 Product Family

Staying competitive in the new digital economy requires an advanced computer-based, client/server infrastructure that lowers costs and enables your organization to adapt quickly to change. The Microsoft Windows 2000 platform—the combination of Windows 2000 Professional and Windows 2000 Server—can deliver the following benefits to organizations of all sizes:

- Lower total cost of ownership (TCO).
- A reliable platform for computing 24-hours-a-day, seven-days-a-week.
- A digital infrastructure that can accommodate rapid change.

The entire product family is designed to provide networking, application, communications, and Web services with increased manageability, reliability, availability, interoperability, scalability, and security. To accommodate the computing needs of organizations of all sizes, there are several Windows 2000 products available. The following sections introduce you to specific products that make up the Windows 2000 family.

Windows 2000 Professional

Windows 2000 Professional allows users to be more productive in a variety of work and user situations (such as mobile and remote users), to ensure the highest level of security for user data, and to deliver the performance necessary for a new generation of personal productivity applications. Windows 2000 Professional helps you to lower the total cost of ownership through:

Improved Client Administration Capabilities Windows 2000 allows your administrators to have total control over your client data and application and system settings, thereby helping you to reduce the number of help desk calls. It also ensures that users do not accidentally damage their systems and allows your users to have 24-hour access to the tools they need to get their jobs done, even when they are working from someone else's computer.

Broad Management Tool Support Designed to improve information technology manageability, Windows 2000 Professional includes "client agents" that enable leading management solutions such as Systems Management Server to work effectively.

Ease of Use The user interface has been designed for easier access to information through the use of personalized menus and Most Recently Used lists. (The operating system determines which tasks you use most often and then displays those tasks in the visible portion of each menu.)

Higher Levels of Stability Windows 2000 Professional is designed to be the most reliable client and mobile operating system available. Clients stay running longer, helping you to ensure higher levels of productivity.

Greater Device Support Windows 2000 Professional supports over 7,000 devices, including expanded support for many devices not previously supported by Microsoft® Windows NT® Workstation version 4.0, such as many older printers, scanners, and digital cameras. This represents a 60 percent increase over the number of devices supported in Windows NT 4.0. Windows 2000 Professional also supports Microsoft® DirectX® version 7.0, a group of low-level application programming interfaces (APIs) that give access to high-performance media acceleration on Windows-based computers.

Note For more information about supported devices, see the Microsoft Windows Hardware Compatibility List (HCL) link on the Web Resources page at http://windows.microsoft.com/windows2000/reskit/webresources.

Easier to Configure New wizards take the guesswork out of configuring and setting up Windows 2000 Professional.

More Language Options MultiLanguage technology provides unparalleled multilingual options for end users and administrators.

For more information about Windows 2000 Professional, see the chapters in Part 6 of this book.

Windows 2000 Server Family

The Windows 2000 Server family has two members: Standard and Advanced. The Standard edition offers core functionality for essential services (including file, print, communications, infrastructure, and Web servers) appropriate to small- and medium-sized organizations with numerous workgroups and branch offices. The Advanced edition is designed to meet mission-critical needs, such as large data warehouses, e-commerce, or Web hosting services for medium-sized and large-sized organizations and Internet service providers (ISPs).

Windows 2000 Server Standard Edition

At the core of Windows 2000 Server is a complete set of infrastructure services based on Active Directory directory service. Active Directory simplifies management, strengthens security, and extends interoperability. It provides a centralized method for managing users, groups, security services, and network resources. In addition, Active Directory has a number of standard interfaces allowing interoperability with a variety of applications and devices.

Windows 2000 Server provides a comprehensive set of Internet services that allows organizations to take advantage of the latest Web technologies. This integrated, flexible Web platform has a full range of services you can use to deploy intranets and Web-based business solutions. These services include site hosting, advanced Web applications, and streaming media.

Windows 2000 Server extends the application services established by Microsoft® Windows NT® Server version 4.0. By integrating application services such as Component Services, transaction and message queuing, and Extensible Markup Language (XML) support, Windows 2000 Server is an ideal platform for both independent software vendor solutions and custom line-of-business applications.

Over the last few years, many companies have benefited from the rapid progress manufacturers have made in the speed of microprocessors. To enhance system performance with faster processors, Windows 2000 Server also supports uniprocessor systems and four-way symmetric multiprocessing *(SMP)* systems with up to 4 gigabytes (GB) of physical memory.

A business server running the Windows 2000 operating system has the multipurpose capabilities required for both clients and servers in both a traditional client/server model and workgroups. Your organization might also require additional departmental deployments of file and print servers, application servers, Web servers, and communication servers. Some key features of the operating system that will assist you in installing and configuring servers that perform these various roles include:

- Active Directory
- IntelliMirror and Group Policy
- Kerberos authentication and Public Key Infrastructure (PKI) security
- Terminal Services
- Component Services
- Enhanced Internet and Web services
- Up to four-way SMP support

Windows 2000 Advanced Server

Windows 2000 Advanced Server is the new version of Windows NT Server 4.0, Enterprise Edition. It provides a comprehensive clustering infrastructure for high availability and scalability of applications and services, including main memory support of up to 8 gigabytes (GB) on Page Address Extension (PAE) systems. Designed for demanding enterprise applications, Advanced Server supports new systems by using up to eight-way symmetric multiprocessing (SMP). SMP enables any one of the multiple processors in a computer to run any operating system or application thread simultaneously with other processors in the system. Windows 2000 Advanced Server is well suited to database-intensive work, and provides high-availability server clustering and load balancing for high system and application availability.

Windows 2000 Advanced Server includes the full feature set of Windows 2000 Server and adds the high availability and scalability required for enterprise and larger departmental solutions. Key features of Advanced Server include:

- All Windows 2000 Server features
- Network (TCP/IP) Load Balancing
- Enhanced two-node server clusters based on the Microsoft Windows Cluster Server (MSCS) in the Windows NT Server 4.0 Enterprise Edition
- Up to 8 GB main memory on PAE systems
- Up to eight-way SMP

Terminal Services

The Terminal Services feature of Microsoft Windows 2000 Server delivers Windows 2000 Professional and the latest Windows-based applications to computers that normally cannot run Windows. Terminal Services also offers a remote administration mode that allows administrators to access, manage, and troubleshoot clients. Through terminal emulation, Terminal Services allows the same set of applications to run on diverse types of computer hardware. For organizations wanting to increase flexibility in application deployment and control computer management costs, the Terminal Services architecture offers an important enhancement to the traditional two- or three-tier, client/server architecture based on servers and full-scale personal computers. For more information about Terminal Services, see “Deploying Terminal Services” in this book.

Using Windows 2000 to Improve the Way You Work

As your organization plans to migrate to Windows 2000, one of the first questions many people will ask is, “What's in it for me?” The advantages of migrating to Windows 2000 will be enjoyed by your administrators as well as your users. Your administrators will enjoy being able to provide greater mobile support, easier client installation, and less administrative overhead. The workers in your organization will be able to take advantage of an easier user interface and increased reliability and availability. Additionally, individual users will be able to see specific enhancements based on the type of work they do.

Looking at how the Windows 2000 platform might affect three different job categories— Information Technology (IT) administrator, department manager, and sales representative—can help you answer questions about how Windows 2000 can improve the work accomplished in your organization. The following sections do not provide a comprehensive list of the features that each of these job categories will use. They provide a sample that you can use to begin planning.

IT Administrator

As an IT administrator, Windows 2000 provides you with centralized control over all of the clients in an organization. An administrator will also be able to use applications written specifically to take advantage of the new technologies of Windows 2000. These applications will be easier to deploy, more manageable, and more reliable. As a result, you will be able to provide better service. The following Windows 2000 features are examples of new Windows 2000 Server technologies that can allow you to work more effectively.

IntelliMirror and Active Directory These features let you use Group Policy to configure clients to meet the varying needs of particular user groups. For example, you can make sure that everyone in the finance department has the spreadsheet, word processing, and presentation applications they need. Likewise, you can assign sales-tracking software to the sales team. And, you can set policies that let users see their preferred arrangements from any computer on the network. To reduce Help desk costs, you can secure users' computers so they cannot change their computer configurations.

Remote Install Technologies Remote Install (RI) technologies allow you use Group Policy to perform an automated clean installation of the Windows 2000 Professional operating system onto a client. You can use this technology (the RIPrep tool is available on the Windows 2000 Server operating system CD) to install the Windows 2000 Professional operating system from one central location. You can combine RI with Microsoft® IntelliMirror technologies to image a complete system. If you also use roaming profiles, this combination of features can assist greatly in the disaster recovery process.

Windows 2000 Logo Application Certification Program

The Windows 2000 Logo program is a Microsoft specification that helps developers build applications that take advantage of Active Directory, Windows Installer software, and other features of Windows 2000 that make applications easier to manage on a company-wide basis. Using the information in this specification, you can develop applications that use Windows 2000 features to reduce your TCO and that run well with other applications in use in your organization. For more information about the Windows 2000 Logo Application specification, see the MSDN Online link on the Web Resources page at http://windows.microsoft.com/Windows 2000/reskit/webresources.

Terminal Services and Mobile Devices These features let you manage services from anywhere on the network. For example, if you receive a call about a network bandwidth issue while you are visiting a branch office, you can use a wireless handheld computer to access the network's centralized management tools, diagnose the issue, and work to resolve it.

Department Manager

As a department manager, you are responsible for coordinating a number of projects and employees. As a result of improved information access, you can now gather and analyze information more easily. The following are examples of how some specific Windows 2000 features will make your work as a manager easier.

Terminal Services or Change and Configuration Management Technologies

By using Change and Configuration Management technologies, your administrator can make sure that the software, data, and desktop settings you need are available, regardless of where you are when you log on to the network. If you are visiting the accounting group and you need to look up a report, you can log on to a thin client device by using Terminal Services and work as if you were still in your office.

NetMeeting, Quality of Service, and USB Plug and Play Support

Microsoft® NetMeeting® lets multiple users on a network see each other over a video link and work together on documents in real time. To ensure that the video connection does not degrade, the Quality of Service (QoS) support integrated with Active Directory lets the administrator assign more bandwidth to the users and applications that need it. And, universal serial bus (USB) support lets users quickly install devices that plug in and work right away, such as video cameras. To set up a video conference, for example, all you have to do is plug in a camera and click on the appropriate names in your address book.

Sales Representative

By using the Change and Configuration Management technologies, your administrator can ensure that you always have the software you need, thereby granting you easy access to your specific tools and information. Additional capabilities are designed for users that spend most of their time away from their primary offices. There are several Windows 2000 features that will make your work time more efficient—whether you are on the road or conducting meetings from your office.

Synchronization Manager Synchronization Manager lets you work with information offline, as if you were working on the network. For example, you can take your customer files with you, work with them in the field, and resynchronize them with the network-based versions the next time you log on. Likewise, you can download Web pages from your company's intranet site and work on them offline. The next time you log on, you can update the intranet information on your laptop and the customer records stored on the network.

Roaming User Profiles Roaming user profiles allows you to use your customized desktop settings and access all of your documents from any location on the network. As you travel, you can log on to the corporate network from any location and still have access to all of your data. You no longer need to worry about transferring data onto floppy disks or through e-mail to have access to your critical information.

Examples of How Business Needs are Satisfied by Windows 2000

Organizations approach deployment from many different perspectives, depending on how they plan to implement a new operating system into their environment. Most organizations deploy an operating system incrementally (or, in phases) to prevent user downtime and to guarantee success at critical steps along the way.

The following sections provide some case studies and examples of how organizations have approached deployment from a product feature perspective. These examples provide information about how some enterprise-scale organizations resolve pressing business issues. Use the information provided in this section for ideas that will help you promote and more effectively use Windows 2000 in your organization.

Case Study 1: North American Industrial Manufacturer

Manufacturing is the primary business of this organization. Product assembly takes place at numerous locations in North America; however, their business offices are located all over the world, creating a highly distributed global computing environment. There are several primary product divisions with multiple product lines. The numerous internal teams distributed worldwide require diverse levels of access to customer and internal documents. The users in each division require a high level of client-based customization. Additionally, there are numerous vendors and subcontractors, some of whom need network access within the firewall, and others whose needs require only external access. Network administrators need to provide varying levels of security based on the needs of each unique internal and external team.

Existing IT Environment

Currently, this organization supports a mixed Windows NT Server 4.0 Service Pack (SP) 4 and UNIX network operating system environment and a mixed Microsoft® Windows® 95 (85 percent), Windows NT Workstation 4.0 (10 percent), and UNIX (5 percent) client environment. Information technology is centrally managed with control of applications and resources distributed to lower level IT managers. The organization has high bandwidth needs and requires strong client management. Microsoft® Exchange Server is currently a global mission-critical application for communications and scheduling.

Goals for Deploying Windows 2000

This corporation wants to standardize on one network operating system and one client system to reduce support costs. It will also be integrating the Exchange Server directory service with Active Directory to create a common directory and for increased team collaboration. In addition, they plan to expand into a multimedia network for collaboration and information sharing.

Table 1.2 summarizes the IT goals of this organization and includes the reasons why this organization chose Windows 2000 to meet their goals.

Table 1.2 IT Goals for a North American Industrial Manufacturer

Goals	What Windows 2000 Offers
Support and install one standard client operating system for rapid installation and configuration as well as inexpensive deployment.	Provides client management features, such as IntelliMirror and automated client install and upgrade technologies, such as Remote Install Services and Systems Management Server.
Install a network operating system that is secure, but flexible and robust enough to run on a wide variety of hardware.	Provides the security features of Kerberos authentication and Internet Protocol security (IPSec). Provides more hardware choices listed in the HCL. Provides Plug and Play functionality.
Reduce deployment and management costs by deploying only one server image. Support only one common server platform and consolidate smaller servers into larger ones.	Advanced Server functionality provides for the computing needs of the entire organization because it provides clustering, load balancing, and additional processor support capabilities.
Maintain high server uptime for Exchange Server because it is mission-critical to the organization.	Windows 2000 provides a stable operating system platform for Exchange Server.
Create a centralized administrative model that provides the ability for distributed control at lower level domains.	Active Directory provides the ability for higher level administrators to delegate control for specific elements within Active Directory to individuals or groups. This eliminates the need for multiple administrators to have authority over an entire domain. Active Directory allows the company to model its networking environment after its business model.
Provide interoperability with current UNIX servers and use a common security protocol.	Domain Name System (DNS) dynamic update protocol provides interoperability. Kerberos security works on both platforms.

(continued)

Table 1.2 IT Goals for a North American Industrial Manufacturer *(continued)*

Goals	What Windows 2000 Offers
Support other cross-platform security across their enterprise.	Distributed security, including IPSec, Kerberos authentication, and PKI.
Use a network operating system and domain structure that reflect business needs.	Windows 2000 is flexible enough for you to shape the domain and security boundaries to reflect the structure of your business rather than requiring you to organize your business around the limitations of the server operating system.
Create one large corporate computer directory.	Allows you to merge Active Directory data with Exchange Server data for a common directory.
Expand into a multimedia network for collaboration and information sharing.	NetMeeting allows groups in diverse parts of the globe to converse. QoS allows you to allocate bandwidth as appropriate during multimedia network events. Plug and Play makes it easy to connect cameras for multimedia events.

Case Study 2: Large Multinational Manufacturer

With headquarters in Europe, this multinational organization maintains offices in more than 190 countries. Growth takes place through expanded markets, increased product sales, and mergers and acquisitions. The company manufactures a wide range of products, including consumer and industrial electronics, computers, and instrumentation. Each separate manufacturing entity is run as an independent company under the umbrella of the parent corporation. There are over 130 separate operating companies, each with its own reporting structure and chief financial, information, and executive officers. This affects inter- and intra-organizational dynamics because each IT organization has different goals, budgets, objectives, and constraints. The parent company needs to provide support and guidelines for intercompany IT cooperation.

Existing IT Environment

There is no centralized IT operations group and few common IT standards across all operating companies, either for network or client operating systems, or for client productivity applications. The centralized IT office is responsible for cross-company directions and standards.

Goals for Deploying Windows 2000

In 1998, this company's IT office sponsored a project to design a global Windows 2000 Active Directory architecture—a unifying concept across each of the decentralized operating companies. Representative groups from several of the operating companies focused on Windows 2000 Server and Windows 2000 Professional architecture and deployment, and then integrated when necessary and appropriate. The parent company was tasked with developing a common framework that would be adopted as needed by each separate operating company.

Table 1.3 summarizes the IT goals of this organization, and includes the reasons why this organization chose Windows 2000 to meet their goals.

Table 1.3 IT Goals for a Large Multinational Manufacturer

Goals	What Windows 2000 Offers
Establish a common IT reference that all operating company IT groups can use to establish a global multioperator model.	The forest architecture of Active Directory provides a single logon point and Global Catalog capabilities.
Establish one common directory service that can be used by all operating companies.	Active Directory is flexible, extensible, and customizable to accommodate the IT and business needs of separate operating companies.
Establish one common model for migrating from the Windows NT environment to Windows 2000.	Availability of Remote Install technologies and other remote or automatic installation tools such as Systems Management Server.
Conduct a pilot rollout that can be used as an implementation standard for all IT groups in other operating companies.	The capability to clone a security principal from another Windows NT domain, and the security identifier (SID) history features that enable the safe move to a pilot environment with rollback options.
Establish one common client operating system that can be used for all operating companies.	A common security model for desktop and portable computers. Plug and Play capability. Common hardware support. Group Policy, IntelliMirror, and other client management tools administered through Active Directory.

Case Study 3: Multinational Financial Services Corporation

A multinational financial services organization comprised of seven separate operating companies has primary headquarters located in North America, Europe, Asia Minor, and Southeast Asia. Over 50 major regional offices provide a complete range of financial services (investment and personal banking, asset management and insurance). Each operating company is an autonomous business unit; however, at the local level, each company might share offices with one or more operating companies.

This company operates under the strict regulatory scrutiny of many countries and under their respective statutes regarding financial privacy, trading, and IT functionality and security. As a result, maintaining secure and stable systems at both the network operating system level and the desktop operating system level is required.

Existing IT Environment

There is no central IT group for all operating companies, so there are no comprehensive IT standards for the entire organization. Each operating company has created its own standards; therefore, each company has its own IT infrastructure. In some locations, operating companies share one common network. In other locations, the number of networks matches the number of operating companies sharing that office location. Local offices, especially the consumer and retail locations, maintain their own file and print servers, although regional offices usually have domain controllers. Regional offices are otherwise limited in their IT functions.

Some financial services applications require the UNIX operating system. Currently, all infrastructure services such as Dynamic Host Configuration Protocol (DHCP) and DNS are managed in a UNIX environment. Windows 2000 DNS dynamic update protocol will be used while the company researches the possibility of migrating the custom applications running on UNIX servers to Windows 2000.

Their current network operating system environment runs 95 percent on Windows NT Server 4.0 and five percent on Novell NetWare Bindery. The current client operating systems in use at each operating company include 80 percent Windows NT Workstation 4.0, approximately 15 percent Windows NT Workstation 3.51, and about 5 percent Windows 95. Some financial services professionals use both UNIX and Windows NT 4.0 clients.

Goals for Deploying Windows 2000

One of the operating companies is developing its own Active Directory structure with the goal of creating a common global directory design for the entire organization. A parent company IT initiative driven by a group of IT professionals that represent each of the operating companies is also working to develop a company-wide Active Directory structure.

The organization plans to retire NetWare Bindery when they install Windows 2000. The network will use both Windows 2000 and UNIX for the foreseeable future.

Table 1.4 summarizes the IT goals of this organization and includes the reasons why this organization chose Windows 2000 to meet their goals.

Table 1.4 IT Goals for a Multinational Financial Services Corporation

Goals	What Windows 2000 Offers
Common client operating system across the entire environment to enable standardization, improve manageability and administrative capability, and reduce TCO.	Increased hardware support allows for a wider selection of company-standard computers (desktop and portable). Improved power management enables network information to be as accessible on portable computers as it is on desktop computers. Group Policy and other management tools can be enabled across the entire IT environment.
Common network operating systems that offer scalability and availability for IT environments with different needs throughout all operating companies.	Offers clustering, load balancing, and the ability to handle large data stores and complex objects. Single point of administration requires only one set of administrators. Group Policy enables refined management for all clients.
Client security on all desktops and portable computers.	Can secure a portable computer as you can a desktop.
Need for multiple monitors at each desktop to simultaneously track trading and access customer information.	Allows one CPU to support more than one monitor.
Reduce TCO through reduced client management while increasing the level of service.	Improved Group Policy and integration with Systems Management Server.

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Table 1.4 IT Goals for a Multinational Financial Services Corporation *(continued)*

Goals	What Windows 2000 Offers
Reduce in-house software development and associated costs.	Component Services and other tools, such as Windows Installer, that are included with Windows 2000 Server enable easier tool building and reduce the time invested in developing custom applications.
Common directory for all operating companies.	Active Directory has sufficient flexibility to accommodate all operating companies.
Allow each separate company to have its own child domain or domains.	Active Directory design uses a top-level domain name as a placeholder domain, thereby allowing each separate company to have its own child domain or domains.
Share a common directory between Exchange Server and Windows 2000 Server.	Synchronize Microsoft® Exchange Server version 5.5 directory with Active Directory by using Active Directory Connector.
Remote administration of services.	Terminal Services is configured in the lightweight Administrative mode rather than Application Server mode. This gives administrators another option for remote administration without negatively impacting server performance.

Case Study 4: International Software Development Company

A leading developer of computer-based operating system and applications software for consumer and business use has its main headquarters in the Western United States. The sales, support, and software development offices are located in 180 worldwide locations. The Information Technology (IT) division has two primary areas of responsibility:

- Providing and maintaining IT systems and solutions that help employees work efficiently and effectively.
- Working with product development groups to test and deploy beta products in an enterprise environment.

Existing IT Environment

The company's current IT environment is a homogenous Windows NT Server 4.0 environment with a broad mix of Windows NT 4.0, Windows 95, and Microsoft® Windows® 98 clients, including multiple computers in user offices that often run beta software. IT provides centralized:

- Directory services.
- Mail and collaboration services.
- Management of Windows NT Server 4.0 security services, network accounts, Web services, and networking.

Users are geographically scattered throughout the globe. Eighty to 90 percent of employees troubleshoot their own client desktops. A large number of users access the network remotely, requiring stable remote access services. IT also supports off-site telecommuters and employees who require international access to the corporate network.

Goals for Deploying Windows 2000

The major goal of this company is to upgrade all of the servers and users to Windows 2000 within 12 months. During migration, the IT group must maintain services of critical applications and at the same time collapse resource domains into geographically-based master user domains. Eliminating many of the resource domains should reduce the number of servers on the network and streamline administration, as well as reduce hardware and software support costs.

The IT department must also keep user attribute information synchronized between Active Directory directory service, Exchange Server 5.5 directory service, and additional systems in use across the company. Everything that is brought online that uses Active Directory must work together. Finally, they want to create a common console tree and create a common directory.

Table 1.5 summarizes the IT goals of this organization and includes the reasons why this organization chose Windows 2000 to meet their goals.

Table 1.5 IT Goals for International Software Development Company

Goals	What Windows 2000 Offers
Consolidate global servers to improve manageability and decrease support costs.	Server consolidation is enabled by the high-performance memory management and multiprocessing capability of Advanced Server. These features improve the scalability of the platform making it an appropriate base for server consolidation efforts.
Purchase new state-of-the-art hardware to create a new high-speed corporate network.	New technologies in Windows 2000 Server are designed to integrate with advances in computer architecture and microchip design, including Advanced Power Management, USB devices, FireWire, smart card readers, and infrared support.
Standardize to one client for better administrative control and authority delegation, and more options for remote installation and management.	Achieve improved desktop management through Group Policy and organizational units enabled by Active Directory, IntelliMirror, and other Change and Configuration Management technologies.
Obtain 50% improvement in performance and reliability over Windows NT 4.0 Server on all Advanced servers.	Baseline improvements at the kernel level of the core operating system enable improvement in memory management, caching, and preemptive multitasking.
Move from a moderately complex Windows NT Server 4.0 environment to a highly simplified Windows 2000 environment.	Active Directory provides increased object storage, more granular management of servers and clients, and improvements in simplified domain design through use of Domain Name System and DNS dynamic update protocol.
Change Windows NT Server 4.0 domain structure to Active Directory model with domains and forests.	Active Directory provides a more flexible domain structure to accommodate current and future organizational needs.
Improve security, information sharing, and transaction capability within the company as well as with other businesses and customers.	Enable a virtual private network using the advanced networking and security features of Windows 2000 Advanced Server.
Improve e-mail security.	Use PKI and certificates.
Maintain a fully functioning corporate network throughout the transition period.	Simultaneous administration and auditing of servers running Windows NT Server 4.0 and Windows 2000 Advanced Server, including all corporate printers, file servers, remote access servers, proxy servers, and internal Web servers. Interoperability with Windows 95, Windows 98, and Windows NT 4.0 clients.

Mapping Windows 2000 Features to Your Business Needs

The prior sections have examined the features and benefits of the Windows 2000 platform from a high-level perspective of business needs, sample corporations and users, and product features. In this section, you will review specific technology features with the goal of determining which technologies are most important for your organization. Review these features while keeping in mind your organization's short-term, mid-term, and long-term plans. The chapters in this book that focus on design go into detail about how each technology is integrated with other Windows 2000 technologies and what the design dependencies are.

The following sections contain tables that list many of the Windows 2000 features that you will want to deploy and configure in your organization. Assess the benefits of the listed features and determine their relative priority for your organization. Then, you can develop a deployment plan that is both timely and cost effective.

All of the tables in this section are included in "Sample Planning Worksheets" in this book. The tables in the appendix are formatted so that you can enter your own comments about the potential role of these features within your organization. Use these worksheets to prepare a customized executive summary of the Windows 2000 features your organization requires.

Note The following tables highlight the main benefits of Windows 2000 Server and Windows 2000 Professional, and are not intended to be a complete description of all features. For more information about a particular feature, see the product Help files or the appropriate book and chapter in the *Microsoft® Windows® 2000 Server Resource Kit.*

Management Infrastructure Services

The management infrastructure services in Windows 2000 Server provide IT departments with tools that enable you to provide the highest levels of service available and reduce ownership costs. Table 1.6 describes the Windows 2000 Server management infrastructure services and their benefits.

Table 1.6 Management Infrastructure Services

Feature	Description	Benefits
Directory services	Active Directory stores information about all objects on the network, making this information easy to find. Provides a flexible directory hierarchy, granular security delegation, efficient permissions delegation, integrated DNS, high-level programming interfaces, and an extensible object store.	Provides a single set of interfaces for performing administrative tasks, such as adding users, managing printers, and locating resources by only logging on once. Makes it easy for developers to enable their applications on a particular directory.
Administration services	Microsoft Management Console (MMC) provides administrators with a common console for monitoring network functions and using administrative tools. MMC is completely customizable.	MMC standardizes your management tool set, reducing training time and increasing productivity for new administrators. It also simplifies remote administration and allows for delegation of tasks.
Group Policy	Group Policy allows an administrator to define and control the state of computers and users. Group Policy can be set at any level of the directory service, including sites, domains, and organizational units. Group Policy can also be filtered based on Security Group memberships.	Group Policy gives administrators control over which users have access to specific computers, features, data, and applications.
Instrumentation services	With Windows Management Instrumentation (WMI), administrators can correlate data and events from multiple sources on a local or organization-wide basis.	WMI allows you to create custom applications and snap-ins by giving you access to Windows 2000 objects.
Scripting services	Windows Script Host (WSH) supports direct execution of Microsoft® Visual Basic Script, Java, and other scripts from the user interface or command line.	WSH allows administrators and users to automate actions, including network connection and disconnection.

For more information about designing and deploying Windows 2000 directory services and Group Policy, see “Designing the Active Directory Structure,” “Planning Distributed Security,” “Defining Client Administration and Configuration Standards,” and “Applying Change and Configuration Management” in this book.

Desktop Management Solutions

Desktop management solutions are features that allow you to reduce the TCO in your organization by making it easier for you to install, configure, and manage clients. These features are also designed as tools that make computers easier to use. Table 1.7 highlights Windows 2000 Server and Windows 2000 Professional desktop management features that increase user productivity.

Table 1.7 Desktop Management Solutions

Feature	Description	Benefits
IntelliMirror	IntelliMirror is a group of features that can be used to make users' data, applications, and customized operating system settings follow them as they move to different computers within their organization.	Users have access to all of their information and applications, whether or not they are connected to the network. Reduces the need for administrators to revisit desktops for application or operating system updates.
Windows Installer	Controls the installation, modification, repair, and removal of software. Provides a model for packaging install information and APIs for applications to function with Windows Installer.	Enables remote deployment and maintenance of applications by system administrators. Reduces the number of dynamic-link library (DLL) conflicts. Enables self-repairing applications.
Remote Install	DHCP-based remote start technology installs the operating system on a client's local hard disk from a remote source. A network start can be initiated by either a pre-boot execution (PXE) environment, a PXE-enabled network card, specific function key, or remote boot floppy provided for clients without PXE.	An administrator does not have to visit a computer to install the operating system. Remote OS Installation also provides a solution for propagating and maintaining a common desktop image throughout your enterprise.
Roaming User Profiles	Roaming User Profiles copies registry values and document information to a location on the network so that a user's settings are available wherever the user logs on.	Users have the ability to travel and still have their documents and system information readily available.
Option Component Manager	Windows 2000 Server Setup allows you to bundle and install add-on components during or after any system setup through an installation module.	Reduces the amount of time required for deployment setup and reduces the number of trips to individual computers.
Disk Duplication	You can customize a single Windows 2000 Server or Windows 2000 Professional setup and clone it across similar computers.	Cloning can save you time and money when deploying a large number of servers or clients.

Note You can use Systems Management Server to complement the desktop management technologies in Windows 2000.

For more information about deploying Windows 2000 Server and Windows 2000 Professional management solutions, see “Defining Client Administration and Configuration Standards” and “Applying Change and Configuration Management” in this book.

Security Features

Enterprise-level security needs to be flexible and robust so that administrators can configure rules to address possible security liability without hindering the free flow of needed information. Table 1.8 highlights Windows 2000 security features.

Table 1.8 Security Features

Feature	Description	Benefits
Security Templates	Allows administrators to set various global and local security settings, including security-sensitive registry values; access controls on files and the registry; and security on system services.	Allows administrators to define security configuration templates, then apply these templates to selected computers in one operation.
Kerberos authentication	The primary security protocol for access within or across Windows 2000 domains. Provides mutual authentication of clients and servers, and supports delegation and authorization through proxy mechanisms.	Speeds performance by reducing server loads while connections are being established. You can also use it to access other enterprise computing platforms that support the Kerberos protocol.
Public key infrastructure (PKI)	You can use integrated PKI for strong security in multiple Windows 2000 Internet and enterprise services, including extranet-based communications.	Using PKI, businesses can share information securely without having to create many individual Windows 2000 accounts. Also enables smart cards and secure e-mail.
Smart card infrastructure	Windows 2000 includes a standard model for connecting smart card readers and cards with computers and device-independent APIs to enable applications that are smart card-aware.	Windows 2000 Smart Card technologies can be used to enable security solutions throughout your intranet, extranet, and public Web site.
Internet Protocol security (IPSec) management	IPSec supports network-level authentication, data integrity, and encryption to secure intranet, extranet, and Internet Web communications.	Transparently secures enterprise communications without user interaction. Existing applications can use IPSec for secure communications.
NTFS file system encryption	Public key–based NTFS can be enabled on a per file or per directory basis.	Allows administrators and users to encrypt data using a randomly generated key.

For more information about deploying Windows 2000 security services, see "Planning Distributed Security" and "Determining Windows 2000 Network Security Strategies" in this book.

Information Publishing and Sharing

Windows 2000 information publishing and sharing technologies make it easier to share information over your organization's intranet, extranet, or the Web. Table 1.9 highlights features for information publishing and sharing.

Table 1.9 Information Publishing and Sharing

Feature	Description	Benefits
Integrated Web services	Windows 2000 Server integrated Web services allow you to use a variety of Web publishing protocols.	Flexible opportunities for publishing information on your extranet, intranet, or the Web.
Indexing Services	Integrated index services allow users to perform full text searches on files in different formats and languages.	Improves productivity.
Removable Storage	Consists of server and tool components for delivering audio, video, illustrated audio, and other types of multimedia over networks.	New opportunities in training, collaboration, and information sharing improve productivity.
Printing	Windows 2000 makes all shared printers in your domain available in Active Directory.	Allows users to quickly locate the most convenient printing source.

For more information about deploying Windows 2000 information publishing and sharing services, see "Upgrading and Installing Member Servers" in this book, and the *Microsoft® Windows® 2000 Server Resource Kit Internet Information Services Resource Guide.*

Component Application Services

As a development platform, Windows 2000 offers Component Object Model (COM) and Distributed COM (DCOM) support that extends a development team's capabilities to efficiently create more scalable component-based applications. Table 1.10 highlights Component Application Services features.

Table 1.10 Component Application Services

Feature	Description	Benefits
Queued Components	Developers and administrators can choose the appropriate communications protocol (DCOM or asynchronous) to use at the time of deployment.	Easier for developers to take advantage of the store and forward services offered by the integrated message queuing services in Windows 2000 Server without having to write any code.
Publish and Subscribe	COM Events provide a uniform publish and subscribe mechanism for all Windows 2000 Server applications.	Developers do not have to reinvent and program fundamental services.
Transaction Services	Provides information updates by calling an application on a mainframe, or sending and receiving a message to or from a message queue.	Provides a way for developers to guarantee correctness of their applications when updating multiple data sources
Message Queuing Services	Ensures that a message transaction is either completed or safely rolled back to the enterprise environment.	Provides developers with the facilities to build and deploy applications that run reliably over unreliable networks and operate with other applications running on different platforms.
Web Application Services	Developers can use Active Server Pages to build a Web-based front-end to their existing server-based applications.	Web Application Services allows remote servers to be administrated through a Web browser with minimum connectivity cost.

For more information about deploying Windows 2000 Component Application Services and the Microsoft® Security Support Provider Interface, see "Determining Windows 2000 Network Security Strategies" in this book. For more information for developers, see the MSDN Platform SDK link on the Web Resources page at http://windows.microsoft.com/windows2000/reskit/webresources.

Note You might want to discuss these features and their potential business value with members of your application development team. Their knowledge can assist you in determining the potential business value of these technologies to your organization.

Scalability and Availability

Faster CPUs and network adapters are the traditional benchmarks of network performance. In the future, more efficient read/write capabilities, improved input/output (I/O) performance, and faster disk access will be equally important characteristics of network architectures. Environments that require mission-critical computers can now use the extended capabilities of Windows 2000. Table 1.11 highlights Windows 2000 features that will assist you in improving network scalability and availability.

Table 1.11 Scalability and Availability

Feature	Description	Benefits
Enterprise Memory Architecture	Windows 2000 Advanced Server allows you to access up to 32 GB of memory on processors.	Allows applications that perform transaction processing or decision support on large data sets to keep more data in memory for improved performance.
Improved symmetric multiprocessing (SMP) scalability	Windows 2000 Advanced Server has been optimized for eight-way SMP servers.	Allows organizations to take full advantage of faster processors.
Cluster service	Allows two or more servers to work together as a single system.	Allows greater availability, reliability, stability, and security with simplified management.
Intelligent Input/Output (I2O) support	I2O relieves the host of interrupt-intensive I/O tasks by offloading processing from main CPUs.	Improves I/O performance in high-bandwidth applications.
Terminal Services	Through terminal emulation, Terminal Services allows the same set of applications to run on diverse types of client hardware, including thin clients, older computers, or clients not running Windows. Can also be used as a remote administration option.	Allows for centralized management of applications and desktops for task-based workers. Provides technology for bridging existing desktops to a full Microsoft® Win32® environment. Gives remote users local network performance over dial-up remote access connections. Also provides for graphical remote administration of any Windows 2000 Server.

(continued)

Table 1.11 Scalability and Availability *(continued)*

Feature	Description	Benefits
Network Load Balancing	Combines up to 32 servers running Windows 2000 Advanced Server into a single load balancing cluster. It is used most often to distribute incoming Web requests among its cluster of Internet server applications.	Enhances the availability and scalability of Web servers, File Transfer Protocol (FTP) servers, streaming media servers, and other mission-critical programs by combining the functionality of two or more host computers (servers that are members of the cluster).
IntelliMirror	IntelliMirror allows users to have their data, applications, and settings follow them when they are not connected to the network.	Data is always available and the user's view of the computing environment is consistent, whether or not the client is connected to the network.

For more information about deploying Windows 2000 Cluster service, see "Ensuring the Availability of Applications and Services" in this book.

For more information about Terminal Services, see "Deploying Terminal Services" in this book.

Networking and Communications

To enhance your networking environment, consider the Windows 2000 technologies listed in Table 1.12, which can give you greater bandwidth control, secure remote network access, and native support for a new generation of communications solutions.

Table 1.12 Networking and Communications

Feature	Description	Benefits
DNS dynamic update protocol	Eliminates the need to manually edit and replicate the DNS database.	Reduces administration and equipment costs by reducing the number of DNS servers needed to support a network.
Quality of Service (QoS)	QoS protocols and services provide a guaranteed, end-to-end express delivery system for IP traffic.	Allows you to prioritize network traffic to ensure that critical processes are completed and data is delivered promptly and accurately.

(continued)

Table 1.12 Networking and Communications *(continued)*

Feature	Description	Benefits
Resource Reservation Protocol (RSVP)	A signaling protocol that allows the sender and receiver to set up a reserved path for data transmission with a specified quality of service.	Improves connection reliability and data transfer.
Asynchronous Transfer Mode (ATM)	An ATM network can simultaneously transport a wide variety of network traffic, including voice, data, images, and video.	Unifying multiple types of traffic on a single network can dramatically reduce costs.
Streaming Media services	Server and tool components for delivering multimedia files over the network.	Streaming Media can dramatically reduce the cost of travel, team collaboration, and training by offering online meeting and information sharing.
Fibre Channel	Fibre Channel provides one gigabit per second data transfer by mapping common transport protocols and merging networking and high-speed input and output in a single connection.	Improved flexibility, scalability, manageability, capacity, and availability over small computer system interface (SCSI) technologies for demanding applications.
IP Telephony	The Telephony API 3.0 (TAPI) unifies IP and traditional telephony.	Developers can use TAPI to create applications that work as well over the Internet or intranet as they do over a traditional telephone network.

For more information about Windows 2000 networking and communications features, see “Preparing Your Network Infrastructure for Windows 2000” and “Determining Network Connectivity Strategies” in this book.

Storage Management

Windows 2000 Server provides storage services designed to improve both reliability and user access. Table 1.13 highlights these services.

Table 1.13 Storage Management

Feature	Description	Benefits
Remote Storage	Monitors the amount of space available on a local hard disk. When free space on the primary hard disk drops below the level necessary for reliable operation, Remote Storage removes local data that has been copied to remote storage.	Allows administrators to manage the amount of free disk space by migrating files to a tape library where the files remain active from the user's perspective.
Removable Storage	Allows administrators to manage removable storage devices and functions. Administrators can create media pools that are owned and used by a particular application.	Allows administrators to optimize network performance by controlling where data is stored. Also makes it possible for multiple applications to share the same storage media resources.
NTFS file system enhancements	Supports performance enhancements such as file encryption, the ability to add disk space to an NTFS volume without restarting, distributed link tracking, and per-user volume quotas to monitor and limit disk space use.	File encryption reduces the risk that confidential data is exposed to unauthorized users. Being able to extend partitions quickly reduces server and network down time and the risk of data loss.
Disk Quotas	Helps administrators plan for and implement disk utilization.	Reduces the need for hardware administration and decreases maintenance costs.
Backup	With Backup, users can back up data to a variety of storage media, including hard drives, and magnetic and optical media.	Helps protect data from accidental loss due to hardware or storage media failure.
Distributed File System (Dfs) Support	Allows administrators to create a single directory tree that includes multiple file servers and file shares, and allows interoperability between Windows 2000 clients and any file server that has a matching protocol.	Dfs makes it easier for administrators and users to find and manage data on the network. Dfs also provides a fault-tolerant share for important network files.

For information about deploying Windows 2000 Server storage management technologies, see "Determining Windows 2000 Storage Management Strategies" in this book.

Planning Task List for Mapping Windows 2000 Features

Use the planning task list contained in Table 1.14 as you begin your Windows 2000 deployment planning process.

Table 1.14 Planning Task List for Mapping Windows 2000 Features

Task	Location in Chapter
Understand how the structure of this book will assist you in your deployment planning process.	Starting Your Plan
Learn about the Windows 2000 product family.	Overview of Windows 2000 Product Family
Analyze how specific features can be used to enhance worker productivity.	Using Windows 2000 to Improve the Way You Work
Review Windows 2000 features in context of your business goals.	Mapping Windows 2000 Features to Your Business Needs