1 Introduction

Pause and think for a moment about the perfect network. Imagine an enterprise network that is without failure of any type, and users that never ask for help or have problems with their systems. Now pinch yourself and wake up because you are surely dreaming. No matter how large or small the networks you manage, odds are that some type of failure creeps up on either an hourly, daily, or weekly basis.

For many, troubleshooting has become an art, or even an act of wizardry. Senior wizards roam some networks, magically dispelling problems as they occur, while junior administrators try to learn from their wisdom. While wisdom is certainly beneficial to troubleshooting any environment, and the need for real-world experience is surely helpful, how can one keep up with today's vast interrelationships of network technologies? In trying to merely keep up with technology, many learn enough about a service or technology to implement it, but then sometimes take hours to fix it when it breaks. The purpose of this book is not to tell you everything you need to know to manage network services and clients in a Microsoft network infrastructure. Instead, you will see how to approach, diagnose, and resolve problems on Microsoft networks.

This book starts at the roots of network troubleshooting and grows from there. After being introduced to Microsoft network infrastructure and fundamental troubleshooting methodology, you can then move on to reading about the technology where the problem exists. For example, if you are experiencing a DNS problem, check out the DNS chapter. If a user is having a problem opening a Word document, turn to the Office XP chapter. For each troubleshooting scenario, this book provides you with the tools and know-how to diagnose and quickly resolve a problem.

Since the array of technologies on Microsoft networks is so vast, this book focuses on the foundational technologies that are common to nearly all Microsoft networks. In troubleshooting Microsoft networks, while you could get by with Microsoft tools alone, you can significantly streamline the troubleshooting process by using the many third-party applications available. In addition to documenting the available Microsoft tools, this book includes over 15 third-party tools on the companion CD-ROM. Each of these tools is documented in Appendix C.

So that you can fully understand the flow of this book, the next 14 sections describe the purpose of each chapter as well as provide details on the book's included appendices.

Chapter 2: Fundamental Networking

This chapter is primarily designed for those with little to moderate experience with Microsoft networks. If you are confident in your understanding of network services such as DNS, WINS, and DHCP and have a solid command of TCP/IP networking, you can get by with merely skimming this chapter. Far too often, many technical books jump to assumptions, sometimes at the expense of the reader, which is something that this book avoids.

Too much is often assumed in IT, including an understanding of the fundamentals. Chapter 2 clears the smoke on Microsoft network components, providing quick-to-read and easy-to-understand explanations of Microsoft networking. Topics covered in this chapter include

- An overview of network protocols, including TCP/IP and IPX/SPX
- DNS
- DHCP
- WINS

After a quick review of the fundamentals, you can then move on to reading about the proven troubleshooting techniques that are highlighted throughout this reference.

Chapter 3: Troubleshooting Techniques

Many consider troubleshooting a journey filled with many stops, starts, twists, and turns. As on any journey, whether it's a trip to the grocery store or a vacation to Wally World, you have to take a series of sequential steps to reach your ultimate goal. For most, these steps have been repeated so often that they are now instinctive. When you go to the grocery store, you get in the car, start it, check the gauges, stop for gas along the way if it is needed, make a series of turns that get you to the store, and eventually park the car.

While many would like to jump in the car and drive off in the midst of a troubleshooting dilemma, that's not the point here. When you understand the techniques, troubleshooting can become as logical as driving a car. You need to know where and how to start, what to do in the middle, and what to do when you get there. Think of this chapter as "driver's ed" for troubleshooters.

Chapter 4: Monitoring and Diagnostic Tools

Resolving problems requires knowledge of what tools to use in each unique circumstance. Think of driving a car without having knowledge that the brake pedal helps you stop. Instead, you plan ahead and put the car in neutral about a half mile before each intersection. This approach may get you where you want to go (and maybe a few tickets as well) but will certainly take a lot longer.

The same can be said for troubleshooting. For most situations, there are likely dozens of tools available for use, some that you are aware of and others that you may have never heard of. This chapter begins to build your troubleshooting toolbox, outlining the use of the most frequently used troubleshooting tools for Microsoft networks. The chapter shows you tools that are available with the operating system, the OS support tools, and the OS resource kit. Also, you will see a few popular freeware troubleshooting tools that are included on the companion CD.

In subsequent chapters, additional tools that are specific to the chapter's content will be added to your toolbox. Choosing the right tool for the job will go far in helping you to resolve that 3:00 PM problem so that you're home in time for dinner.

With an understanding of the common troubleshooting tools at your disposal, you can then work through the remaining chapters of this book in any order that is appropriate. Client-server troubleshooting is the first troubleshooting topic covered, primarily because many of the troubleshooting tools in this chapter are useful in many other scenarios. The topics discussed in this chapter are covered next.

Chapter 5: Client-Server Troubleshooting

The majority of the computers on practically all networks are client systems. By simply weighing the odds alone, we can assume that resolving client computer problems is an inevitable part of day-to-day operations for most organizations. This chapter shows you the tools and techniques for quickly isolating and resolving faults on user systems. Since the client tools covered in this chapter are also available on Windows servers, the techniques used in this chapter also complement the troubleshooting techniques found in the server-specific chapters that begin with Chapter 7.

In addition to an explanation of operating system troubleshooting tools and techniques, this chapter presents the most common problems with XP clients and Windows Server 2003, along with their solutions. Regardless of what level of systems you support, this chapter is a "must read."

Chapter 6: Office XP

Office XP problems come in two forms: usability problems and application or file faults. Usability problems are often the result of a lack of user training and thus are not covered in this chapter. Answers to usability problems come merely from experience with the product and not from fault isolation.

While it would be nice if Office were the utopian application that never failed, that is not the case. Many tools have been included in Office XP to allow it to repair itself when application corruption occurs. This chapter describes these tools and explains what to do when these "automatic" tools fail to automatically correct an application problem.

Aside from the application itself failing, users may also experience problems with Word, PowerPoint, Excel, and Access files. Files occasionally become corrupted and oftentimes can be saved, or repaired at the very least. The remainder of this chapter breaks down common Office document faults and explains how to resolve them without having to turn to your trusty backup software to give the user yesterday's version of the needed file.

Chapter 7: Disk Subsystems

Regardless of the arrangement of your storage infrastructure, much of your organization's data will reside on hard disks, whether on IDE drivers on client systems, or on a server's storage array. Disk failures can be catastrophic, and oftentimes your job after a disk failure will be to get the system back to working order as quickly as possible.

This chapter focuses on giving you the tools and techniques for speedily troubleshooting disk-related problems. In addition to learning about the multitude of available diagnostic tools, you will see methods for identifying and resolving problems by using the Disk Management tool. The chapter concludes by showing you the common disk-related stop messages and how to isolate and resolve each of their associated problems.

Chapter 8: DNS

Domain Name Service (DNS) is a key cog in the core of nearly all networks. For many technicians and administrators, spending hours troubleshooting a problem that merely required a one-minute DNS-related fix is something that normally only has to occur once. Countless services rely on DNS for name resolution, so it is not unusual for what appears to be the failure of an application to actually be the lack of the existence of a needed A record in a DNS zone.

The chapter starts from the top, literally, by briefly covering the DNS hierarchy. Understanding the big picture makes it much easier to follow the flow of the DNS name resolution process and thus pinpoint the source of a DNS problem. From there, two additional tools will be added to your virtual toolbox, with the essential DNS tools `nslookup` and `dnscmd` being fully explored.

The remainder of the chapter focuses on troubleshooting both client- and server-side DNS issues, including client configuration, server configuration and replication, zone configuration, and Active Directory integration.

Chapter 9: WINS

While Windows Internet Naming Service (WINS) is dying a slow death, it is still not absent from most Microsoft networks. To that end, problems with WINS are still inevitable, and troubleshooting them should not be ignored. The chapter shows you the common `netsh` (Netshell) commands available for troubleshooting WINS problems and then follows a format similar to Chapter 8. Client and server resolution problems are first explored, and then the chapter finishes up at the heart of WINS troubleshooting: server and database configuration, and WINS database replication problems.

If you have already eradicated WINS from your network and see no hot spots of the disease remaining, consider yourself lucky. For the rest of us that still cannot avoid dealing with WINS problems at the beginning, middle, and end of the day (a slight exaggeration), this chapter is definitely beneficial.

Chapter 10: DHCP

Odds are that DHCP, unlike WINS, is alive and well on your enterprise network. When clients and servers can no longer communicate, and you see Automatic Private IP Addressing (APIPA) popping up on clients around your network, it's time to sound the DHCP problem siren.

This chapter answers the call by first showing you three handy tools for DHCP troubleshooting: the DHCP MMC snap-in, audit logging, and `dhcploc`. Further into the chapter, you will learn how to isolate and correct problems on both DHCP clients and DHCP servers, as well as problems relating to the Active Directory. In the event that you have DHCP relay agents deployed on your network, the chapter also includes a section on identifying problems relating to a relay agent and then provides steps on how to correct this type of problem.

DHCP problems can be localized to a single client computer or can have far-reaching consequences, such as when an entire network segment can no longer communicate with the rest of the network. When the DHCP problem siren rings (if we were only so lucky to have one), this chapter helps you answer the bell and come out punching.

Chapter 11: Network and Application Services

There are many more network services in addition to DNS, WINS, and DHCP, all of which have dedicated chapters. This chapter is the catch-all for the remaining services that are not wide-scale enough to warrant their own troubleshooting chapters. This chapter focuses on isolating and resolving faults for a potpourri of services, including

- Print services
- Terminal services

- Distributed File System (DFS)
- Remote Installation Services (RIS)
- NetWare integration

As with earlier chapters, each topic covered in this chapter begins with a quick refresher on its architecture, followed by descriptions of useful troubleshooting tools, and concludes with details on identifying and resolving the service's related problems.

Chapter 12: Routing and Remote Access

Routing and Remote Access Service (RRAS) has often stirred up more controversy in the certification world than in the real world. Plenty have had to learn to deal with common Windows RRAS troubleshooting issues in order to pass the dreaded network infrastructure administration exam, but few have had to apply these concepts in real life.

Many that work in and around enterprise networks would never build a Windows server and then convert it to a router, when they could simply purchase a router that is likely more efficient for far less money than a server. On the other hand, if you support small businesses, there is a likely chance that they are using at least a portion of Routing and Remote Access Service, such as Network Address Translation (NAT), in order to provide routing services and Internet access while keeping costs down. If you find yourself in this boat, then this chapter will be extremely valuable for you, since Routing and Remote Access Service can be fraught with danger.

If routing is not a concern of yours, then don't forget about the other half of the service: remote access. Maybe routing is not important, but you have remote access configured for dial-up connections to a Windows server. If this is the case, then you will find the remote access troubleshooting portion of the chapter very useful.

In addition to the usual quick architectural and fault resolution explanations, this chapter provides descriptions of some hidden treasures in the troubleshooting world by documenting many unknown tools that you will find invaluable when trying to pinpoint the source of an RRAS problem.

Chapter 13: Active Directory

What a way to end! Some have said that they fear Active Directory (AD) more than public speaking. AD is a vast sea of entwined objects and interrelationships, but with a general understanding of its framework and a troubleshooting game plan in place, you will see that approaching, troubleshooting, and resolving problems with the Active Directory is not much different from approaching any other network service.

Perhaps the key differentiator between AD and the other services mentioned in this book is that it is much newer than they are. This means that there are not many out there that can honestly state that they have years of troubleshooting experience on AD issues. If Cliffs Notes were ever needed for AD troubleshooting, you will find them here.

This chapter outlines the abundance of Microsoft tools available for locating and correcting AD faults and also references the AD tools contained on this book's CD. All aspects of Active Directory fault isolation are covered in this meaty chapter, including

- Group policies
- Domains
- Trusts
- Replication
- The Active Directory schema
- Flexible Single-Master Operations (FSMO) roles
- Security

With the pressure still on AD to prove itself as a reliable directory service, its credibility depends on you. The quicker that you can resolve AD problems as they occur, the sooner your organization will come to accept your Active Directory integrated network infrastructure. This chapter leaves no stone unturned in its pursuit of AD fault detection and correction.

Appendices

The book's three appendices are jammed with valuable troubleshooting information. Appendix A provides an alphabetical list and description of every command line troubleshooting tool referenced in this book. Appendix B lists the most common error and stop messages, along with ways to quickly identify and resolve the cause of their related problem. Appendix C is a troubleshooter's treasure chest. In it you will find documentation on all of the third-party tools included on this book's companion CD as well as documentation on tools available for download over the Internet. With these tools in your toolbox, you will resolve network faults quicker and even know about many faults before anyone else realizes that there's a problem.

Summary

This chapter introduced you to the framework for this reference. These are the key points to remember about navigating through this book.

- Start with Chapters 2 and 3 to build a troubleshooting foundation.
- Continue to Chapter 4 to familiarize yourself with the tools at your disposal.

- Move to Chapter 5 to understand XP client and Windows Server 2003 troubleshooting as well as tools such as Remote Desktop and System Restore that will aid you in resolving many of the server-related problems you may encounter.
- Work through the remaining chapters in any order you desire.

It is recommended that you initially read through the book to familiarize yourself with the many troubleshooting concepts and tools presented, and then keep the book handy so that you can refer to a particular chapter when you find yourself in a bind in any troubleshooting scenario. When you have the proper technique and knowledge of the systems you are troubleshooting, troubleshooting can quickly become one of the most enjoyable and rewarding aspects of your job. Turn to Chapter 2 to let the fun begin.