MCSE

Windows® 2000 Directory Services Design

Study Guide

Exam
70-219

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SYBEX®

Microsoft Certified
Professional
Approved Study Guide

MCSE:
Windows® 2000
Directory Services Design
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To Our Valued Readers:

In recent years, Microsoft's MCSE program has established itself as the premier computer and networking industry certification. Nearly a quarter of a million IT professionals have attained MCSE status in the NT 4 track. Sybex is proud to have helped thousands of MCSE candidates prepare for their exams over these years, and we are excited about the opportunity to continue to provide people with the skills they'll need to succeed in the highly competitive IT industry.

For the Windows 2000 MCSE track, Microsoft has made it their mission to demand more of exam candidates. Exam developers have gone to great lengths to raise the bar in order to prevent a paper-certification syndrome, one in which individuals obtain a certification without a thorough understanding of the technology. Sybex welcomes this new philosophy as we have always advocated a comprehensive instructional approach to certification courseware. It has always been Sybex's mission to teach exam candidates how new technologies work in the real world, not to simply feed them answers to test questions. Sybex was founded on the premise of providing technical skills to IT professionals, and we have continued to build on that foundation, making significant improvements to our study guides based on feedback from readers, suggestions from instructors, and comments from industry leaders.

The depth and breadth of technical knowledge required to obtain Microsoft's new Windows 2000 MCSE is staggering. Sybex has assembled some of the most technically skilled instructors in the industry to write our study guides, and we're confident that our Windows 2000 MCSE study guides will meet and exceed the demanding standards both of Microsoft and you, the exam candidate.

Good luck in pursuit of your MCSE!

Neil Edde
Associate Publisher—Certification
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As always, to Suze.
  Bob King

To Bobbi, my very best friend in the whole world.
  Gary Govanus

Acknowledgments

It's funny how life throws you curveballs from time to time. When I accepted this project, I was living just north of Tampa, was self-employed, and planned to use the traditional slow period at the beginning of the year to write. By the time we started working, I was moving to Grand Rapids, had a new job, and ended up using all of my free time trying to keep up! Special thanks go to my little girls, Katie and Carrie, with whom I missed a lot of bedtime stories and Disney videos! And special thanks go to my wife, Susan, who (because of the business I'm in) has experienced single parenting for the last few months (I'll take some time off now—I promise!), and to the management of The Ziemba Group, who have cut a new employee some slack so he could finish a prior commitment.

I'd also like to thank my partner Gary Govanus (this is starting to feel like one of those Oscar acceptance speeches that gets cut off in the middle). Gary is a true friend, a true professional, and someone whom I respect deeply. He also recommended me to Sybex in the first place—thanks Gary.

Thanks also go to the guys at Ingram Micro, who donated a couple of killer Everest computers to my home lab so I could test my theories before I committed them to print! Ingram Micro doesn't sell to the public, but if you're a reseller, I give them two thumbs up for service! (You can visit them at www.ingrammicro.com.)

—Bob King

I think Bob will agree that whenever we take on these projects, they sure sound good. It should be really easy to knock these books out. It usually takes about two weeks before the enormity of the task hits and we start looking at the page count and thinking we may never finish. And then, someone is asking us for our dedications and acknowledgments. My how time does fly.

Because Bob and I live so far apart (I live in Minnesota, and at last check, he lived in Michigan), I can't tell you what he is like during the book-writing process. I do know that I am not the most fun person in the world to live with. I am never the most fun person in the world to live with, but while writing a book, I can be an absolute bear. So, I really have to thank all those people closest to me.

Introduction

Microsoft's new Microsoft Certified Systems Engineer (MCSE) track for Windows 2000 is the premier certification for computer industry professionals. Covering the core technologies around which Microsoft's future will be built, the new MCSE certification is a powerful credential for career advancement.

This book has been developed, in cooperation with Microsoft Corporation, to give you the critical skills and knowledge you need to prepare for one of the core requirements of the new MCSE certification program for Windows 2000 Server. You will find the information you need to acquire a solid understanding of designing an Active Directory structure; to prepare for Exam 70-219: Designing a Microsoft Windows 2000 Directory Services Infrastructure; and to progress toward MCSE certification.

Why Become Certified in Windows 2000?

As the computer network industry grows in both size and complexity, the need for *proven* ability is increasing. Companies rely on certifications to verify the skills of prospective employees and contractors.

Whether you are just getting started or are ready to move ahead in the computer industry, the knowledge, skills, and credentials you have are your most valuable assets. Microsoft has developed its Microsoft Certified Professional (MCP) program to give you credentials that verify your ability to work with Microsoft products effectively and professionally. The MCP credential for professionals who work with Microsoft Windows 2000 networks is the new MCSE certification.

Over the next few years, companies around the world will deploy millions of copies of Windows 2000 as the central operating system for their mission-critical networks. This will generate an enormous need for qualified consultants and personnel to design, deploy, and support Windows 2000 networks.

Windows 2000 is a huge product that requires professional skills of its administrators. Consider that Windows NT 4 has about 12 million lines of code, while Windows 2000 has more than 35 million! Much of this code is needed to deal with the wide range of functionality that Windows 2000 offers.

Windows 2000 actually consists of several different versions:

Windows 2000 Professional   The client edition of Windows 2000, which is comparable to Windows NT 4 Workstation 4, but also includes the best features of Windows 98 and many new features.

Windows 2000 Server/Windows 2000 Advanced Server   A server edition of Windows 2000 for small to mid-sized deployments. Advanced Server supports more memory and processors than Server does.

Windows 2000 Datacenter Server   A server edition of Windows 2000 for large, wide-scale deployments and computer clusters. Datacenter Server supports the most memory and processors of the three versions.

With such an expansive operating system, companies need to be certain that you are the right person for the job being offered. The MCSE is designed to help prove that you are.

> As part of its promotion of Windows 2000, Microsoft has announced that MCSEs who have passed the Windows NT 4 core exams must upgrade their certifications to the new Windows 2000 track by December 31, 2001, to remain certified. The MCSE Study Guide series, published by Sybex, covers the full range of exams required for either obtaining or upgrading your certification. For more information, see "Exam Requirements" later in this introduction.

Is This Book for You?

If you want to acquire a solid foundation in Active Directory design issues, this book is for you. You'll find clear explanations of the fundamental concepts you need to grasp.

If you want to become certified as an MCSE, this book is definitely for you. However, if you just want to attempt to pass the exam without really understanding Windows 2000, this book is *not* for you. This book is written for those who want to acquire hands-on skills and in-depth knowledge of Windows 2000.

If your goal is to prepare for the exam by learning how to use and manage the new operating system, this book is for you. It will help you to achieve the high level of professional competency you need to succeed in this field.

What Does This Book Cover?

This book contains detailed explanations, hands-on exercises, and review questions to test your knowledge.

Think of this book as your complete guide to designing an Active Directory structure. It begins with a review of directory services, covering the key concepts that are considered prerequisite knowledge for the Active Directory Design exam. Next, you will learn how to analyze various aspects of a given environment with an emphasis on issues pertinent to designing an Active Directory structure, including the following:

- The physical infrastructure

- The business environment

- The current IT environment

You will also learn the key issues involved in designing an overall Windows 2000– and Active Directory–based environment:

- Naming strategies

- Planning a domain and OU structure

- Planning for desktop management

- Planning for Active Directory connectors

- Creating an Active Directory customization strategy

Last, you will be presented with a guide to creating an implementation strategy to roll out your AD design in your environment.

Throughout the book, you will find design scenarios that will help to solidify the concepts discussed in each chapter. At the end of each chapter, you'll find a summary of the topics covered in the chapter, which also includes a list of the key terms used in that chapter. The key terms represent not only the terminology that you should recognize, but also the underlying concepts that you should understand to pass the exam. All of the key terms are defined in the glossary at the back of the study guide.

Finally, each chapter concludes with 10 review questions and one case study that test your knowledge of the information covered. You'll find an entire practice exam, with 35 additional questions and two more case studies, in Appendix A. Many more questions, as well as additional case studies, are included on the CD that accompanies this book, as explained in "What's on the CD?" at the end of this introduction.

The topics covered in this book map directly to Microsoft's official exam objectives. Each exam objective is covered completely.

How Do You Become an MCSE?

Attaining MCSE certification has always been a challenge. However, in the past, individuals could acquire detailed exam information—even most of the exam questions—from online "brain dumps" and third-party "cram" books or software products. For the new MCSE exams, this simply will not be the case.

To avoid the "paper-MCSE syndrome" (a devaluation of the MCSE certification because unqualified individuals manage to pass the exams), Microsoft has taken strong steps to protect the security and integrity of the new MCSE track. Prospective MSCEs will need to complete a course of study that provides not only detailed knowledge of a wide range of topics, but also true skills derived from working with Windows 2000 and related software products.

In the new MCSE program, Microsoft is heavily emphasizing hands-on skills. Microsoft has stated that, "Nearly half of the core required exams' content demands that the candidate have troubleshooting skills acquired through hands-on experience and working knowledge."

Fortunately, if you are willing to dedicate time and effort with Windows 2000, you can prepare for the exams by using the proper tools. If you work through this book and the other books in this series, you should successfully meet the exam requirements.

This book is a part of a complete series of MCSE Study Guides, published by Sybex, that covers the five core Windows 2000 requirements as well as the new Design electives you need to complete your MCSE track. Titles include the following:

- *MCSE: Windows 2000 Professional Study Guide*

- *MCSE: Windows 2000 Server Study Guide*

- *MCSE: Windows 2000 Network Infrastructure Administration Study Guide*

- *MCSE: Windows 2000 Directory Services Administration Study Guide*

- *MCSE: Windows 2000 Network Security Design Study Guide*

- *MCSE: Windows 2000 Network Infrastructure Design Study Guide*

- *MCSE: Windows 2000 Directory Services Design Study Guide*

There are also study guides available from Sybex on additional MCSE electives.

Exam Requirements

Successful candidates must pass a minimum set of exams that measure technical proficiency and expertise:

- Candidates for MCSE certification must pass seven exams, including four core operating system exams, one Design exam, and two electives.

- Candidates who have already passed three Windows NT 4 exams (70-067, 70-068, and 70-073) may opt to take an "accelerated" exam plus one core design exam and two electives.

If you do not pass the accelerated exam after one attempt, you must pass the five core requirements and two electives.

The following tables show the exams a new certification candidate must pass. *All* of these exams are required:

All of these exams are required

Exam #	Topic	Requirement Met
70-216	Implementing and Administering a Microsoft® Windows® 2000 Network Infrastrucuture	Core (Operating System)
70-210	Installing, Configuring, and Administering Microsoft® Windows® 2000 Professional	Core (Operating System)
70-215	Installing, Configuring, and Administering Microsoft® Windows® 2000 Server	Core (Operating System)
70-217	Implementing and Administering a Microsoft® Windows® 2000 Directory Services Infrastructure	Core (Operating System)

One of these exams is required

Exam #	Topic	Requirement Met
70-219	Designing a Microsoft® Windows® 2000 Directory Services Infrastructure	Core (Design)
70-220	Designing Security for a Microsoft® Windows® 2000 Network	Core (Design)
70-221	Designing a Microsoft® Windows® 2000 Network Infrastructure	Core (Design)

Two of these exams are required

Exam #	Topic	Requirement Met
70-219	Designing a Microsoft® Windows® 2000 Directory Services Infrastructure	Elective
70-220	Designing Security for a Microsoft® Windows® 2000 Network	Elective
70-221	Designing a Microsoft® Windows® 2000 Network Infrastructure	Elective
Any current MCSE elective	Exams cover topics such as Exchange Server, SQL Server, Systems Management Server, Internet Explorer Administrators Kit, and Proxy Server (new exams are added regularly)	Elective

NOTE For a more detailed description of the Microsoft certification programs, including a list of current MCSE electives, check Microsoft's Training and Certification Web site at www.microsoft.com/trainingandservices.

The Designing a Microsoft Windows 2000 Directory Services Infrastructure Exam

The Designing a Microsoft Windows 2000 Directory Services Infrastructure exam covers concepts and skills required for the design of an Active Directory structure. It emphasizes the following areas of Active Directory design:

- Analysis of the business environment

- Analysis of the physical environment

- Planning for the use of Active Directory and Windows 2000 features

- Creating an optimized Active Directory environment

This exam differs from the core MCSE examinations in that there are no objectives that represent physical tasks. The test objectives involve your ability to analyze a given situation and suggest a solution that meets the business needs of that environment. System analysis is not a skill that can be quantified into a series of facts or procedures to be memorized. Because of the emphasis on providing business solutions, much of this book (and most of the exam objectives) revolve around your ability to create an Active Directory structure that is stable, optimized, *and* designed in such a way that if fulfills true business needs (as opposed to being technology for technology's sake).

> **NOTE** Microsoft provides exam objectives to give you a very general overview of possible areas of coverage of the Microsoft exams. For your convenience, we have added in-text objectives listings at the points in the text where specific Microsoft exam objectives are covered. However, exam objectives are subject to change at any time without prior notice and at Microsoft's sole discretion. Please visit Microsoft's Training and Certification Web site (www.microsoft.com/trainingandservices) for the most current exam objectives listing.

Types of Exam Questions

In the previous tracks, the formats of the MCSE exams were fairly straightforward, consisting almost entirely of multiple-choice questions appearing in a few different sets. Prior to taking an exam, you knew how many questions you would see and what type of questions would appear. If you had

purchased the right third-party exam preparation products, you could even be quite familiar with the pool of questions you might be asked. As mentioned earlier, all of this is changing.

In an effort to both refine the testing process and protect the quality of its certifications, Microsoft has introduced adaptive testing, as well as some new exam elements. You will not know in advance which type of format you will see on your exam. These innovations make the exams more challenging, and they make it much more difficult for someone to pass an exam after simply "cramming" for it.

> **NOTE** Microsoft will be accomplishing its goal of protecting the exams by regularly adding and removing exam questions, limiting the number of questions that any individual sees in a beta exam, limiting the number of questions delivered to an individual by using adaptive testing, and adding new exam elements.

Exam questions may be in multiple-choice or case study–based formats. You may also find yourself taking an adaptive format exam. Let's take a look at the exam question types and adaptive testing so you can be prepared for all of the possibilities.

Multiple-Choice Questions

Multiple-choice questions include two main types of questions. One is a straightforward type that presents a question followed by several possible answers, of which one or more is correct.

The other type of multiple-choice question is more complex. This type presents a set of desired results along with a proposed solution. You must then decide which results would be achieved by the proposed solution.

> **NOTE** You will see many multiple-choice questions in this study guide and on the accompanying CD, as well as on your exam.

Case Study–Based Questions

Case study–based questions first appeared in the Microsoft Certified Solution Developer program (Microsoft's certification program for software programmers). Case study–based questions present a scenario with a range of requirements. Based on the information provided, you need to answer a

series of multiple-choice and ranking questions. The interface for case study-based questions has a number of tabs, each of which contains information about the scenario. At present, this type of question appears only in the Design exams.

Adaptive Exam Format

Microsoft presents many of its exams in an *adaptive* format. This format is radically different from the conventional format previously used for Microsoft certification exams. Conventional tests are static, containing a fixed number of questions. Adaptive tests change, or "adapt," depending on your answers to the questions presented.

The number of questions presented in your adaptive test will depend on how long it takes the exam to ascertain your level of ability (according to the statistical measurements on which the exam questions are ranked). To determine a test-taker's level of ability, the exam presents questions in increasing or decreasing order of difficulty.

> Unlike the previous test format, the adaptive format will *not* allow you to go back to see a question again. The exam only goes forward. Once you enter your answer, that's it—you cannot change it. Be very careful before entering your answer. There is no time limit for each individual question (only for the exam as a whole). Your exam may be shortened by correct answers (and lengthened by incorrect answers), so there is no advantage to rushing through questions.

How Adaptive Exams Determine Ability Levels

As an example of how adaptive testing works, suppose that you know three people who are taking the exam: Herman, Sally, and Rashad. Herman doesn't know much about the subject, Sally is moderately informed, and Rashad is an expert.

Herman answers his first question incorrectly, so the exam presents him with a second, easier question. He misses that, so the exam gives him a few more easy questions, all of which he misses. Shortly thereafter, the exam ends, and he receives his failure report.

Sally answers her first question correctly, so the exam gives her a more difficult question, which she answers correctly. She then receives an even more difficult question, which she answers incorrectly. Next, the exam gives her a