Windows NT® 4.0 MCSE Study Guide

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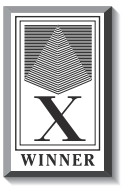

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5/7/98

The Value of Microsoft Certification

As a computer professional, your opportunities have never been greater. Yet you know better than anyone that today's complex computing environment has never been more challenging.

Microsoft certification keeps computer professionals on top of evolving information technologies. Training and certification let you maximize the potential of Microsoft Windows desktop operating systems; server technologies, such as the Internet Information Server, Microsoft Windows NT, and Microsoft BackOffice; and Microsoft development tools. In short, Microsoft training and certification provide you with the knowledge and skills necessary to become an expert on Microsoft products and technologies—and to provide the key competitive advantage that every business is seeking.

Microsoft offers you the most comprehensive program for assessing and maintaining your skills with our products. When you become a Microsoft Certified Professional (MCP), you are recognized as an expert and are sought by employers industry-wide. Technical managers recognize the MCP designation as a mark of quality—one that ensures that an employee or consultant has proven experience with Microsoft products and meets the high technical proficiency standards of Microsoft products.

As an MCP, you receive many benefits, such as direct access to technical information from Microsoft; the official MCP logo and other materials to identify your status to colleagues and clients; invitations to Microsoft conferences, technical training sessions and special events; and exclusive publications with news about the MCP program.

Research shows that organizations employing MCPs also receive many benefits:

- A standard method of determining training needs and measuring results—an excellent return on training and certification investments
- Increased customer satisfaction and decreased support costs through improved service, increased productivity, and greater technical self-sufficiency
- A reliable benchmark for hiring, promoting, and career planning

- Recognition and rewards for productive employees by validating their expertise
- Retraining options for existing employees, so they can work effectively with new technologies
- Assurance of quality when outsourcing computer services

Through your study, experience, and achievement of Microsoft certification, you will enjoy these same benefits, too, as you meet the industry's challenges.

Nancy Lewis
General Manager
Microsoft Training and Certification

Foreword to the MCSE Series

Certifications are an effective way of "selling your skills" to prospective employers, since they represent a consistent measurement of knowledge about specific software or hardware products. Because of their expansive product line and tremendous marketing efforts, Microsoft certifications have become the gold standard in the exploding certification industry. As a Microsoft Certified Professional, you are recognized as a "Subject Matter Expert" as defined by objective standards. As a training organization, we recognize the value of offering certification-level training. In fact, approximately 55 percent of students in our Microsoft classes are working toward certification, and I expect that number to continue to rise.

Studies have been conducted that show increased productivity among Microsoft Certified Solutions Developers versus noncertified programmers. Additionally, compensation for Microsoft Certified Systems Engineers and Microsoft Certified Solutions Developers averages higher than for those without certification. For individuals looking for a career in these areas, there is no better metric of legitimacy that can be placed on a resume than Microsoft certification credentials.

Information Systems/Information Technology (IS/IT) decision-makers for ExecuTrain clients worldwide increasingly require certifications for their IS employees. Often, individuals are required to be certified or find that certification was their competitive edge in landing the job. Conventional wisdom and every study you read indicates these trends will continue as technologies become more a part of daily business in corporations.

Microsoft recently certified the 100,000th Microsoft Certified Professional. I expect this number to balloon as corporations make certification part of IS staff job descriptions. I predict certified candidates can expect better-paying jobs and positions with more technical responsibility to match their hard-won certification. Although the number of MCPs rises daily, that population is eclipsed by the more than 200,000 open IT positions reported today. Microsoft tracks these open positions and would like to fill each of them with MCPs. My bet is that if anyone can make the math work, they can.

Kevin Brice
Vice President/General Manager
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ExecuTrain Corporation

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Alan R. Carter is a Microsoft Certified Systems Engineer (MCSE), a Microsoft Certified Internet Professional (MCIP), and a Microsoft Certified Trainer (MCT). He teaches Microsoft Official Curriculum courses throughout the U.S. He also participates in the development of new courses and other educational materials. In addition to his Microsoft certifications, Alan is a Certified Network Professional (CNP), a Novell Master Certified Network Engineer (CNE), and a Certified Novell Instructor (CNI). He lives in Kirkland, Washington. He welcomes comments from his readers and can be contacted via the Internet at alan_carter@usa.net.

To Timothy

Foreword

When I first met Alan Carter, the author of this book, my understanding of networking was pretty uneven. I knew a great deal about some aspects, but nearly nothing about others. My basic computing fundamentals were sound, but I had not yet taken the step of applying those fundamentals to the big picture of networking.

I met Alan when I signed up for his classes. I had heard a number of very positive comments about his training skills from several of my colleagues, and his experience and certifications constituted a veritable laundry list of acronyms. However, what was important to me was learning to apply networking skills to the computing foundation I had already acquired, and expanding my abilities specifically to Enterprise-level network operating systems. Alan helped me achieve just that.

Alan's vast real-world experience and intimate product knowledge provided the learning context and background I needed to pair up with my more theoretical computing basics. My benchmark for a good instructor is one who can tailor the subject to my needs, provide real-world insight and details to round out my knowledge base, and expand my understanding without simply drilling down to the rote details. Alan's teaching style and provocative discussions do exactly that. He answered my questions just as they were forming on my tongue. He provided compelling real-world examples at every turn, so I never got distracted by the details or lost the big picture.

This is not to say that Alan isn't careful with the details! He is completely familiar with the products and the people who build them. His attention to minutiae makes both his training courses and this book excellent resources for every detail. He understands inside out not only what it takes to pass these difficult exams, but also what real-world skills a certified professional must bring to the table to be effective on the job.

In this book, Alan brings you the same excellence and detail that he does in his training courses. Absolutely every exam objective is covered here—with labs and exercises to reinforce your hands-on experience. More importantly, Alan's vast training experience and product background will provide you with the context you

need in the real world, not just on paper. Getting through the Windows NT MCSE exams is no easy task. Fortunately, you've made the right decision in choosing Alan's book to help prepare for these crucial exams.

Donald E. Dillenburg
Senior Network Integrator
Bank of America Northwest
MCSE, CNE, ASE

Preface

Welcome to the MCSE Certification Series! This book is designed to help you acquire the knowledge, skills, and abilities you'll need to pass three of the Microsoft Certified Professional exams:

- Exam No. 70-73: Implementing and Supporting Microsoft Windows NT Workstation 4.0
- Exam No. 70-67: Implementing and Supporting Microsoft Windows NT Server 4.0
- Exam No. 70-68: Implementing and Supporting Microsoft Windows NT Server 4.0 in the Enterprise

If you're *not* planning to take one or more of these exams, but you want to develop a comprehensive working knowledge of the Microsoft Windows NT (referred to mostly from here on out simply as Windows NT or NT) products, then this book is also for you.

This book is designed to be the only book or course you'll need to prepare for and pass the NT exams. However, the goal of this book is *not* to make you into an NT guru. I'll cover NT to the depth of the exam objectives, but not go substantially beyond that point. If, during the course of your study, you find yourself wanting more depth, detail, and advanced technical tidbits, I heartily recommend the following resources:

- *Microsoft Windows NT Workstation Resource Kit for version 4.0* (Microsoft Press, 1996)
- *Microsoft Windows NT Server Resource Kit for version 4.0* (Microsoft Press, 1996)
- *Inside Windows NT* (Microsoft Press, 1993)
- *Inside the Windows NT File System* (Microsoft Press, 1994)

How This Book Is Organized

This book is organized into seven major parts, followed by a Resources section that contains appendices and supplemental materials, plus a compact disc. These major parts closely parallel the Microsoft Certified Professional exam objectives for the three Windows NT 4.0 exams.

Within these major parts, each chapter begins with an overview of the topics that will be covered in that chapter. Then pertinent information on each topic is presented. A Key Point Summary follows, summarizing the chapter highlights and reviewing important material. At the end of each chapter are Instant Assessment questions to make sure you understand and can apply what you've read. Additionally, at the end of many chapters there are review activities, and hands-on lab exercises so you can master the specific tasks and skills tested by the exams.

I should explain, at this point, why the preparation guides for the NT Workstation and NT Server exams have been combined into a single book, rather than presented as two separate books. Simply stated, NT is NT. Yes, there are some differences between NT Workstation and NT Server, but the two products are fundamentally the same operating systems. When we talk about NT, we are talking about a coherent body of knowledge. When you learn to perform a task using Windows NT Workstation, it's usually the same as learning the same task on Windows NT Server. Throughout this book, therefore, except where differences are noted, NT refers to *both* NT Workstation and NT Server.

Part I: Overview

The Overview discusses the basics of Windows NT Workstation and Windows NT Server, including a section on the architecture of Windows NT.

Part II: Installation and Configuration

This part covers, in detail, installing and configuring Windows NT Workstation and Windows NT Server, including chapters on configuring disks, using Control Panel, deploying Windows NT from a server, and managing printing.

Part III: Managing Resources

This part explains how to use the features, services, and tools that come with Windows NT. It explains user and group accounts, account policy, auditing, user rights, user profiles, and system policy. It covers managing and optimizing Windows NT Server Directory Services, as well as sharing and securing file systems. It teaches the reader how to access network resources, how to use NT Server tools, and how to back up and restore data.

Part IV: Connectivity

Connectivity is all about how NT functions in a network setting. Protocols, particularly TCP/IP, are examined. This section discusses the coexistence of Windows NT with Novell NetWare, as well as migrating from a NetWare environment to a Windows NT environment. You will learn how to install and configure Remote Access Server, and also learn about connectivity with Macintosh computers.

Part V: Running Applications

In this part, I introduce the application environments and explain how to optimize applications to run under Windows NT.

Part VI: Monitoring and Optimization

This part explores how to monitor and optimize the performance of a specific computer or an entire network. You will learn how to use tools such as Performance Monitor and Network Monitor to gather data. I also examine the basics of capacity planning.

Part VII: Troubleshooting

From basic to advanced troubleshooting, this part covers it. You'll learn how to approach a troubleshooting situation, as well as which resources to consult when you're stumped by a problem.

Part VIII: Resources

The supplemental materials at the back of the book contain a wealth of information. In addition to a detailed glossary and thorough index, you'll find the following information in the appendices: exam preparation tips; answers to chapter Instant Assessment questions, Review Activities, and Hands-on Labs; a Mini-Lab Manual that features all of the Hands-on Lab Exercises from the book; Windows NT planning forms; and a description of the compact disc contents. Appendices A, B, and C, which contain the exam objectives for each of the three Windows NT 4.0 exams, also include detailed Exam Objectives Cross-Reference Charts for study purposes.

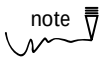
CD-ROM

The compact disc included with this book contains the following materials: an electronic version of this book in Adobe Acrobat format; excerpts from *MCSE Career Microsoft®!* (IDG Books Worldwide, 1997); Adobe Acrobat Reader; Microsoft Internet explorer version 3.01; Validate! Windows NT 4.0 Workstation and Server practice exams; Microsoft Training and Certification Offline CD-ROM; *MicroHouse Technical Library* (evaluation copy); and Diskeeper Lite (evaluation copy).

How to Use This Book

This book can be used either by individuals working independently or by groups in a formal classroom setting.

For best results (and we both know that the only acceptable results are passing scores on the MCSE exams), I recommend the following plan of attack as you use this book. First, read the chapter and the Key Point Summary at the end. Use this summary to see if you've really got the key concepts under your belt. If you don't, go back and reread the section(s) you're not clear on. Then do *all* of the Instant Assessment section questions and review activities at the end of the chapter. Finally, *do* the hands-on lab exercises. Remember, the important thing is to master the tasks that will be tested on the exams. There's really no way to master tasks without seeing the various NT screens over and over again.



When you do the hands-on lab exercises and are asked to type something, the text you are instructed to type will be printed in bold, like this:
WORKGROUP

Important words and concepts appear in italics, and all filenames, folder names, directories, Uniform Resource Locators (URLs), and code appear as monospaced font.

The chapters of this book have been designed to be studied sequentially. In other words, it would be best if you complete Chapter 1 before you proceed to Chapter 2. A few chapters could probably stand alone, but all in all, I recommend a sequential approach. The hands-on lab exercises have also been designed to be completed in a sequential order and often depend on successful completion of the previous labs.

After you've completed your study of the chapters and reviewed the questions and lab exercises in the book, use the compact disc to take the assessment exams and practice tests. The assessment exams and practice tests will help you assess how much you've learned from your study and will also familiarize you with the type of exam questions you'll face when you take the real exams. Once you identify a weak area, you can restudy the corresponding chapters (including the review questions and lab exercises) to improve your knowledge and skills in that area. Use the exam objectives cross-reference charts in the appendices to help you determine on which chapter(s) to redouble your efforts.

Prerequisites

Although this book is a comprehensive study and exam preparation guide, it does not start at ground zero. I do assume you have the following knowledge and skills at the outset:

1. Basic terminology and basic skills to use a Microsoft Windows product. (This could be Windows 95, Windows for Workgroups, or a Windows NT product.)
2. Basic mouse skills: being able to left-click, right-click, use the pointer, and so on.
3. Networking knowledge or experience equal to the scope required to pass the Microsoft Certified Professional Networking Essentials Exam (Exam No. 70-58).

If you meet these prerequisites, you're ready to begin this book.

If you don't have the basic Windows experience or mouse skills, I recommend you either take a one-day Windows application course or work through a self-study book, such as *Windows 95 For Dummies* (IDG Books Worldwide, Inc.), to acquire these skills *before* you begin this book.

If you don't have the networking knowledge or experience, I recommend you use a tool such as *Networking Essentials MCSE Study Guide* by Jason Nash (IDG Books Worldwide, Inc.), to obtain this knowledge, and pass the Networking Essentials exam *before* you begin this book.

How to Determine What You Should Study

Your individual certification goals will ultimately determine which parts of this book you should study. If you want to pass two or three of the Microsoft Certified Professional NT exams, or simply want to develop a comprehensive working knowledge of NT, I recommend you study, in sequential order, the entire book.

If you are preparing for the Implementing and Supporting Microsoft Windows NT Workstation 4.0 exam, I suggest you follow the recommended study plan, shown in Table 1.

If you are preparing for the Implementing and Supporting Microsoft Windows NT Server 4.0 exam, I suggest following the recommended study plan shown in Table 2.

If you are preparing for the Implementing and Supporting Microsoft Windows NT Server 4.0 in the Enterprise exam, I suggest following the study plan shown in Table 3.

TABLE 1 CHAPTERS AND LABS THAT PREPARE YOU FOR THE IMPLEMENTING AND SUPPORTING MICROSOFT WINDOWS NT WORKSTATION 4.0 EXAM

CHAPTER NUMBER	*CHAPTER TITLE*	*RECOMMENDED LABS*
1	Qverview of Windows NT Workstation and Windows NT Server	None
2	Installing Windows NT Workstation and Windows NT Server	Lab 2.1, Lab 2.2
3	Configuring Disks	Lab 3.3
4	Using Control Panel	Lab 4.6
5	Server-Based Deployment	Lab 5.7
6	Managing Printing	Lab 6.8, Lab 6.9
7	Managing User and Group Accounts	Lab 7.10
9	Managing User Profiles and System Policy	Lab 9.13
12	Sharing and Securing File Systems	Lab 12.18, Lab 12.20
13	Accessing Resources on the Network	Lab 13.21, Lab 13.22
16	Networking Using TCP/IP	Lab 16.26
17	Coexistence with NetWare	Lab 17.29
19	Installing and Configuring Remote Access Service (RAS)	Lab 19.32
21	Running Applications on Windows NT	Lab 21.34
22	Using Performance Monitor	Lab 22.35
25	Performance Optimization	Lab 25.37
26	The Troubleshooting Process	None
27	Advanced Troubleshooting Topics	Lab 27.39

TABLE 2 CHAPTERS AND LABS THAT PREPARE YOU FOR THE IMPLEMENTING AND SUPPORTING MICROSOFT WINDOWS NT SERVER 4.0 EXAM

CHAPTER NUMBER	*CHAPTER TITLE*	*RECOMMENDED LABS*
1	Qverview of Windows NT Workstation and Windows NT Server	None
2	Installing Windows NT Work-station and Windows NT Server	Lab 2.1, Lab 2.2
3	Configuring Disks	Lab 3.3, Lab 3.4
4	Using Control Panel	Lab 4.5, Lab 4.6
5	Server-Based Deployment	Lab 5.7
6	Managing Printing	Lab 6.8, Lab 6.9
7	Managing User and Group Accounts	Lab 7.10
8	Managing Account Policy, User Rights, and Auditing	Lab 8.11, Lab 8.12
9	Managing User Profiles and System Policy	Lab 9.13, Lab 9.14
12	Sharing and Securing File Systems	Lab 12.18, Lab 12.19, Lab 12.20
13	Accessing Resources on the Network	Lab 13.21
14	Using Windows NT Server Tools	Lab 14.23
15	Backing Up and Restoring Data	Lab 15.24
16	Networking Using TCP/IP	Lab 16.27, Lab 16.28
17	Coexistence With NetWare	Lab 17.30
18	Migrating to Windows NT from NetWare	None
19	Installing and Configuring Remote Access Service (RAS)	Lab 19.32
22	Using Performance Monitor	Lab 22.35
25	Performance Optimization	Lab 25.37
26	The Troubleshooting Process	None
27	Advanced Troubleshooting Topics	None

TABLE 3 CHAPTERS AND LABS THAT PREPARE YOU FOR THE IMPLEMENTING AND SUPPORTING WINDOWS NT SERVER 4.0 IN THE ENTERPRISE EXAM

CHAPTER NUMBER	*CHAPTER TITLE*	*RECOMMENDED LABS*
1	Qverview of Windows NT Workstation and Windows NT Server	None
2	Installing Windows NT Workstation and Windows NT Server	Lab 2.1, Lab 2.2
3	Configuring Disks	Lab 3.3, Lab 3.4
4	Using Control Panel	Lab 4.5
5	Server-Based Deployment	None
6	Managing Printing	Lab 6.8, Lab 6.9
7	Managing User and Group Accounts	Lab 7.10
8	Managing Account Policy, User Rights, and Auditing	Lab 8.11, Lab 8.12
9	Managing User Profiles and System Policy	Lab 9.13, Lab 9.14
10	Managing Windows NT Directory Services	Lab 10.15, Lab 10.16
11	Optimizing Windows NT Server Directory Services	Lab 11.17
12	Sharing and Securing File Systems	Lab 12.18, Lab 12.19, Lab 12.20
13	Accessing Resources on the Network	Lab 13.21, Lab 13.22
14	Using Windows NT Server Tools	Lab 14.23
15	Backing Up and Restoring Data	Lab 15.24
16	Networking Using TCP/IP	Lab 16.25, Lab 16.26, Lab 16.27, Lab 16.28
17	Coexistence With NetWare	Lab 17.30, Lab 17.31
18	Migrating to Windows NT from NetWare	None
19	Installing and Configuring Remote Access Service (RAS)	Lab 19.32
20	Macintosh Connectivity	Lab 20.33
22	Using Performance Monitor	Lab 22.35
23	Using Network Monitor	Lab 23.36
24	Capacity Planning	None
25	Performance Optimization	Lab 25.37, Lab 25.38
26	The Troubleshooting Process	None
27	Advanced Troubleshooting Topics	Lab 27.39

Hardware and Software You'll Need

You will need access to various hardware and software to be able to do the hands-on lab exercises in this book. It is extremely important that you do these labs to acquire the skills tested by the Microsoft Certified Professional exams.

If you have the minimum hardware listed below, you will be able to complete *most* of the hands-on lab exercises in this book, and certainly all of the critical exercises. To be able to perform *all* of the labs, however, you will need the additional hardware as well.

Minimum hardware requirements:

- Intel-based computer with 486/33 processor, 16MB RAM, and 500MB–1GB available hard disk space
- CD-ROM drive
- Mouse
- VGA monitor and graphics card

I strongly recommend that you only use hardware found on the Microsoft Windows NT Hardware Compatibility List, which is shipped with the NT product, or can be accessed via Microsoft's World Wide Web site at `http://www.microsoft.com/ntworkstation`, **or at** `http://www.microsoft.com/ntserver`.

Optional additional hardware:

- Additional computer (with the same minimum specifications as the first one)
- Network adapter and cabling (if you have the additional computer listed above)
- Printer
- Tape drive
- Modem and Internet connection (so you can access online resources)

Warning! Some of the lab exercises in this book have the potential to erase or corrupt data on existing hard disk drives. Make sure you back up all important data and programs *before* you attempt to perform any of the lab exercises. Or do the labs on a computer that does not contain any vital data or programs.

Software requirements:

- Microsoft Windows NT Workstation 4.0
- Microsoft Windows NT Server 4.0

Icons Used in This Book

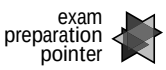
Several different icons used throughout this book draw your attention to matters that deserve a closer look:

Workstation
Server
Enterprise

This icon identifies the MCSE certification exam(s) pertinent to the content adjacent to it. You'll see this icon at the beginning of each chapter and alongside hands-on labs and review activities.

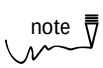
This icon points you to another place in this book (or to another resource) for more coverage on a given topic. It may point you back to a previous chapter where important material has already been covered, or it may point you ahead to let you know that a concept will be covered in more detail later on.

Be careful here! This icon points out information that can save you a lot of grief. It's often easier to prevent tragedy than to fix it afterwards.



This icon identifies important advice for those studying to pass the three Microsoft Certified Professional exams on Windows NT.

I know this will be hard for you to believe, but sometimes things work differently in the real world than books—or software documentation—say they do. This icon draws your attention to the author's real world experiences, which will hopefully help you on the job, if not on the Microsoft Certified Professional exams.



This icon points out an interesting or helpful fact, or some other comment that deserves emphasis.

This icon indicates an online resource that you can access to obtain products, utilities, and other worthwhile information.

Here's a little piece of friendly advice, or a shortcut, or a bit of personal experience that might be of use to you.

I guess that about wraps up the general comments. From here you can get started on the nuts and bolts of learning about NT and get ready to pass those exams. I wish you great success!

Acknowledgments

"No man is an island, entire of itself," wrote John Donne. There's no time when that statement is more true than when you're producing a book like this one. It's a tremendous undertaking — not just by the author, but by scores of other people, too.

With that thought in mind, I'd like to take this opportunity to thank the following people who helped make this book possible:

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