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Foreword

This book's primary goal is to help you prepare to take and pass Microsoft's exam number 70-649, *Upgrading Your MCSE on Windows Server 2003 to Windows Server 2008*. Our secondary purpose in writing this book is to provide exam candidates with knowledge and skills that go beyond the minimum requirements for passing the exam and help to prepare them to work in the real world of Microsoft computer networking.

What Is MCTS Exam 70-649?

Microsoft Certified Technology Specialist (MCTS) Exam 70-649 is a requirement for those upgrading their Windows Server 2003 MCSE certification to the Microsoft Certified Information Technology Professional (MCITP) for Windows Server 2008. Microsoft's stated target audience consists of IT professionals with MCSE certification on Windows Server 2003 and experience on a medium-sized or large company network. This means a multisite network with at least three domain controllers, running typical network services such as file and print services, messaging, database, firewall services, proxy services, remote access services, an intranet, and Internet connectivity.

Exam 70-649 is composed of topics from three other MCTS exams: Exam 70-640 (Configuring Active Directory), Exam 70-642 (Configuring Network Infrastructure), and Exam 70-634 (Configuring Application Platform), and covers the basics of administering a Microsoft Windows Server 2008 network. The book includes the following task-oriented objectives:

- **Configuring Network Access** This includes configuring remote access, configuring Network Access Protection components, configuring network authentication, configuring data transmission protocols, configuring wireless access, configuring certificate services, configuring DHCP, configuring IPv4 and IPv6 addressing, and configuring routing.
- **Configuring Terminal Services** This includes configuring TS remote programs, TS gateway, and TS load balancing; configuring resource allocation for TS, and configuring TS licensing, client connections, and server options.
- **Configuring a Web Services Infrastructure** This includes configuring FTP Server, backups, web applications, application pools, and IIS components; publishing IIS web sites; migrating sites and web applications; configuring SMTP service; and configuring UDDI service.
- **Configuring Security for Web Services** This includes configuring handlers, .NET trust levels, authentication, rights, permissions, authorization, and certificates.
- **Deploying and Monitoring Servers** This includes configuring WDS, capturing and deploying WDS images, configuring Windows activation, creating virtual machines, configuring Virtual Server settings, installing Windows Server Enterprise, and installing server core.
- **Configuring Server Roles** This includes implementing server roles using Server Manager; and configuring ADLDS, ADRMS, server core, RODC, Certificate Services, and Federation Services.
- **Maintaining the Active Directory Environment** This includes configuring backup and recovery, performing offline maintenance, and configuring custom application directory partitions.
- **Configuring the Active Directory Infrastructure** This includes configuring communication security for Active Directory and configuring the global catalog.

Path to MCTS/MCITP/MS Certified Architect

Microsoft certification is recognized throughout the IT industry as a way to demonstrate mastery of basic concepts and skills required to perform the tasks involved in implementing and maintaining Windows-based networks. The certification program is constantly evaluated and improved, and the nature of information technology is changing rapidly. Consequently, requirements and specifications for certification can also change rapidly. This book is based on the exam objectives as stated by Microsoft at the time of writing; however, Microsoft reserves the right to make changes to the objectives and to the exam itself at any time. Exam candidates should regularly visit the Certification and Training Web site at www.microsoft.com/learning/mcp/default.mspx for the most updated information on each Microsoft exam.

Microsoft currently offers three basic levels of certification on the technology level, professional level, and architect level:

- **Technology Series** This level of certification is the most basic, and it includes the **Microsoft Certified Technology Specialist (MCTS)** certification. The MCTS certification is focused on one particular Microsoft technology. There are 19 MCTS exams at the time of this writing. Each MCTS certification consists of one to three exams, does not include job-role skills, and will be retired when the technology is retired. Microsoft Certified Technology Specialists will be proficient in implementing, building, troubleshooting, and debugging a specific Microsoft technology.
- **Professional Series** This is the second level of Microsoft certification, and it includes the **Microsoft Certified Information Technology Professional (MCITP)** and **Microsoft Certified Professional Developer (MCPD)** certifications. These certifications consist of one to three exams, have prerequisites from the Technology Series, focus on a specific job role, and require an exam refresh to remain current. The MCITP certification offers nine separate tracks as of the time of this writing. There are two Windows Server 2008 tracks, Server Administrator

and Enterprise Administrator. To achieve the Server Administrator MCITP for Windows Server 2008, you must successfully complete one Technology Series exam and one Professional Series exam. To achieve the Enterprise Administrator MCITP for Windows Server 2008, you must successfully complete four Technology Series exams and one Professional Series exam.

- **Architect Series** This is the highest level of Microsoft certification, and it requires the candidate to have at least 10 years' industry experience. Candidates must pass a rigorous review by a review board of existing architects, and they must work with an architect mentor for a period of time before taking the exam.

Upgrading Your MCSE Certification

Those who already hold the MCSE Windows 2003 can upgrade their certifications to MCITP Server Administrator by passing:

- Exam 70-649
- Exam 70-646 *Windows Server 2008 Server Administrator*, a Professional Series exam

Those who already hold the MCSE in Windows 2003 can upgrade their certifications to MCITP Enterprise Administrator by passing:

- Exam 70-649
- Exam 70-620 *Configuring Windows Vista Client*, a Technology Series exam
- Exam 70-647 *Windows Server 2008 Enterprise Administrator*, a Professional Series exam

NOTE

Upon passing Exam 70-649, you have completed the requirements for Technology Specialist certification in Windows Server 2008 Active Directory Configuration (Exam 70-640), Windows Server 2008 Network Infrastructure Configuration (Exam 70-642), and Windows Server 2008 Applications Configuration.

Prerequisites and Preparation

Certification as an MCSE on Windows Server 2003 is a mandatory prerequisite for taking Exam 70-649.

Preparation for this exam should include the following:

- Visit the Web site at www.microsoft.com/learning/exams/70-649.mspx to review the updated exam objectives.
- Work your way through this book, studying the material thoroughly and marking any items you don't understand.
- Answer all practice exam questions at the end of each chapter.
- Complete all hands-on exercises in each chapter.
- Review any topics that you don't thoroughly understand
- Consult Microsoft online resources such as TechNet (www.microsoft.com/technet/), white papers on the Microsoft Web site, and so forth, for better understanding of difficult topics.
- Participate in Microsoft's product-specific and training and certification newsgroups if you have specific questions that you still need answered.
- Take one or more practice exams, such as the one included on the Syngress/Elsevier certification Web site at www.syngress.com/certification.

Exam Day Experience

Taking the exam is a relatively straightforward process. Prometric testing centers administer the Microsoft 70-649 exam. You can register for, reschedule, or cancel an exam through the Prometric Web site at www.register.prometric.com. You'll find listings of testing center locations on these sites. Accommodations are made for those with disabilities; contact the individual testing center for more information.

Exam price varies depending on the country in which you take the exam.

Exam Format

Exams are timed. At the end of the exam, you will find out your score and whether you passed or failed. You will not be allowed to take any notes or other written materials with you into the exam room. You will be provided with a pencil and paper, however, for making notes during the exam or doing calculations.

In addition to the traditional multiple-choice questions and the select and drag, simulation, and case study questions, you might see some or all of the following types of questions:

- *Hot area* questions, in which you are asked to select an element or elements in a graphic to indicate the correct answer. You click an element to select or deselect it.
- *Active screen* questions, in which you change elements in a dialog box (for example, by dragging the appropriate text element into a text box or selecting an option button or checkbox in a dialog box).
- *Drag and drop* questions, in which you arrange various elements in a target area.

Test-Taking Tips

Different people work best using different methods. However, there are some common methods of preparation and approach to the exam that are helpful to many test-takers. In this section, we provide some tips that other exam candidates have found useful in preparing for and actually taking the exam.

- Exam preparation begins before exam day. Ensure that you know the concepts and terms well and feel confident about each of the exam objectives. Many test-takers find it helpful to make flash cards or review notes to study on the way to the testing center. A sheet listing acronyms and abbreviations can be helpful, as the number of acronyms (and the similarity of different acronyms) when studying IT topics can be overwhelming. The process of writing the material down, rather than just reading it, will help to reinforce your knowledge.
- Many test-takers find it especially helpful to take practice exams that are available on the Internet and with books such as this one. Taking the practice exams can help you become used to the computerized exam-taking experience, and the practice exams can also be used as a learning tool. The best practice tests include detailed explanations of why the correct answer is correct and why the incorrect answers are wrong.
- When preparing and studying, you should try to identify the main points of each objective section. Set aside enough time to focus on the material and lodge it into your memory. On the day of the exam,

you be at the point where you don't have to learn any new facts or concepts, but need simply to review the information already learned.

- The value of hands-on experience cannot be stressed enough. Exam questions are based on test-writers' experiences in the field. Working with the products on a regular basis—whether in your job environment or in a test network that you've set up at home—will make you much more comfortable with these questions.
- Know your own learning style and use study methods that take advantage of it. If you're primarily a visual learner, reading, making diagrams, watching video files on CD, etc., may be your best study methods. If you're primarily auditory, classroom lectures, audiotapes you can play in the car as you drive, and repeating key concepts to yourself aloud may be more effective. If you're a kinesthetic learner, you'll need to actually *do* the exercises, implement the security measures on your own systems, and otherwise perform hands-on tasks to best absorb the information. Most of us can learn from all of these methods, but have a primary style that works best for us.
- Although it may seem obvious, many exam-takers ignore the physical aspects of exam preparation. You are likely to score better if you've had sufficient sleep the night before the exam and if you are not hungry, thirsty, hot/cold or otherwise distracted by physical discomfort. Eat prior to going to the testing center (but don't indulge in a huge meal that will leave you uncomfortable), stay away from alcohol for 24 hours prior to the test, and dress appropriately for the temperature in the testing center (if you don't know how hot/cold the testing environment tends to be, you may want to wear light clothes with a sweater or jacket that can be taken off).
- Before you go to the testing center to take the exam, be sure to allow time to arrive on time, take care of any physical needs, and step back to take a deep breath and relax. Try to arrive slightly early, but not so far in advance that you spend a lot of time worrying and getting nervous about the testing process. You may want to do a quick last-minute review of notes, but don't try to "cram" everything the morning of the exam. Many test-takers find it helpful to take a short walk or do a few calisthenics shortly before the exam to get oxygen flowing to the brain.

- Before beginning to answer questions, use the pencil and paper provided to you to write down terms, concepts and other items that you think you may have difficulty remembering as the exam goes on. Then you can refer back to these notes as you progress through the test. You won't have to worry about forgetting the concepts and terms you have trouble with later in the exam.
- Sometimes the information in a question will remind you of another concept or term that you might need in a later question. Use your pen and paper to make note of this in case it comes up later on the exam.
- It is often easier to discern the answer to scenario questions if you can visualize the situation. Use your pen and paper to draw a diagram of the network that is described to help you see the relationships between devices, IP addressing schemes, and so forth.
- When appropriate, review the answers you weren't sure of. However, you should change your answer only if you're sure that your original answer was incorrect. Experience has shown that more often than not, when test-takers start second-guessing their answers, they end up changing correct answers to the incorrect. Don't "read into" the question (that is, don't fill in or assume information that isn't there); this is a frequent cause of incorrect responses.
- As you go through this book, pay special attention to the Exam Warnings, as these highlight concepts that are likely to be tested. You may find it useful to go through and copy these into a notebook (remembering that writing something down reinforces your ability to remember it) and/or go through and review the Exam Warnings in each chapter just prior to taking the exam.
- Use as many little mnemonic tricks as possible to help you remember facts and concepts. For example, to remember which of the two IPsec protocols (AH and ESP) encrypts data for confidentiality, you can associate the "E" in encryption with the "E" in ESP.

Pedagogical Elements

In this book, you'll find a number of different types of sidebars and other elements designed to supplement the main text. These include the following:

- **Exam Warning** These sidebars focus on specific elements on which the reader needs to focus in order to pass the exam (for example, "Be sure you know the difference between symmetric and asymmetric encryption").
- **Test Day Tip** These sidebars are short tips that will help you in organizing and remembering information for the exam (for example, "When preparing for the exam on test day, it may be helpful to have a sheet with definitions of these abbreviations and acronyms handy for a quick last-minute review").
- **Configuring & Implementing** These sidebars contain background information that goes beyond what you need to know from the exam, but provide a "deep" foundation for understanding the concepts discussed in the text.
- **New & Noteworthy** These sidebars point out changes in Windows Server 2008 from Windows Server 2003, as they will apply to readers taking the exam. These may be elements that users of Windows Server 2003 would be very familiar with that have changed significantly in Windows Server 2008 or totally new features that they would not be familiar with at all.
- **Head of the Class** These sidebars are discussions of concepts and facts as they might be presented in the classroom, regarding issues and questions that most commonly are raised by students during study of a particular topic.

Each chapter of the book also includes hands-on exercises in planning and configuring the features discussed. It is essential that you read through and, if possible, perform the steps of these exercises to familiarize yourself with the processes they cover.

You will find a number of helpful elements at the end of each chapter. For example, each chapter contains a *Summary of Exam Objectives* that ties the topics discussed in that chapter to the published objectives. Each chapter also contains an *Exam Objectives Fast Track,* which boils all exam objectives down to manageable summaries that are perfect for last-minute review. *The Exam Objectives Frequently Asked Questions* section answers those questions that most often arise from readers and students regarding the topics covered in the chapter. Finally, in the *Self Test* section, you will find a set of practice questions written in a multiple-choice format that will assist you in your exam preparation These questions are designed to assess your mastery of the exam objectives and provide thorough remediation, as opposed to simulating the variety of question formats you may encounter in the actual exam. You can use the *Self Test Quick Answer Key* that follows the *Self Test* questions to quickly determine what information you need to review again. The *Self Test Appendix* at the end of the book provides detailed explanations of both the correct and incorrect answers.

Additional Resources

There are two other important exam preparation tools included with this study guide. One is the CD included in the back of this book. The other is the concept review test available from our Web site.

- **A CD that provides book content in multiple electronic formats for exam-day review** Review major concepts, test day tips, and exam warnings in PDF, PPT, MP3, and HTML formats. Here, you'll cut through all of the noise to prepare you for exactly what to expect when you take the exam for the first time. You will want to use this CD just before you head out to the testing center!
- **Web-based practice exams** Just visit us at **www.syngress.com/certification** to access a complete Windows Server 2008 concept multiple-choice review. These remediation tools are written to test you on all of the published certification objectives. The exam runs in both "live" and "practice" mode. Use "live" mode first to get an accurate gauge of your knowledge and skills, and then use practice mode to launch an extensive review of the questions that gave you trouble.

Chapter 1

MCTS/MCITP Exam 649

Deploying Servers

Exam objectives in this chapter:

- Installing Windows Server 2008
- The Windows Deployment Service
- Configuring Storage
- Configuring High Availability
- Configuring Windows Activation

Exam objectives review:

- ☑ Summary of Exam Objectives
- ☑ Exam Objectives Fast Track
- ☑ Exam Objectives Frequently Asked Questions
- ☑ Self Test

Introduction

After you learn that Microsoft has released a new server operating system, it is only natural to want to learn everything there is to know about this new product and its new technologies. The extensive lengths that were taken to integrate more security into a product already established in the market are evident. Gathering information about an operating system is relatively easy, and learning how to integrate such a technology into an existing or new organization has proven rather easy to achieve as well.

Computer and network security is of paramount importance for companies in the global marketplace, and a large percentage of these companies have Microsoft infrastructures in place, including domain controllers (DCs), Exchange servers, and Vista and XP workstations. A Windows server provides a number of useful functions in a company's network infrastructure.

This chapter covers how an individual or group can achieve the aptitude needed to implement and maintain the desired deployment required by the organization. With the new certification track Microsoft has implemented, individuals can prove their skills in much more detail in the marketplace.

Installing Windows Server 2008

For any computer to function, it needs an operating system, also known as the network operating system (NOS), which is used to describe a server operating system. To decide which software you will need as your NOS, you will need to examine and consider scalability, security, and stability. Windows Server 2008 meets all of these requirements on different levels.

Installing the server operating system on a new server might seem like a daunting task to any system administrator, especially if it's a newly released OS with many new features. Having the skill to install a server OS is sometimes not enough. The planning and preparation stage is vital to a successful rollout. Any experienced system administrator will know that spending enough time in the planning phase of a new OS rollout and making the installation procedure simplified and well laid out will not only standardize organization server OS configurations, but also make the task of rolling out a new server infrastructure much easier, even when it involves upgrading an existing infrastructure.

The overall IT life cycle (from the beginning to the end) of an OS or infrastructure solution may be large or small. Using Microsoft Solutions Framework (MSF) and Microsoft Operations Framework (MOF), here are the four steps required to create and operate the new solution (or change to an existing one) in a production environment:

- **Plan** Understand the business requirements to create the right solution. This includes the features and settings due to be implemented.
- **Build** Complete the features and components set out in the planning phase using the appropriate development tools and processes.
- **Deploy** Deploy into the production environment using strong release management processes.
- **Operate** Maintain operational excellence.

Understanding the need for documenting, assessing the impact of, and reviewing changes in an IT environment is at the heart of standardizing and communicating such a solution.

Changes in Functionality from Windows Server 2003 with SP1 to Windows Server 2008

Microsoft introduced many new features and technologies in the Windows Server 2008 operating system, as well as improved some existing features. These additions and changes will help to increase security and productivity and reduce administrative overhead. The following paragraphs describe some of these features and technologies.

Active Directory Certificate Services (AD CS) provides customizable services for creating and managing public key certificates when employing public key technologies. Security is enhanced by binding the identity of a person, device, or service to a corresponding private key. The following are improvements made in AD CS functionality:

- Online Certificate Status Protocol support (online responders and responder arrays)
- Network Device Enrollment Service (NDES is now part of the OS)
- Web enrollment (new enrollment control)
- Policy settings (new policy stores added)
- Restricted Enrollment Agent (limiting permissions for users enrolling smart card certificates on behalf of other users)
- Enterprise PKI (PKIView) (monitors the health of certificate authorities [CAs] in the public key infrastructure [PKI] and supports Unicode character encoding

Active Directory Domain Services (AD DS) stores information about users, computers, and other devices on the network. AD DS is required to install directory-enabled applications. The following are improvements made in AD DS functionality:

- Auditing (log value changes that are made to AD DS objects and their attributes)
- Fine-grained password policies (functionality to assign a special password and account lockout policies for different sets of users)
- Read-only DCs (hosts a read-only partition of the AD DS database)
- Restartable AD DS (can be stopped so that updates can be applied to a DC)
- Database mounting tool (compare different backups, eliminating multiple restores)
- User interface improvements (updated AD DS Installation Wizard)

Active Directory Federation Services (AD FS) is used to create extensible and scalable solutions that can operate across multiple platforms, including Windows and non-Windows environments, for secure identity access. Federation Services was first introduced with Windows Server 2003 R2 and is now included in Microsoft Windows Server 2008 as a server role. New functionality includes improved installation and improved application support.

Active Directory Lightweight Directory Services (AD LDS) is a Lightweight Directory Access Protocol (LDAP) directory service. It eliminates dependencies that are required for AD DS by providing data storage and retrieval for directory-enabled applications. AD LDS replaces Active Directory Application Mode (ADAM) for previous versions of Windows.

Active Directory Rights Management Services (AD RMS) includes features not available in Microsoft Windows RMS. Windows RMS was available for Windows Server 2003 and was used to restrict access to rights-protected content to files made by RMS-enabled applications. The added features were incorporated to ease administrative overhead of AD RMS and to extend use outside the organization. New features include:

- AD RMS is now a server role
- Microsoft Management Console (MMC) snap-in
- Integration with AD FS
- Self-enrollment of AD RMS servers
- The ability to delegate responsibility with new AD RMS administrative roles

Server Manager is a single source for managing identity and system information, managing server status, identifying problems with server role configuration, and managing all roles installed on the server. It replaces the "Manage Your Server, Configure Your Server, and add or Remove Windows Components" feature in Windows Server 2003.

The Server Core is a minimal environment. This option limits the roles that can be performed; however, it can improve security and reduce the management and installation footprint.

The Application Server Role is an expanded role and integrated environment for running custom, server-based business applications. Typically, deployed applications running on the Application Server take advantage of Internet Information Services (IIS), the Hypertext Transfer Protocol (HTTP), the .NET Framework, ASP.NET, COM+, message queuing, and Web services that are built with Windows Communication Foundation (WCF).

The Terminal Services Role enables users to access Windows-based programs that are installed on the terminal server.

Terminal Services Core Functionality offers users the following features:

- Remote Desktop Connection 6.1
- Plug and Play Device redirection for media players and digital cameras
- Microsoft Point of Service for .NET 1.11 device redirection
- Single sign-on

Terminal Services also includes the following enhancements and improvements:

- Terminal Services printing has been enhanced with the addition of the Terminal Services Easy Print printer.
- Terminal Services RemoteApp allows access to Windows-based programs from any location, provided that the new Remote Desktop Connection (RDC) client is installed.
- Terminal Services Web Access makes Terminal Services RemoteApp programs and provides users with the ability to connect from a Web browser to a remote desktop of any server or client.
- Terminal Services Licensing includes the ability to track Terminal Services per User CALs.
- Terminal Services Gateway allows remote users to connect to resources on an internal corporate network using the Remote Desktop Protocol (RDP) over HTTP.

- Terminal Services Session Broker runs session load balancing between terminal servers.
- Microsoft Windows System Resource Manager provides the functionality to set how CPU and memory resources are assigned to applications, services, and processes.

The Print Services Role Server manages integration with Print Services. The DNS Server Role has the following improvements:

- Background zone loading (the domain name system [DNS] server can respond to queries while the zone is loading)
- Support for IPv6 addresses (full support for IPv6 [128 bits long] and IPv4 [32 bits long])
- Read-only DC support (the read-only DC [RODC] has a full read-only copy of any DNS zones)
- GlobalNames zone (commonly used to map a canonical name [CNAME] resource record to a fully qualified domain name [FQDN])
- Global Query block list (prevents DNS name hijacking)

The Fax Server Role replaces the fax console. The File Services Role helps to manage storage and shared folders, as well as enable file replication and fast file searching. The following list describes changes in functionality:

- **Distributed File System** New functionality includes access-based enumeration, cluster support, replication improvements, and support for read-only DCs.
- **File Server Resource Manager** Enforces storage limits on folders and volumes, and offers the ability to prevent specific file types and to generate storage reports.
- **Windows Server Back-up** Offers improvements in backup technology, restoration, application recovery, scheduling, and remote administration.
- **Services for the Network File System** Offers the ability to share files between Windows and UNIX environments. New functionality includes Active Directory lookup, 64-bit support, enhanced server performance, special device support, and enhanced UNIX support.
- **Storage Manager for SANs** This is an optional feature in Windows Server 2008.

- New Transactional NTFS and the Transactional Registry
- **New Self-Healing NTFS** No requirement for offline Chkdsk.exe usage.
- **New Symbolic Linking** This is a file system object pointing to another file system object.

The Network Policy and Access Services (NPAS) provides deployment of virtual private network (VPN), dial-up networking, and 802.11-protected wireless access and is a new set of operating system components. NPAS includes the following functions:

- Network Access Protection (NAP) Used to ensure that computers on the private network meet requirements for system health
- Network Policy Server (NPS) Provides organization-wide network access policies for system health
- Routing and Remote Access Service Features the Secure Socket Tunneling Protocol (SSTP), a mechanism to encapsulate PPP traffic over the Secure Sockets Layer (SSL) channel

The Web Server (IIS) role delivers Web publishing that integrates IIS, ASP.NET, and Windows Communication Foundation. Improvements include the ability to enable distributed configuration, new administration tools, the ability to make single pipeline requests, and the ability to perform Web site diagnostics.

The Streaming Media Services Role includes new cache/proxy management and playlist attributes.

The Virtualization Role is technology that is a component of the Windows Server 2008 OS and enables you to create a virtualized server computing environment. This new feature is provided through Hyper-V.

The Windows Deployment Services (WDS) role is the redesigned version of Remote Installation Services (RIS). WDS components are organized into these three categories: Server Components, Client Components, and Management Components.

Windows BitLocker Drive Encryption (BitLocker) provides protection on the operating system volume. New functionality includes full-volume encryption, integrity checking, recovery options, remote management, and secure decommissioning.

User Account Control is a new security component that allows an administrator to enter credentials to perform an administrative task when needed in a nonadministrative

logged-in session. This increases security as there is now no need to ever log in to a session as the local administrator.

Authorization Manager's new features include custom object pickers, business rule groups and stores. Authorization Manager can store authorization stores in SQL, AD, or XML.

New functionality in the Encrypting File System includes smart card key storage, increased configurability of EFS through Group Policy, and an Encrypting File System rekeying wizard.

Changes to the Security Configuration Wizard include installation, securing servers, Windows Firewall, and Advanced Security integration.

Installing Windows Server 2008 Enterprise Edition

Before you install the operating system, you first need to know the organization's requirements. Knowing this upfront will facilitate the installation procedure as well as consecutive configuration tasks, and help to ensure that they run smoothly. Second, verify the installation and configuration plan with the stakeholders before the project commences. Before you install Windows Server 2008, follow the steps in this section to prepare for the installation. Depending on the role the server will take, you will have to check the server for application compatibility. This is important whether the server will just have Windows Server 2008, or whether it will host any other Microsoft or third-party applications.

Microsoft Windows Server 2008 is available in multiple editions, based on the organization's needs, size, and operating systems, and providing support for different levels of hardware compatibility.

Windows Server 2008 Standard Edition provides key server functionality. It includes both full and Server Core installation options. It is designed to increase the flexibility and reliability of your server infrastructure, with built-in virtualization and enhanced Web capabilities. Enhanced security features and high dependability come with this edition. The Standard Edition includes the following:

- **32-bit and 64-bit** Support for up to four CPUs
- **32-bit** Support for up to 4 GB of RAM
- **64-bit** Support for up to 32 GB of RAM

Windows Server 2008 Enterprise Edition provides even greater scalability and availability and adds technologies such as failover clustering and AD FS. The enterprise-class

platform improves security and lays down the foundation for a scalable IT infrastructure. The Enterprise Edition includes the following:

- **32-bit and 64-bit** Support for up to eight CPUs
- **32-bit** Support for up to 64 GB of RAM
- **64-bit** Support for up to 2 TB of RAM

Windows Server 2008 Datacenter Edition offers the same functionality as the Enterprise Edition, but with additional memory and processor capabilities from two to 64 processors. With its unlimited virtual image usage rights, the Datacenter Edition is the foundation on which to build large enterprise-class solutions. The Datacenter Edition includes the following:

- **32-bit** Support for up to 32 CPUs
- **64-bit** Support for up to 64 CPUs
- **32-bit** Support for up to 64 GB of RAM
- **64-bit** Support for up to 2 TB of RAM

Windows Web Server 2008 is designed to be used as a single-purpose Web server. Other server roles are not available in this edition. The Web edition delivers a solid Web infrastructure with newly redesigned tools. The Web Server Edition includes the following:

- **32-bit and 64-bit** Support for up to four CPUs
- **32-bit** Support for up to 4 GB of RAM
- **64-bit** Support for up to 32 GB of RAM

Windows Server 2008 for Itanium-based Systems is designed for use with Intel Itanium 64-bit processors. This is designed to provide high availability for large databases and line-of-business applications, and to provide high availability to meet the needs of mission-critical solutions. The Itanium-based edition includes the following:

- Support for up to 64 × 64-bit Itanium CPUs
- Support for up to 2 TB of RAM

When working with the Windows Server 2008 Enterprise Edition, you must complete a few preinstallation tasks. First, check the system hardware requirements. Table 1.1 lists the requirements for Windows Server 2008 Enterprise Edition.

Table 1.1 Hardware Requirements for Windows Server 2008 Enterprise Edition

Component	Requirement
Processor	Minimum: 1 GHz (x86 processor) or 1.4 GHz (x64 processor)
	Recommended: 2 GHz or faster
	Note: An Intel Itanium 2 processor is required for Windows Server 2008 for Itanium-based systems.
Memory	Minimum: 512 MB of RAM
	Recommended: 2 GB or more of RAM
	Maximum (32-bit systems): 4 GB (Standard) or 64 GB (Enterprise and Datacenter)
	Maximum (64-bit systems): 32 GB (Standard) or 2 TB (Enterprise, Datacenter, and Itanium-based systems)
Available disk space	Minimum: 10 GB
	Recommended: 40 GB or greater
	Note: Computers with more than 16 GB of RAM will require more disk space for paging, hibernation, and dump files.
Drive	DVD-ROM drive
Display and peripherals	Super VGA (800 × 600) or higher-resolution monitor
	Keyboard
	Microsoft mouse or compatible pointing device

Once you have determined that the hardware meets the minimum requirements and that the software that will run on the server meets the requirements of the hardware, it is time to decide whether you want to do a clean install of the operating system on the new or used server hardware or whether you want to upgrade an

older version of Server 2008 or Server 2003. In an upgrade, you retain options such as the desktop, users and groups, and program groups. If you don't have an operating system you want to upgrade, you need to perform a clean install.

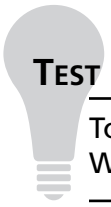
Table 1.2 shows which Windows operating systems can be upgraded to which editions of this release of Windows Server 2008.

Table 1.2 Upgrade Paths

If you are running:	You can upgrade to this version of:
Windows Server 2003 R2 Standard Edition	Full installation of Windows Server 2008 Standard
Windows Server 2003 Standard Edition with Service Pack 1 (SP1)	Full installation of Windows Server 2008 Enterprise
Windows Server 2003 Standard Edition with Service Pack 2 (SP2)	
Windows Server 2008 Standard RC0	
Windows Server 2008 Standard RC1	
Windows Server 2003 R2 Enterprise Edition	Full installation of Windows Server 2008 Enterprise
Windows Server 2003 Enterprise Edition with SP1	
Windows Server 2003 Enterprise Edition with SP2	
Windows Server 2008 Enterprise RC0	
Windows Server 2008 Enterprise RC1	
Windows Server 2003 R2 Datacenter Edition	Full installation of Windows Server 2008 Datacenter
Windows Server 2003 Datacenter Edition with SP1	
Windows Server 2003 Datacenter Edition with SP2	
Windows Server 2008 Datacenter RC0	
Windows Server 2008 Datacenter RC1	

Before you begin the upgrade, consider the following:

- You may want to back up and test the backup of the server before the upgrade starts.
- Upgrading from Server 2003 to the Server Core of Windows Server 2008 is not supported.
- An upgrade to Windows Server 2008 cannot be uninstalled; however, if the installation failed, you can roll back to the previous operating system.
- Be sure to do an application compatibility check before the upgrade is started. Microsoft made an application compatibility toolkit available for this reason.



TEST DAY TIP

To completely prepare for test day, perform an attended installation of Windows Server 2008.

EXERCISE 1.1

INSTALLING WINDOWS SERVER 2008

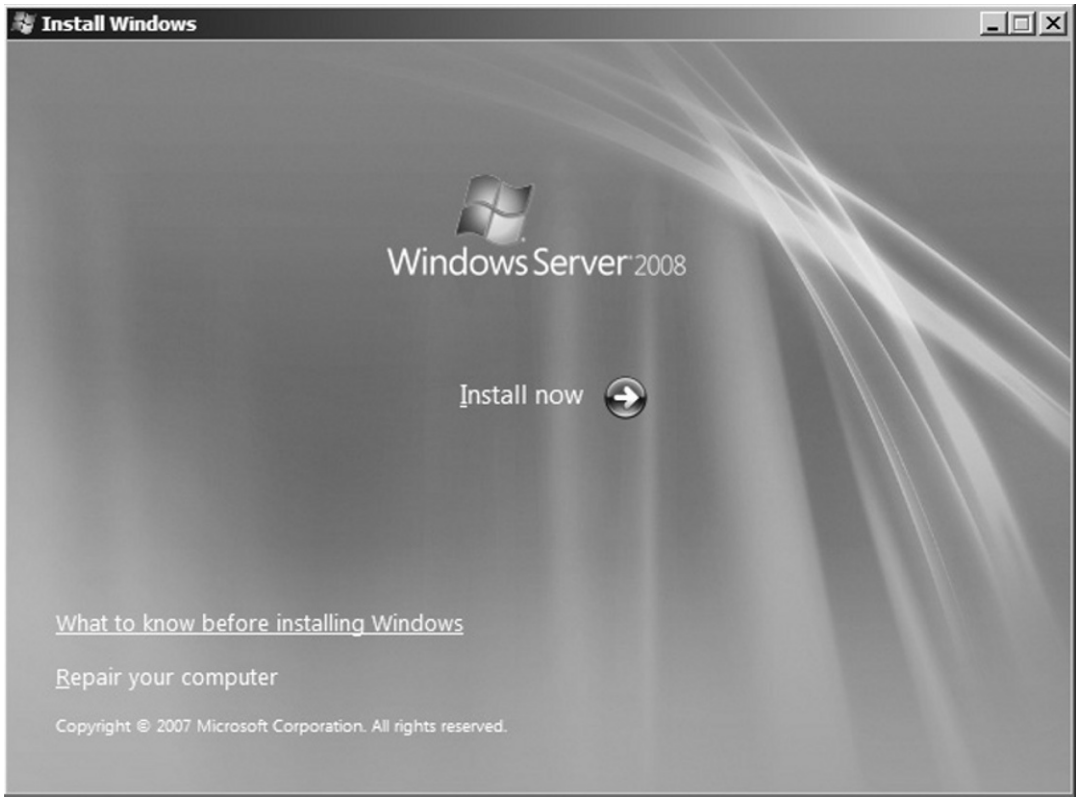
To install Windows Server 2008, follow these steps:

1. Insert the Windows Server 2008 Enterprise Edition DVD in the DVD-ROM drive.
2. Make the necessary selections in Figure 1.1 and click **Next**.

Figure 1.1 Installing Windows Server 2008

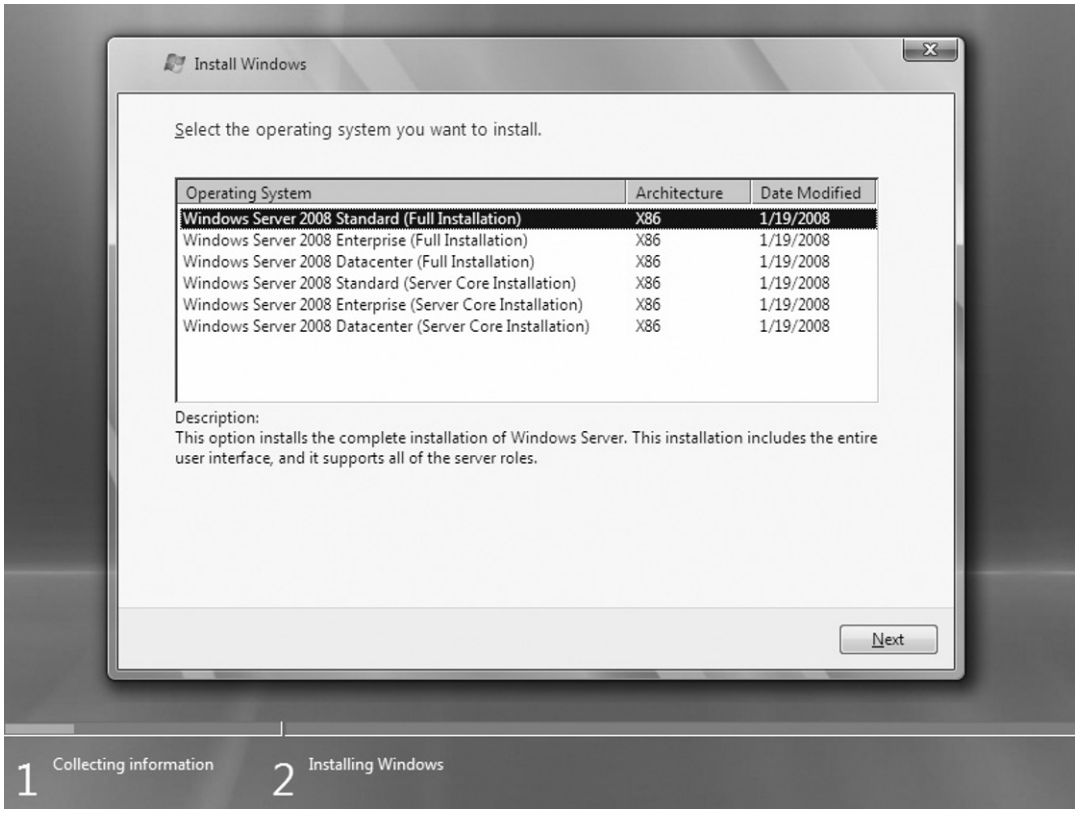
3. Click **Install now**, as shown in Figure 1.2.

Figure 1.2 Clicking Install Now



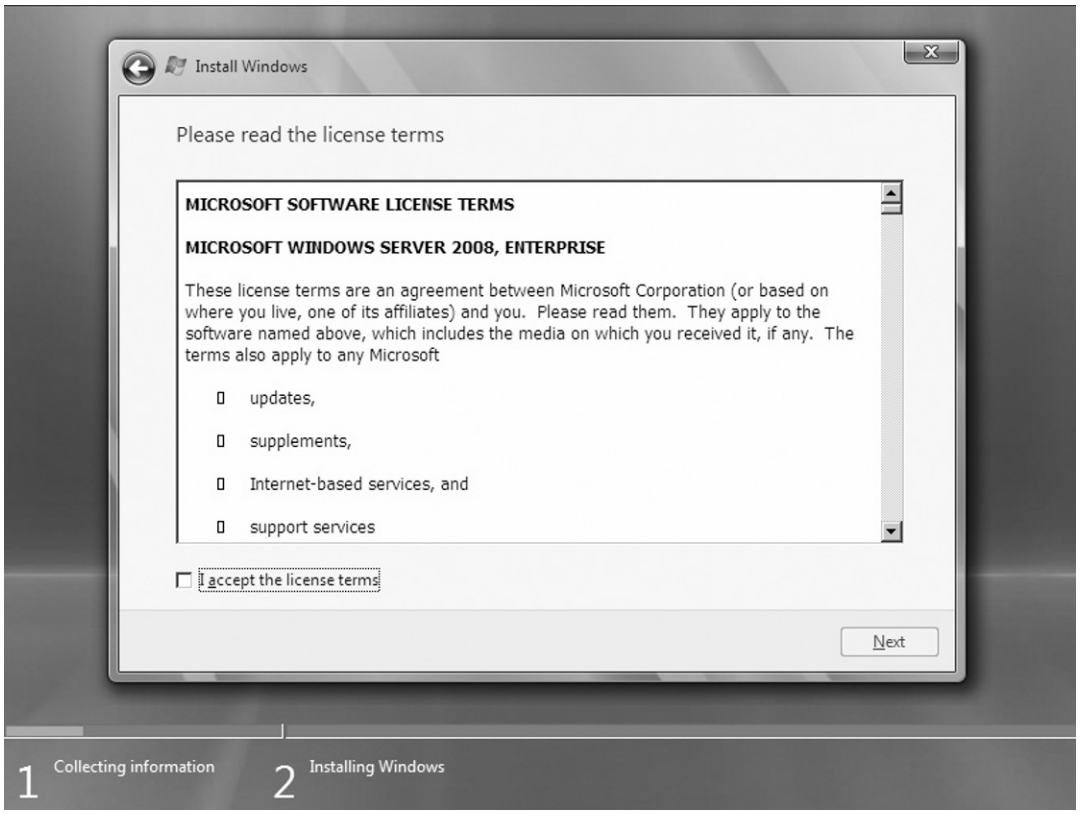
4. Figure 1.3 shows a list of the editions of the operating system available on the DVD. Make a selection and click **Next**.

Figure 1.3 Selecting the Operating System



5. Accept the license terms as shown in Figure 1.4, and click **Next**.

Figure 1.4 Accepting the Terms and Conditions



6. Select to perform either an **Upgrade** or a **Custom** (clean) install, as shown in Figure 1.5.