SANS GIAC Certification:

Security Essentials Toolkit (GSEC)

Eric Cole
Mathew Newfield
John M. Millican

que® CERTIFICATION
SANS PRESS

201 West 103rd Street, Indianapolis, Indiana 46290

SANS GIAC CERTIFICATION: SECURITY ESSENTIALS TOOLKIT (GSEC)

International Standard Book Number: 0-7897-2774-9

Library of Congress Catalog Card Number: 2002101824

Printed in the United States of America

First Printing: March 2002

04 03 02 4 3 2 1

Trademarks

All terms mentioned in this book that are known to be trademarks or service marks have been appropriately capitalized. Que Publishing cannot attest to the accuracy of this information. Use of a term in this book should not be regarded as affecting the validity of any trademark or service mark.

Warning and Disclaimer

Every effort has been made to make this book as complete and as accurate as possible, but no warranty or fitness is implied. The information provided is on an "as is" basis. The authors and the publisher shall have neither liability nor responsibility to any person or entity with respect to any loss or damages arising from the information contained in this book.

PUBLISHER
David Culverwell

SENIOR ACQUISITIONS EDITOR
Jeff Riley

DEVELOPMENT EDITOR
Ginny Bess Munroe

MANAGING EDITOR
Thomas F. Hayes

PROJECT EDITOR
Thomas F. Hayes

COPY EDITOR
Ginny Bess Munroe

INDEXER
Tom Dinse

PROOFREADER
Megan Wade

TECHNICAL EDITORS
Mike Poor
David Goldsmith
Sheila Ettinger

INTERIOR DESIGNER
Anne Jones

COVER DESIGNER
Aren Howell

CONTENTS AT A GLANCE

TABLE OF CONTENTS

FOREWORD

More people have taken the SANS Security Essentials course than any other information security course in the world, and the numbers are growing rapidly. Today, our job in security is so complex that each of us must realize we have significant gaps in our understanding. Security Essentials fills the gaps. A few people have played notable roles in developing the courseware, though it is the product of several hundred security practitioners in the defensive community working together, and it continues to evolve to meet the needs of the students.

Security Essentials was born at the SANS 1999 annual conference in Baltimore, Maryland. Alan Paller, Director of Research for SANS, had been trying to develop a program to cover only those elements you need to know about information security and nothing else; however, it had been slow and painful. Everyone who worked on the project ended up giving up after a couple of weeks. I was very busy at the time, but Alan would tell me what he had attempted and why it didn't work. I would nod and express my condolences being careful not to volunteer my opinions or help. I wanted to help, but it sounded like a tremendous amount of effort involving potentially thousands of hours. However, I too was frustrated. I was a manager for the Department of Defense, and it was hard to hire people with the skills to do the jobs we needed done. At best, potential employees understood the theory of security, and they understood that those theories tended to originate from a mainframe era. I thought if I could just hire people who met a minimum standard, my life would be ten times easier. Prior to departing for Baltimore, I knew that for better or worse, I was going to take the lead for the Security Essentials project. It was too important a project, and I wanted to help Alan get it off the ground.

On the third day of the conference, I had a day off, one of the few days when I wasn't teaching, so Alan and I got in a harbor taxi boat to get away from the noise and excitement of the conference. We had a set of index cards with us, and as soon as we go on the boat, we started brainstorming on those cards. We knew we had to figure out what people needed to know, or what was critical versus what wasn't critical. We asked ourselves, "What are the essentials of information security for the practitioner?"

When we got back to the conference speaker room, Fred Kerby, an information security manager for the U.S. Navy, took the cards and started to create a list from what we had written. Michele Guel, Hal Pomeranz, and other instructors debated the list and added their unique perspectives. Dr. Eugene Schultz, founder of CIAC and an instructor, contributed to an hour-long conference call expressing his concerns and giving us his suggestions. We arrived at version .21 of the course. The fact that we were not yet at a full-numbered version tells you how far we felt we needed to go. We then had objectives and domains of knowledge reviewed by the CIO Institute to get feedback from senior management and from as many system, network, and security administrators in the trenches as we could find.

Finally, we began development of the first course modules by starting with what we thought were the absolutely necessary courses, such as cryptography, malicious code, how IP works, and threat and risk assessment. At the time, we were hoping to partner with ISC2, the company that produces the CISSP. We shared the design, objectives, and courseware developed at the time, and we asked for guidance on what they thought might be missing, or what needed to be covered differently. Eventually, after 99 revisions, we reached version 1.0 of Security Essentials. Before anyone outside of the development team ever saw the courseware, over a hundred security experts from 15 different countries had invested in the creation of Security Essentials.

The goal of this project from the beginning was for it to represent a consensus of the global community. Special thanks should be offered to Philip Boyle, an IT worker from New Zealand; Guy Bruneau who worked in the DnD Cirt from Canada; Andrew Sturman, a consultant from the United Kingdom; and Dean White, an intrusion detection analyst from Australia. We also felt that the only way to distribute this product globally was to offer

an online version of the course. Jennifer Kolde, Director of the GIAC Certification, was instrumental in formatting the early courseware. Dave Turley, a lead programmer for SANS, wrote the software delivery system for both the courses and exams, which he built on the work that Rob Kolstad started. John Green, the second leader of the "Shadow team" and co-founder of Incidents.org, created the powerful database that tracks registration and accounting for both the live and online training. Doug Austin, a consultant, developed the system we use for digital audio. Karen Ellrick, a musician and missionary in Japan, helped us make a huge breakthrough when she suggested we convert from audio tapes as our sound source to mini-disks. The higher-quality source material resulted in better sounding files, one of the biggest problems we had to overcome and did, thanks to Karen.

Eric Cole, the lead author of this workbook, was involved with the project since the early days, and he is a top-notch instructor of the courseware. When we realized that we were going to have to expand the program from three to six days to cover the material properly, Eric took the lead role in the conversion.

The course is being taught somewhere in the world almost weekly, in conferences, in private onsite sessions, or in the form of a local, mentoring project. We've seen the course taught just about everywhere, from Atlanta, Georgia, to Honolulu, Hawaii to Dubai.

I am thankful to have had the best seat in the house from which I could watch this course grow. I have met a lot of wonderful people, and I know that together we are making a difference. I thank God for giving me the courage to work on this project. It is by far the most challenging project I have ever worked on. I missed out on a lot of sleep and many swims off the beaches of Kauai with my wife and son, but I feel it was, and is, worth the sacrifice. The day is coming when it will be impossible to be considered a credible information security practitioner without holding a GIAC Security Essentials Certification.

This book is a very positive step forward in the evolution of the program. I want to thank Eric Cole, Matt Newfield, John Millican, and the review team for their tremendous efforts. It takes tools to get work done, and this workbook will help practitioners acquire and use the tools that will help accomplish the essential work of security. Take your time, master the tools, and take notes (there is space to do this in the book) while building a toolbox that works for you. We care deeply about your experiences, what works for you, and what doesn't work for you. We want to know the things you know or don't know, so don't be a stranger.

Stephen Northcutt
The SANS Institute

ABOUT THE AUTHORS

Eric Cole has worked in the information security arena for more than 10 years. He holds several professional certifications and has helped develop several of the SANS GIAC certifications and corresponding courses. Eric has a BS and MS in computer science from New York Institute of Technology and is completing his Ph.D. in network security. He has extensive experience with all aspects of information security including the following: cryptography, stenography, intrusion detection, NT security, Unix security, TCP/IP and network security, Internet security, router security, security assessment, penetration testing, firewalls, secure Web transactions, electronic commerce, SSL, TLS, IPSec, and information warfare.

Eric has created and headed up corporate security for several large organizations, built several security consulting practices, and worked for more than five years at the Central Intelligence Agency. He was an adjunct professor at New York Institute of Technology and is currently an adjunct professor at Georgetown University. Eric is author of the book *Hackers Beware* and contributing author to *Know Thy Enemy: The HoneyNet Project*. Eric teaches a wide range of courses for SANS and is actively involved with several of the research projects that SANS is performing. He led the SANS Top 20 vulnerability consensus project and is actively involved with the Cyber Defense Initiative.

Mathew Newfield serves as a Senior Security Analyst for TruSecure Corporation. His background includes penetration testing, security architecture, and design and network consulting. He currently works with several companies in securing their environments and obtaining corporate security certifications.

John M. Millican has been providing information consulting services since 1978. During that time, he has supported numerous versions of Unix, including AT&T, CTIX, SCO Unix, AIX, Unixware, and Linux. John was the first person to earn all the GIAC Level 2 Certifications offered by the SANS Institute. He is certified by SANS GIAC for Intrusion Detection In Depth (GCIA); Advanced Incident Handling and Hacking Exploits (GCIH); Firewalls, VPNs, and Perimeter Protection (GCFW); Securing Windows (GCFW); Securing Unix (GCUX); and Auditing Networks, Perimeters, and Systems (GCNA). He is currently the chairman of the SANS Unix Security Certification Board. John also assisted in the development of the SANS Security Essentials Bootcamp.

TECHNICAL REVIEWERS

Mike Poor is a security analyst for Compugenx, a Washington, D.C.-based consulting company. He holds SANS, GSEC, and GCIA certifications. As a security analyst, he conducts vulnerability assessments, penetration tests and security audits and administers intrusion detection systems. Previously, Mike has worked in network engineering and systems, network, and Web administration. He is currently working on merging Snort, Shadow, and ngrep to bring more analytical power to the analyst.

Sheila Ettinger is gainfully employed as a Unix Systems Administrator at Concordia University in Montreal. In her previous life, she worked in contract research and as a technical writer, software tester, and Windows trainer. Sheila is currently part of the design team involved in a project to reorganize Concordia's IT services. (She is being dragged kicking and screaming into the world of Active Directory. We'll let you know if she survives.)

In addition to her day job, Sheila teaches evening computer courses at Concordia's Center for Continuing Education and is a Program Consultant for the center's Computer Institute. In her down time, she enjoys playing clarinet in a number of community concert bands and taking courses in the university's music department.

David Goldsmith has been working in the computer and network industry for over 10 years, of which he has focused the last 3 on Internet connectivity and system/network security. From 1990 to 1995, he worked for the USMC as a system/network administrator and systems engineer. From 1995 to 1999, he worked for Ocean Systems Engineering Corporation providing system administration and network security support for the USMC. David currently has his own business, Rappahannock Technologies, Incorporated, which focuses on providing network security consulting services to commercial companies. He holds a degree in computer science from the University of California, San Diego.

DEDICATION

From Eric Cole:

To my loving wife for all her support.

From Mathew Newfield:

I would like to dedicate this book to my son Samuel.

From John M. Millican:

I dedicate this to my wife for all of her support throughout our years together.

ACKNOWLEDGMENTS

From Eric Cole:

I want to thank Que Certification for their help and support through this process, mainly Jeff Riley and Ginny Bess. They are a great publishing team to work with and have proven that the only way to produce a great product is to have fun doing it.

I also want to thank SANS for being such a great organization. Alan Paller and Stephen Northcutt are wonderful people to work with and very helpful. They gave me great advice and support throughout the process of writing this book.

What always makes me nervous about including an acknowledgements section is the thought that I might overlook someone. When this book comes out, I am going to remember who I forgot. Thus, I am dedicating a blank line here for those I forgot to acknowledge. You can write your name into this section _____. Most of all, I want to thank God for blessing me with a great life and a wonderful family. Kerry Magee Cole is a loving and supportive wife. My wonderful son, Jackson, brings me joy and happiness every day. I'm also grateful for the new special blessing in our life who will be arriving in June. Ron and Caroline Cole and Mike and Ronnie Magee are great parents to me and offer both love and support. Finally, I'm grateful for a wonderful sister, brother-in-law, nieces, and nephews: Cathy, Tim, Allison, Timmy, and Brianna.

For anyone who I forgot or did not mention by name, I thank you, especially my friends, family, and co-workers, who have supported me in numerous ways throughout this entire process.

From Mathew Newfield:

I would like to thank my wife Jennifer, my son Samuel, my mother and Bill, my father and Sarah, and all of my friends for always being there for me. I would also like to thank TruSecure Corporation and especially Bill Harrod and Kristen Lovejoy for giving me the support, time, and opportunity to dedicate to this project.

From John M. Millican:

I would like to thank my wife Jill, my daughter Julie, and my son Chris for their support and patience during this long, strange trip. I would also like to add my expression of appreciation to the entire SANS community. It is their commitment to helping develop the information security community that has offered these opportunities to me.

TELL US WHAT YOU THINK!

As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

As a senior acquisitions editor for Que Certification, I welcome your comments. You can fax, email, or write me directly to let me know what you did or didn't like about this book—as well as what we can do to make our books stronger.

Please note that I cannot help you with technical problems related to the topic of this book, and that due to the high volume of mail I receive, I might not be able to reply to every message.

When you write, please be sure to include this book's title and authors as well as your name and phone. I will carefully review your comments and share them with the authors and editors who worked on the book.

Fax: 317-581-4666
Email: `jeff.riley@quepublishing.com`
Mail: Que
201 West 103rd Street
Indianapolis, IN 46290 USA

Introduction

The SANS (System Administration, Networking, and Security) Institute is a cooperative research and education organization through which more than 96,000 system administrators, security professionals, and network administrators share the lessons they are learning and find solutions to the challenges they face. SANS was founded in 1989.

The core of the institute consists of security practitioners in government agencies, corporations, and universities around the world who invest hundreds of hours each year in research and teaching to help the entire SANS community. During 2000 and 2001, this core group grew rapidly as the Global Information Assurance Certification program developed mentors to help new security practitioners master the basics.

The SANS community creates four types of products:

- System and security alerts and news updates
- Special research projects and publications
- In-depth education
- Certification

Several SANS resources, such as news digests, research summaries, security alerts, and award-winning papers, are free. Income from printed publications funds university-based research programs. The Global Information Assurance Certification program and special research projects are funded by income from SANS educational programs.

SANS's GIAC (Global Information Assurance Certification) is one of the fastest growing areas among the institute's educational offerings. GIAC online training caters to the needs of security professionals, from those who are just getting started with the Information Security KickStart module, to the advanced GIAC Security Engineer honors program. Over 1,000 students have achieved GIAC certification, and many more are currently in the process of achieving it.

For more information, see `http://www.sans.org` or `http://www.giac.org`.

WHO SHOULD READ THIS BOOK

This book is beneficial to those who are interested in security or those who are new to security. It covers the essential tools and concepts that you need to understand in order to be a productive security professional. If you have been working in the security field, you will still find value in the material presented in this book. You might be familiar with some of the tools, but several of the tools will be new to you, or you might discover new ways of using a tool. In summary, this book is meant to provide a hands-on style of learning that compliments the SANS Security Essentials course. This book was written to provide value as an independent text. We wrote this book under the general principle that if we could teach you about the tools, you would be prepared to conquer any security task.

NOTES

WHAT'S IN THIS BOOK

This book is about the tools. There is so much work to be done in security. Manual methods are just too time-consuming. If we use the most valuable tools, and we understand the benefits of them, we will be more productive with our time. With this premise in mind, this book covers tools across all areas of security, as noted in this list:

- Security Overview
- Security Concepts
- Network Security
- Secure Communications
- Windows Security
- Unix Security

Each section of the book is broken up into chapters that cover a number of tools.

CONVENTIONS USED IN THIS BOOK

Each chapter is composed of a set of exercises, each of which features a specific tool. The idea is for you to learn how to install and use the tools so that you can apply your knowledge to secure your company's network and computer systems. To make the tools and exercises easy to understand, the following format is used to describe each exercise:

- **Description** The Description section provides an overview of the tool being discussed in the exercise and where it fits in the overall security scheme. Background information and other relevant data are also described in this section.
- **Objective** Every tool is designed for a specific purpose or domain of use. The Objective section describes the purpose of the tool and what skills you should gain by completing the exercise and running the tool.
- **Requirements** Whatever is required in order to run the exercise and utilize the tool is described in this section.

  Subsections of the Requirements section include the following:

  Permission Keep in mind that some of the tools discussed can compromise systems or perform actions that could be deemed illegal in some countries or states. Thus, this section explains when you need to gain permissions.

  Hardware Various programs require hardware or components to run. Hardware requirements are listed in this section.

  Software Various programs run on different operating systems and require other programs to be loaded. Software that is needed in order to run a tool or complete an exercise is listed in this section.

- **Challenge Procedure** The Challenge Procedure sections provide an overview of the steps that you perform to complete the exercises.
- **Challenge Procedure Step-by-Step** This section provides a detailed step-by-step instruction of the steps required to install, configure, and run the tool that is discussed in the Description section and Challenge Procedure section. Screen shots are provided to make this section as straightforward and easy as possible to follow.
- **Challenge Questions** Throughout the step-by-step procedures, questions are periodically inserted that challenge you to think about other ways the tools can be used to help expand your knowledge and understanding of the concepts that are being described.
- **Additional Reading** Additional reference materials are recommended for several of the exercises. These include articles, papers, or books. They are listed in this section.
- **Summary** The Summary section ties together what you have learned in each section. The summaries also serve to summarize the bigger picture helping you to resolve the puzzles of network security. Any other features or functions of the system are also described in this section.

- **Commands, Screen Captures, Menus, Keys, and Buttons** For your convenience, we highlighted in bold commands and items that are "selected" or "clicked." We also highlighted in bold the names of screens, menus, keys, and buttons. We used this convention to make your work easier and to make the exercises easier to follow.
- **Notes** Periodically, we inserted notes to supplement your understanding of specific topics. In addition, we provided you space to take your own notes. Use this space to jot down tips or instructions that you want to take back to your organization. Or, use it to jot down questions you might want to pursue when you research some of the "Additional Reading" references.

Remember, the best way to learn is to experiment and test each of these tools. Download them, install and run them on your system, and learn the value they can offer your security strategies. Above all else, have fun as you take steps toward securing your organization.

NOTES

NOTES

Chapter 1

Security Overview

INTRODUCTION TO SECURITY TOOLS

Security is a complex field. Manually testing and securing your systems can be a daunting task at best and impossible at worst. Thankfully, there are numerous tools available that can help secure your site with minimal effort. With these tools, you will still have to analyze the results, but at least a bulk of the work is done for you.

The purpose of this book is to provide you with the exact steps for installing, configuring, and running the most popular security software tools on your systems. To teach you in the most efficient manner, we've developed a workbook-style approach. This book also concentrates on shareware and freeware tools emphasizing the fact that you do not need to spend a lot of money in order to have a secure network.

The following table shows you the tools that will be discussed in this book.

NOTES

Shareware and Freeware Security Tools

Application	Description	Available At
BlackWidow	An offline Web site browser and information tool	http://www.softbytelabs.com/files/BlackWidow.exe
Cisco ConfigMaker v2.5.1	Cisco network configuration tool	http://www.cisco.com/univercd/cc/td/doc/clckstrt/cfgmkr/download.htm
Crack	A password cracker	http://www.users.dircon.co.uk/~crypto/download/c50-faq.html
Dumpel	Dumps the contents of the Windows NT and Windows 2000 event logs	http://www.microsoft.com/windows2000/techinfo/reskit/tools/existing/dumpel-o.asp
DumpSec	Windows security auditing program	http://www.somarsoft.com/somarsoft_main.htm
Ethereal	Network sniffing and packet analysis tool	http://www.ethereal.com/distribution/win32/ethereal-setup-0.9.0-1.exe
Forensic Toolkit	File properties analyzer	http://www.foundstone.com/rdlabs/tools.php?category=Forensic
Fport	Reports all open TCP and UDP ports and maps them to the running application	http://www.foundstone.com/rdlabs/termsofuse.php?filename=FportNG.zip
Fragrouter	A tool to fragment packets sent from a host to a target	http://www.packetstormsecurity.com
Ghost Corporate Edition	DOS-based disk cloning	http://www.enterprisesecurity.symantec.com/content/productlink.cfm?
HFNETCHCK	A tool developed by Microsoft to help administrators stay current with system patches	http://www.microsoft.com/downloads/release.asp?releaseid=31154
Hping2	An advanced tool that expands on ICMP functionality	http://www.hping.org/hping2.0.0-rc1.tar.gz
IIS Lockdown	A tool to assist in the hardening of an IIS installation	http://www.microsoft.com/Downloads/Release.asp?ReleaseID=32362
John the Ripper	A password cracker	http://www.packetstormsecurity.com
Jphs	A Windows-based steganography tool	http://www.linux01.gwdg.de/~alatham/stego.html
Jsteg	A Windows-based steganography tool	http://www.tiac.net/users/korejwa/jsteg.htm
LeakTest	Tests personal firewalls to determine if they warn when outbound connections are made	http://www.grc.com/lt/leaktest.htm
Legion	A Windows-based share scanner	http://www.nmrc.org/files/snt
Logcheck v1.1.1	Unix log monitoring system	http://www.psionic.com/abacus/logcheck
L0pht Crack 3.0	A password cracker	http://www.atstake.com/research/lc3/
Nessus	A Linux-based vulnerability scanner	http://www.nessus.org

NOTES

Shareware and Freeware Security Tools Continued

Application	Description	Available At
Netbus 1.7	Remote control trojan software	http://www.packetstorm.decepticons.org/trojans/NetBus170.zip
nmap	A Linux-based port scanning utility	http://www.insecure.org/nmap/nmap_download.html
pgp	Encryption software for files and email	http://www.pgpi.org/products/pgp/versions/freeware/
Ping War	A Windows-based tool to quickly ping a large range of IP addresses	http://www.simtel.net/autodownload.html?mirror=5&product=17874&key=00dbb38ca3570c3050b1
Psionic PortSentry 1.1	Unix port monitoring tool	http://www.psionic.com/tools/portsentry-1.1.tar.gz
Purge-It!	Trojan removal helper application	http://www.purge-it.com
PWDump3	A password cracker	http://www.ebiz-tech.com/pwdump3
S-tools	A Windows-based steganography tool	http://www.members.tripod.com/steganography/stego/software.html
Snort	A freeware IDS and packet sniffer	http://www.snort.org/downloads.html#1.19
Socket 80	A GUI-based application that runs Unicode attacks against IIS servers	http://www.astalavista.com/tools/auditing/network/http-server/
Startup Cop	A tool to create startup profiles in Windows	http://www.pcmag.com/article/0,2997,s=400&a=8066,00.asp?download_url=http://common.ziffdavisinternet.com/download/0/1098/startcop.zip
SubSeven	Remote control trojan software	http://www.securityfocus.com/tools/1403
Sudo v1.6.3p7	Grants limited access to Unix privileges	http://www.rge.com/pub/admin/sudo/
SuperScan	A Windows-based port scanner	http://www.packetstormsecurity.com
Swatch 3.0.4	Unix syslog monitoring tool	ftp://ftp.stanford.edu/general/security-tools/swatch/
Tcpdump	A packet sniffer for Linux	http://www.tcpdump.org
TCP Wrappers 7.6	Inetd wrapper program that monitors, logs, and controls access to network services	ftp://ftp.porcupine.org/pub/security/tcp_wrappers_7.6.tar.gz
TFN2K	A DDoS tool	http://www.packetstormsecurity.com
Tiny	Personal firewall	http://www.tinysoftware.com/
Firewall v2.0	for Windows-based systems	tiny/files/apps/pf2.exe
Tripwire	Host-based intrusiondetection system that uses MD5 hashes of files to detect changes	http://www.tripwire.org/downloads/index.php
Webslueth	A Web site analysis tool	http://www.download.com
Whisker	A CGI scanner	http://www.wiretrip.net
Wildpackets's	Windows IP	http://www.wildpackets.com/

NOTES

Shareware and Freeware Security Tools Continued

Application	Description	Available At
IP Subnet Calculator	Subnet calculator	products/ipsubnetcalculator
Windump	A packet sniffer for Windows	http://www.netgroup-serv.polito.it/windump/install/Default.htm
Winnuke	A tool that causes Windows NT 4.0 servers SP 3 or earlier to perform a Blue Screen of Death	http://www.astalavista.com
WinZip 8.1	A Windows-based file archiving and compression tool	http://www.winzip.com
Xinetd 2.3.3	Inetd replacement that combines inetd and TCP wrappers	http://www.synack.net/xinetd/
ZoneAlarm Personal Firewall	Personal firewall for Windows-based systems	http://www.zonealarm.com/za_download_1.htm

In order to make the most out of this book and the tools on your network, you need to be running both Microsoft Windows 2000 and RedHat Linux. The easiest way to do this is to configure your system to dual-boot two different operating systems. The following section walks you through the steps needed to configure your system.

NOTES

EXERCISE 1: CONFIGURING YOUR SYSTEM

Description

Throughout this book you will perform several exercises that use either Windows 2000 or Linux. To successfully perform these exercises, it is necessary to have access to systems running either Windows 2000 or Linux, or both. To minimize the investment required to set up your test lab, we will show you how to create a single system that can run either operating system.

This technique does not allow you to operate both operating systems simultaneously. To do that, you will need a product, such as Vmware, that creates virtual machines to operate concurrently. Now that used systems are fairly cheap, ideally you could set up at least two computers to dual-boot. Then, you can boot either system into either operating system for maximum flexibility.

Both Windows 2000 and Linux are dynamic operating systems, and security patches are constantly published as new vulnerabilities are discovered. This is normally a good thing, but it can work against your ability to run this book's exercises successfully. A security patch might correct a problem that we are trying to demonstrate. For this reason, we strongly recommend that you set up a system as defined in this exercise. This ensures that you achieve the maximum value the activities in this book offer. Also even if an exercise doesn't work properly, you can still learn about the tools demonstrated. Thus, even if you have an existing system that has been patched, it is worth your time to run through each exercise.

Similarly, we emphasize that this is not how you should set up a production system. Lab systems are set up for learning. We are deliberately leaving vulnerabilities installed and unnecessary services running. Excellent references are available to assist with the setup of secure production systems. The SANS Institute has several references to aid you, including the following guides: *Windows 2000 Security: Step-By-Step* and *Securing Linux: Step-By-Step*.

We also strongly recommend that you not connect the lab systems you set up for this book to a production network. You will be installing software that can be dangerous or that can reveal sensitive information. You should not risk exposing your valuable systems to these tools.

Finally, unless you are the owner of the system you will be setting up for these labs, you should get written permission from the system owner to install the software and perform the exercises in this book. Failure to do so could subject you to disciplinary action. Anyone who works in the field of network security should have a small, personal lab set up at home, where new exploits and tools can be tested without risking repercussions from an employer.

Requirements

- **Permission**

  The exercises in this book entail the installation of malware that can provide complete control over a targeted system. If you are not the legal owner of the systems used for the exercises in this book, you should obtain authorization from the legal owner and/or your management team prior to conducting this or any other exercise. ***Do not proceed without receiving the necessary permissions.***

- **Hardware**

  An Intel-based PC that meets the requirements of Windows 2000 as documented by Microsoft at `http://www.microsoft.com/windows2000/server/howtobuy/upgrading/compat/default.asp` and Red Hat Linux 7.2 as documented by Red Hat at `http://www.hardware.redhat.com/hcl/genpage2.cgi?pagename=hcl`

NOTES

4GB minimum hard disk drive

128MB RAM memory (256MB or greater is recommended)

Ethernet adapter

- **Software**

  Windows 2000 Professional

  Red Hat Linux 7.2 Professional

Challenge Procedure

The following are the general steps that you are going to perform:

1. Install Windows 2000 Professional.
2. Install Red Hat Linux 7.2 Professional.
3. Test boot into each operating system.

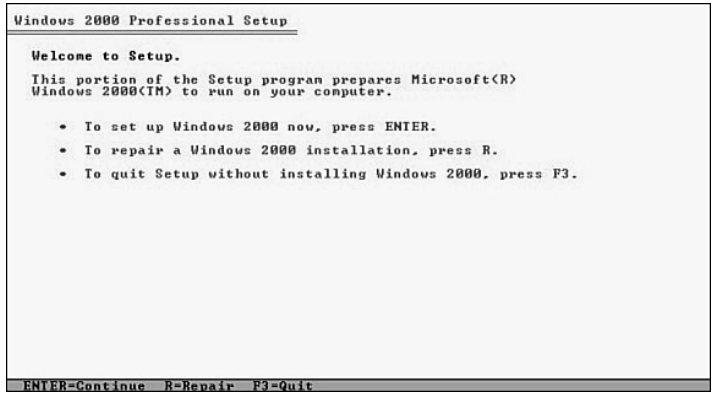
Challenge Procedure Step-by-Step

The following are the exact steps you are going to perform to configure your system for dual-boot operating systems:

1. First, install Windows 2000 Professional. To do this, power on the PC and insert the Windows 2000 Professional installation CD. The system should boot off of the CD. If it does, proceed to step 3. If your system does not boot from the CD, check the PC BIOS settings to verify that it is set up to do so. It is a good security procedure to disable this feature, and it may have been disabled on your PC. If your PC does not support booting from the CD, you will need to perform step 2 to create boot disks.
2. Label four blank, formatted, 3.5-inch, 1.44MB floppy disks: **Setup Disk One**, **Setup Disk Two**, **Setup Disk Three**, and **Setup Disk Four**.
3. Insert **Setup Disk One** into the floppy disk drive of any Windows or DOS system.
4. Insert the Windows 2000 CD-ROM into the CD-ROM drive.
5. Click **Start**, and then click **Run**. In the **Open** box, type the following:

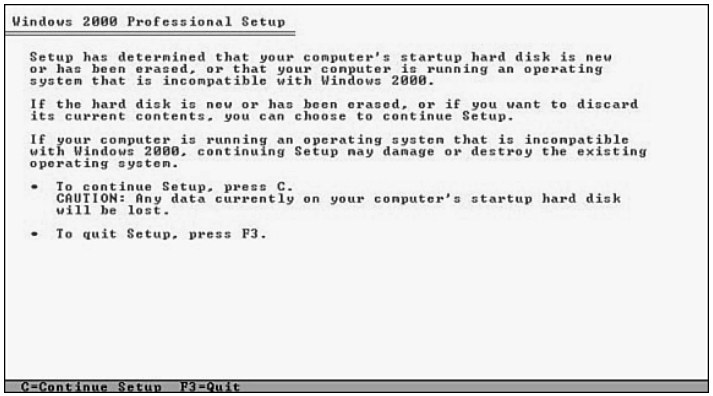
   d:\bootdisk\makeboot a:

   d: is the drive letter assigned to your CD-ROM drive. Click **OK**.
6. Follow the screen prompts. Then, insert **Setup Disk One** in the floppy disk drive of the lab PC and power the PC on.
7. After processing for a while, the following screen should appear. Press **Enter** to install Windows 2000.

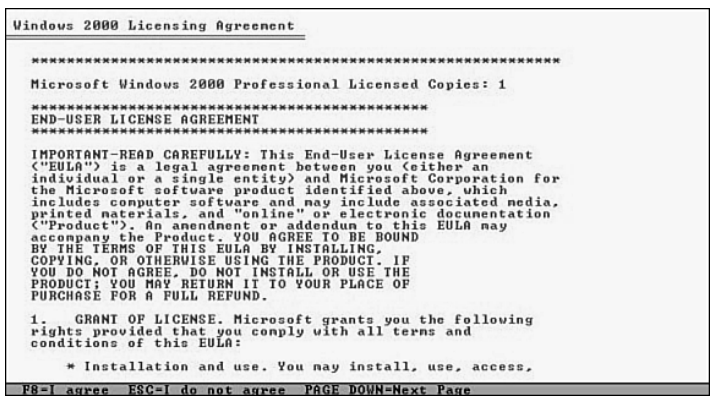


NOTES

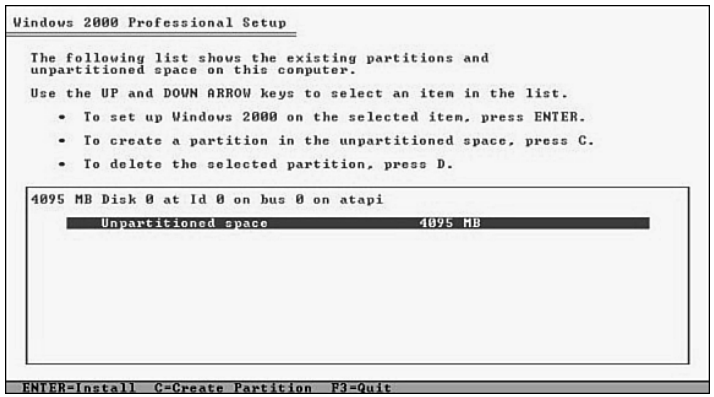
8. Press **C** to continue with the installation.



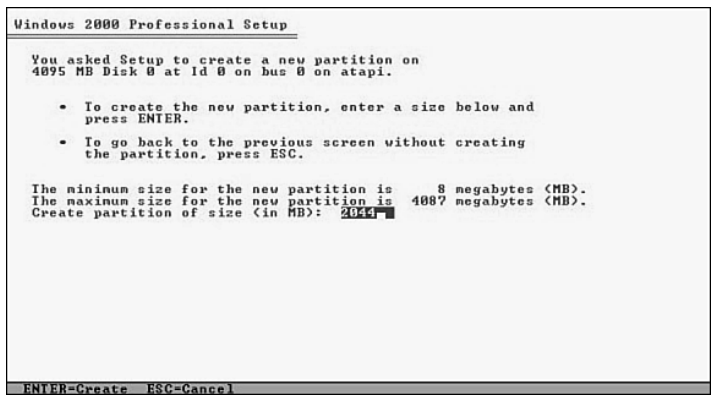
9. Review the license agreement and press **F8** to accept it.



10. Press **C** to create a partition in the unpartitioned disk space.

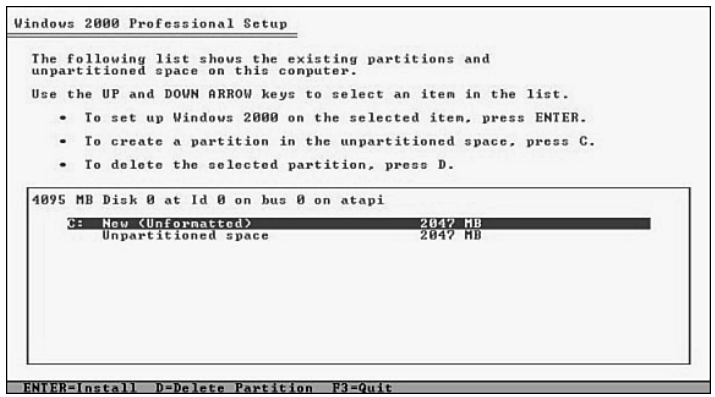


11. Create a partition that is at least 2,000MB (2GB).



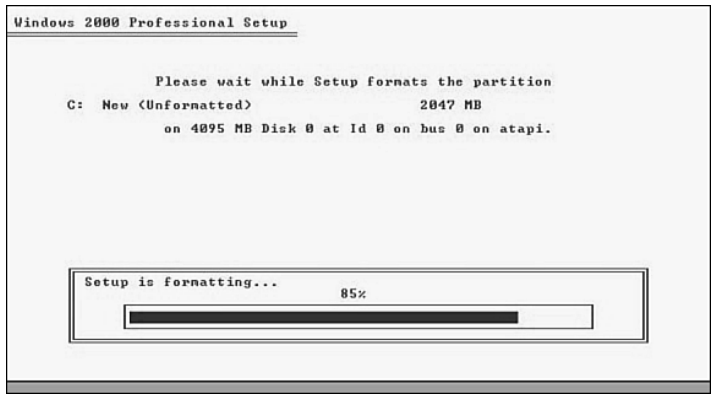
NOTES

12. You are taken back to the main partition selection screen. Select the **C:** partition and press **Enter**.

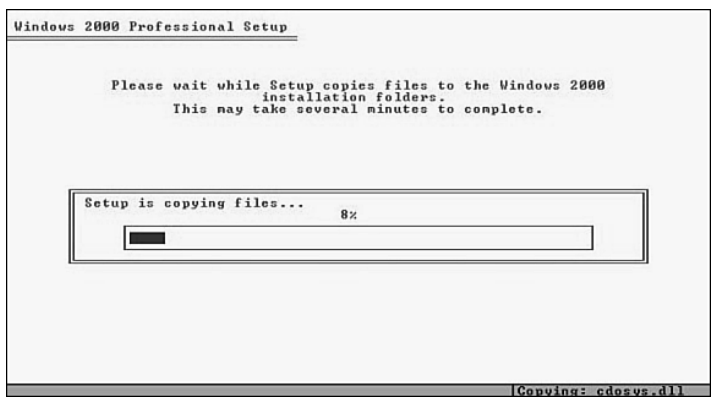


13. Select **Format the Partition Using the FAT File System** and press **Enter**.

14. A progress bar displays.



15. After the disk is formatted, the setup routine copies the initial files to the system.

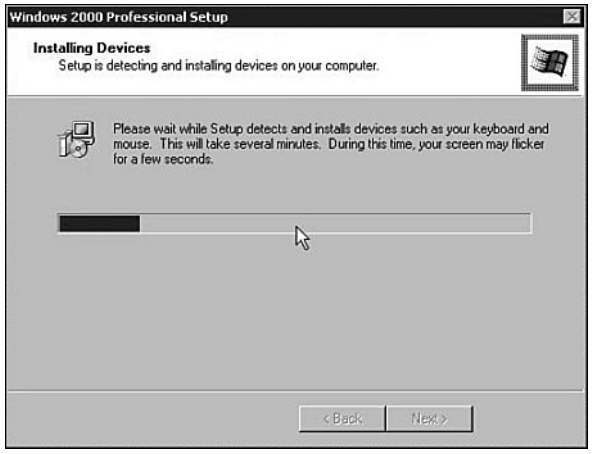


NOTES

16. After the initial installation files have been copied to the new system, press **Enter** to reboot the system. It automatically reboots after about 15 seconds. If you booted off floppies, be sure to remove them from the disk drive before rebooting.

17. When the system reboots, the Windows 2000 Setup Wizard automatically starts. Click **Next** to continue.

18. The Setup Wizard attempts to detect the devices on your system. Click **Next** to proceed.

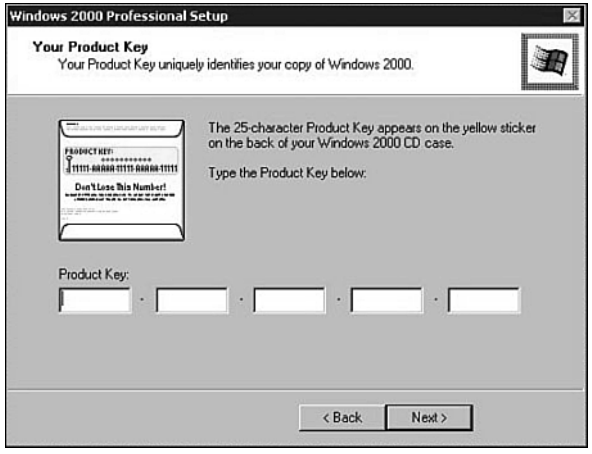


19. The installation process defaults to the English (United States) locale with the US keyboard layout. Click **Next** to accept the defaults. The **Regional Settings** screen appears.

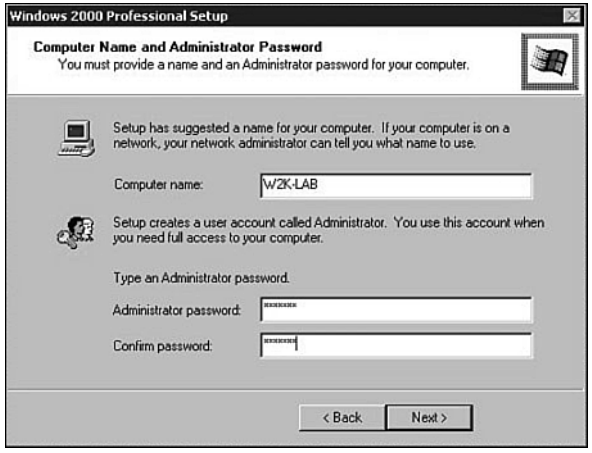
NOTES

20. Enter an account name and organization to personalize your software. The **Personalize Your Software** screen appears. Click **Next**.

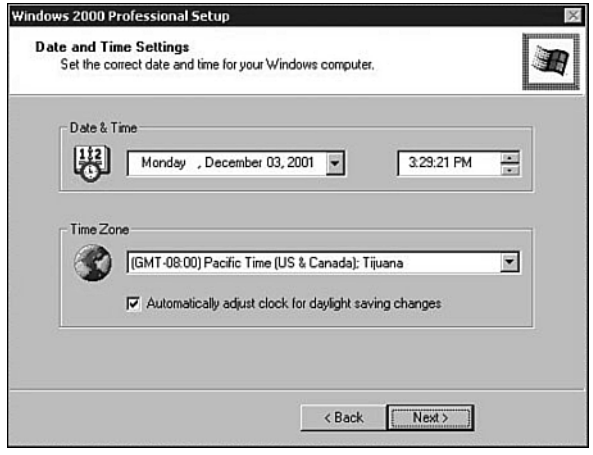
21. The **Your Product Key** screen appears. Enter the product key that came with your Windows 2000 distribution. Click **Next**.



22. The **Computer Name and Administrator Password** screen appears. Give it a meaningful name and assign a strong password to the administrator account. Good passwords are at least eight characters in length and include upper- and lowercase letters, special characters, and numbers. Click **Next**.

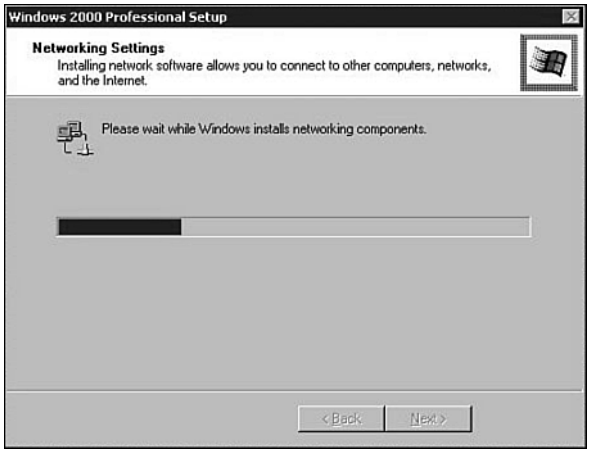


23. In the **Date and Time Settings** box, set the time zone to correspond to yours and adjust the date and time if necessary. Click **Next**.

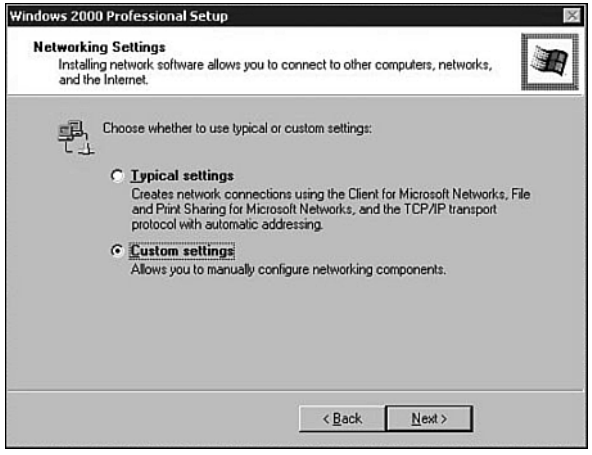


NOTES

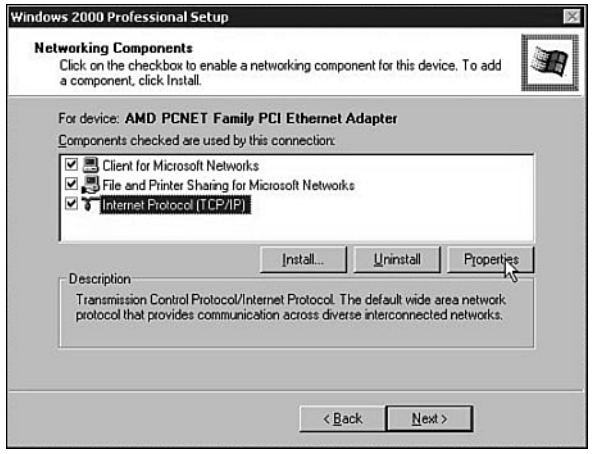
24. The wizard installs the networking software for your system.



25. When prompted, click the **Custom Settings** radio button, and then click **Next**.



26. In the **Networking Components** screen, double-click the **Internet Protocol (TCP/IP)**.

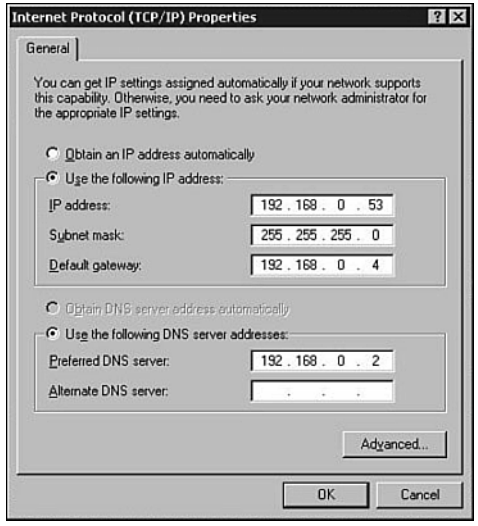


NOTES

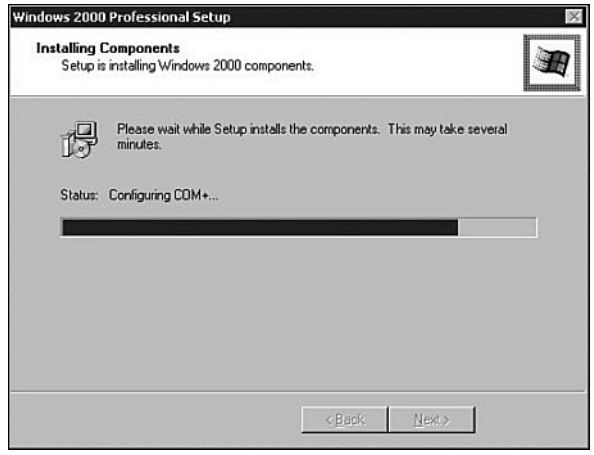
27. Enter the appropriate IP settings. Click **Use the Following IP Address** and **Use the Following DNS Server Addresses**. Enter the following values:

    IP address: 192.168.0.53
    Subnet mask: 255.255.255.0
    Default gateway: 192.168.0.4
    Preferred DNS server: 192.168.0.2

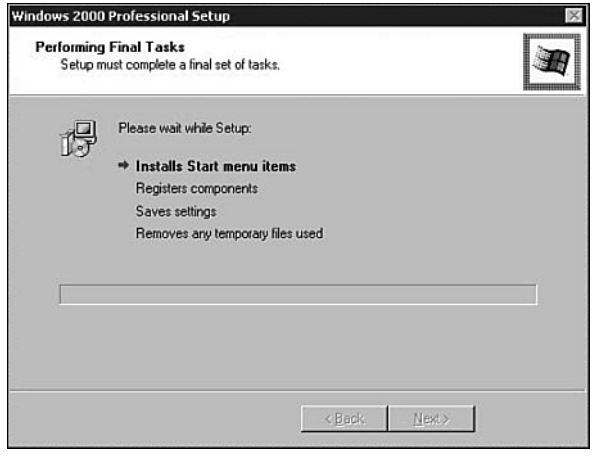
    If you want to hook the system up to a network, use settings appropriate for your network. Click **OK** after you have entered the settings.



28. The system proceeds with the installation.



    The Setup Wizard completes the installation by building the Start menu, registering installed components, and removing the temporary files it created.

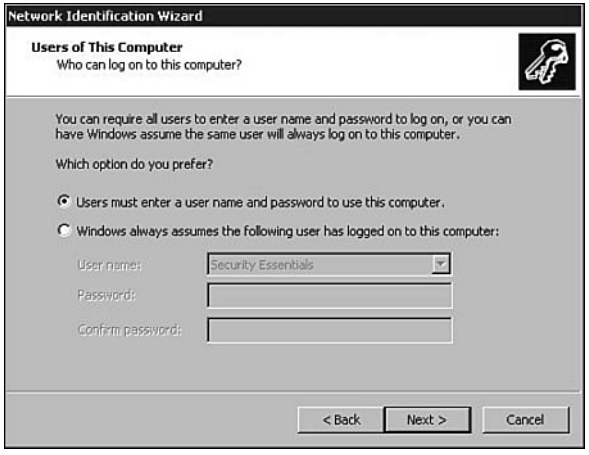


NOTES

29. The basic installation is completed. Remove the installation CD and click **Finish** to reboot the system.

30. The Network Identification Wizard automatically starts. Click **Next**.

31. Click the **Users Must Enter a Name and Password to Use This Computer** radio button, and then click **Next**.



32. Click **Finish** to complete the wizard.

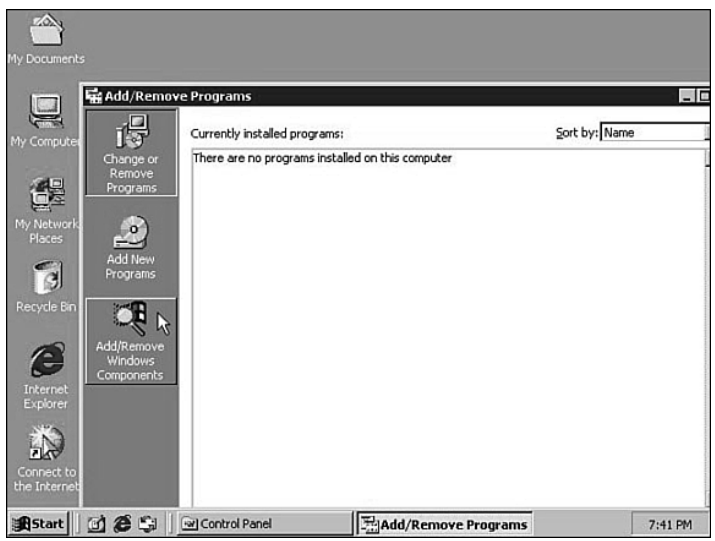
NOTES

33. Log in to the system with the password you defined earlier.

34. In the **Getting Started With Windows 2000** screen, uncheck the **Show This Screen at Startup** check box and then click **Exit**.

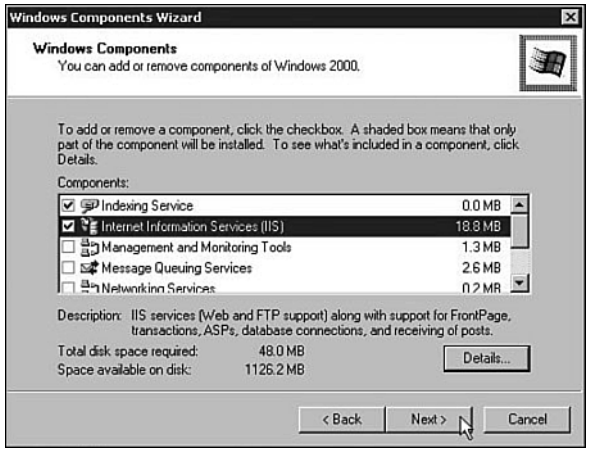
35. Select **Start**, **Settings**, **Control Panel**. Double-click **Add/Remove Programs**.

36. Click the **Add/Remove Windows Components** button.



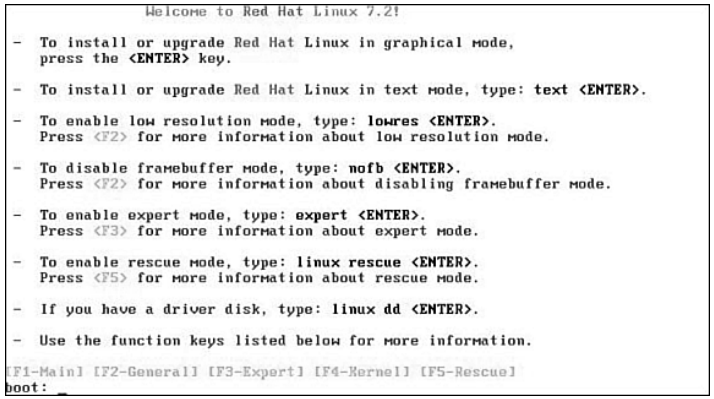
NOTES

37. Click the **Internet Information Services (IIS)** check box, and then click **Next**.

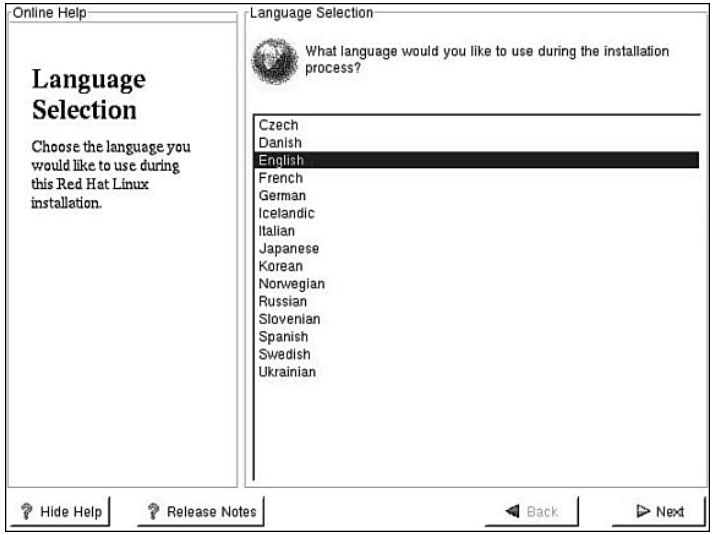


38. After the IIS installation has completed, remove the Windows CD and insert the Red Hat CD labeled **Red Hat Linux 7.1 Operating System CD 1**. Select **Start**, **Shutdown** and select **Restart** from the drop-down box. Click **OK** to restart the system, and you are done installing Windows 2000.

39. Next, install Red Hat Linux 7.2 Professional. The system will boot off the Red Hat Linux Installation CD and give you an installation choice menu. Press the **Enter** key to start the Linux installation process. If necessary, use the boot disk provided with the Red Hat distribution.

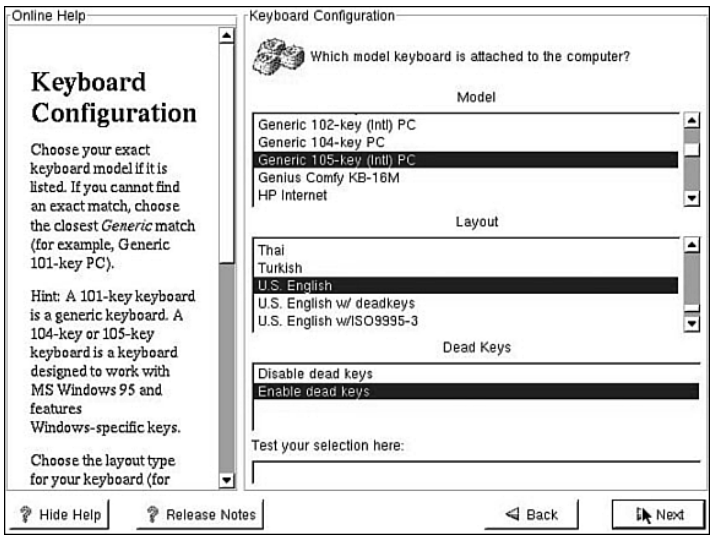


40. When the **Language Selection** screen appears, click **English**, and then click **Next**.

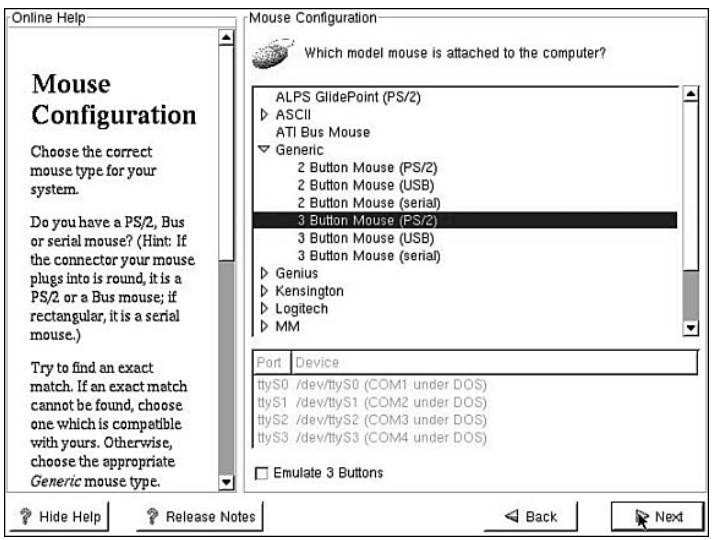


NOTES

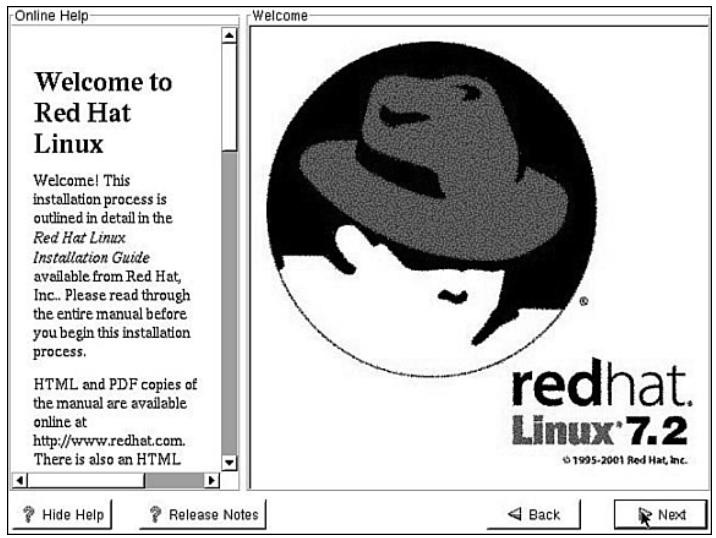
41. Accept the default keyboard configuration options and click **Next**.



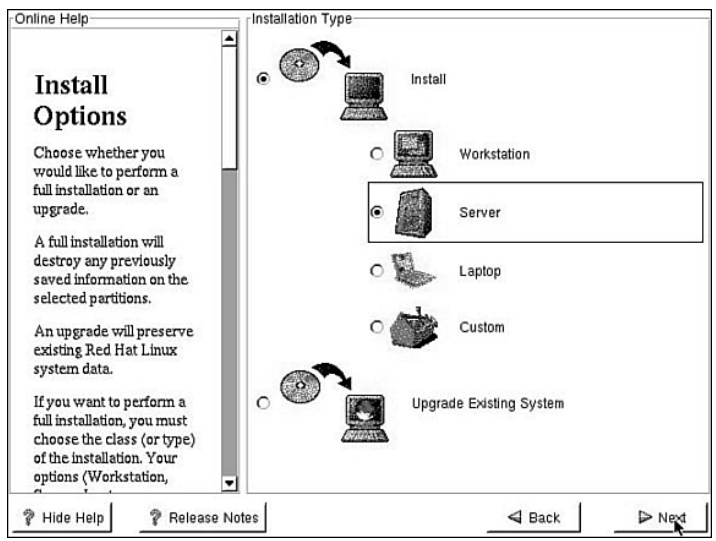
42. Accept the default mouse configuration and click **Next**.



43. In the **Welcome to Red Hat Linux** screen, click **Next** to continue.

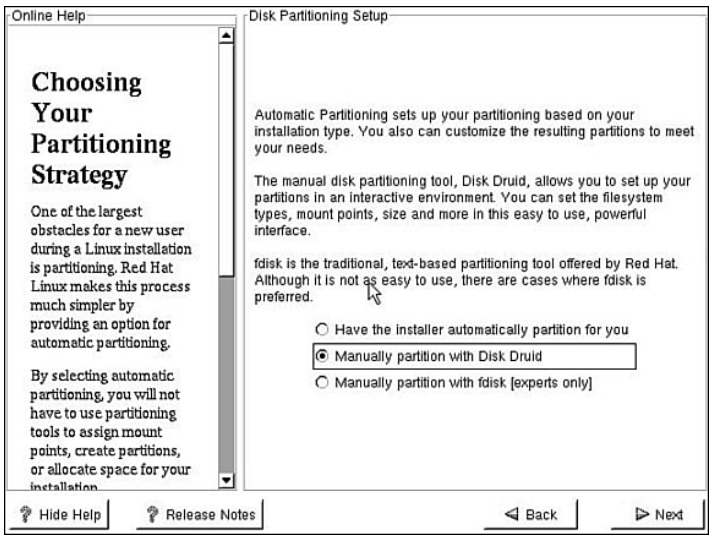


44. Click the **Server** radio button, and then click the **Next** button to do a basic server installation.

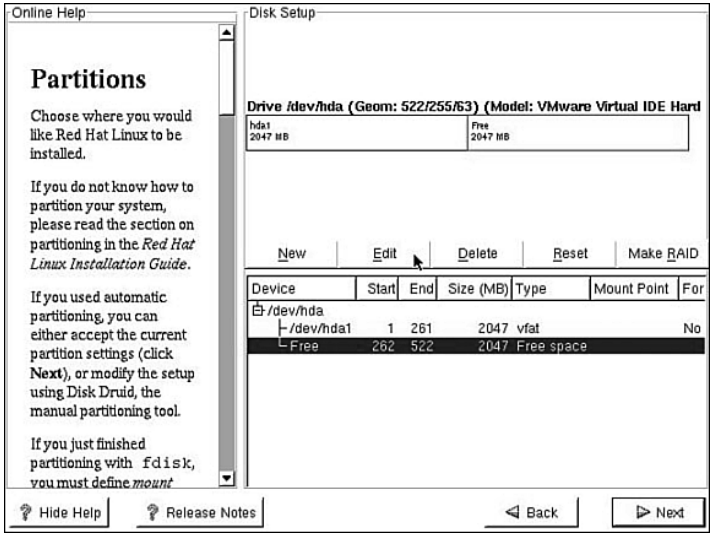


NOTES

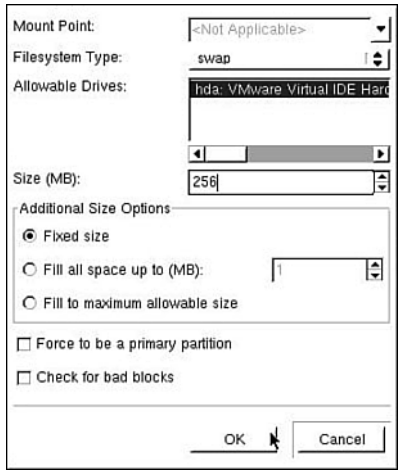
45. Click the **Manually Partition with Disk Druid** radio button, and then click the **Next** button.



46. Click the **Free** partition, and click **Next**.

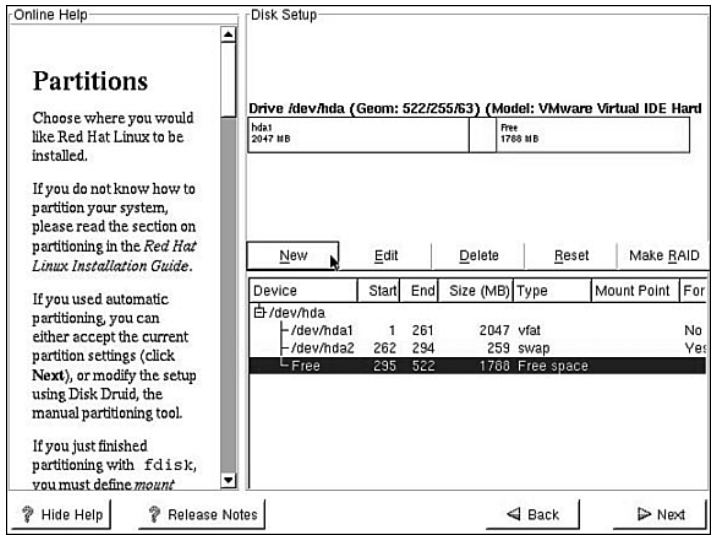


47. On the **Filesystem Type:** list box, select **swap**. Enter an appropriate value into the **Size (MB)** text box. As a rule of thumb, the swap file should be twice the size of your system's memory. However, for this installation you should leave at least 1.5GB for the Linux partition. Click **Next** to proceed.

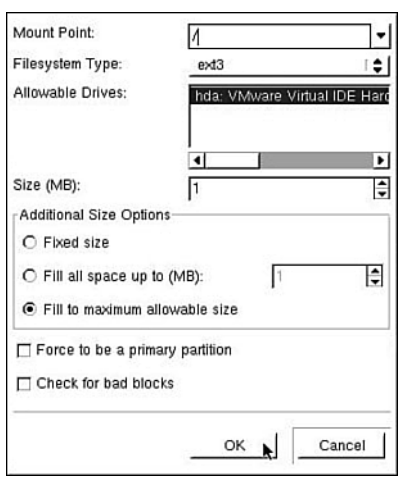


NOTES

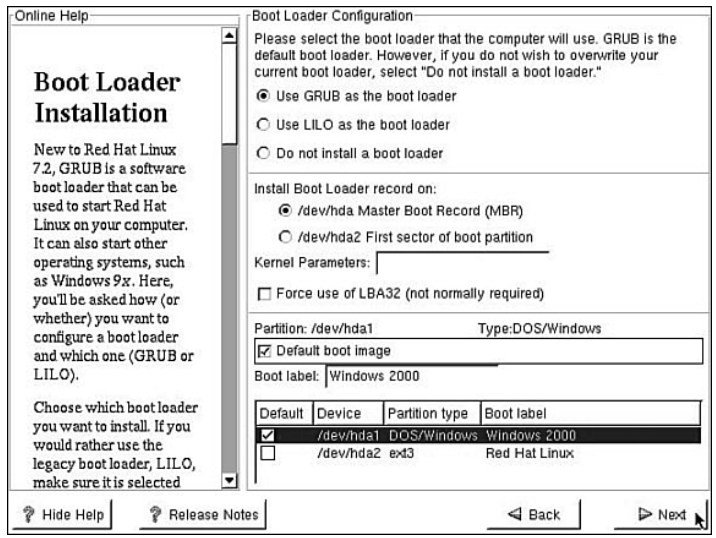
48. Click the **Free** partition, and then click the **New** button.



49. In the **Mount Point** drop-down box, select the root directory (/). Under the **Filesystem Type** list box, select **ext3**. Click the **Fill to Maximum Allowable Size** radio button. Click **OK** to accept the partition values. Finally, click **Next** to proceed.

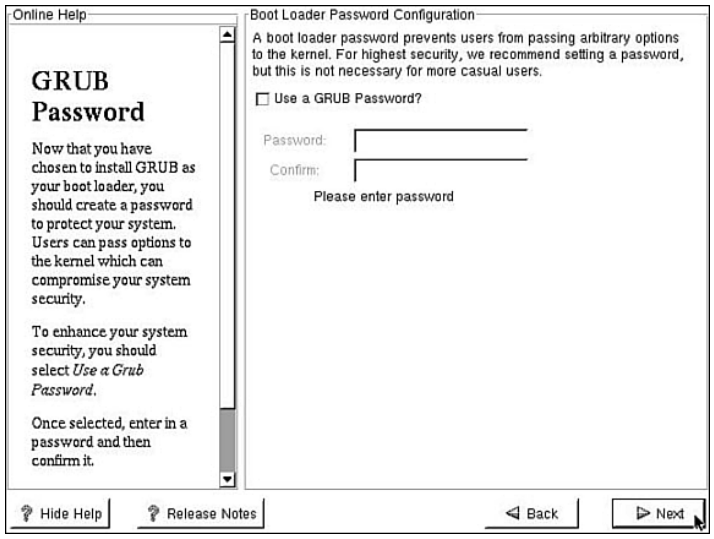


50. Click the **Use GRUB as the Boot Loader** radio button. Select the **DOS** partition. In the **Boot Label:** text box, enter **Windows 2000**. If you want, you can set the system to boot into Windows 2000 by default by checking the **Default Boot Image** check box.



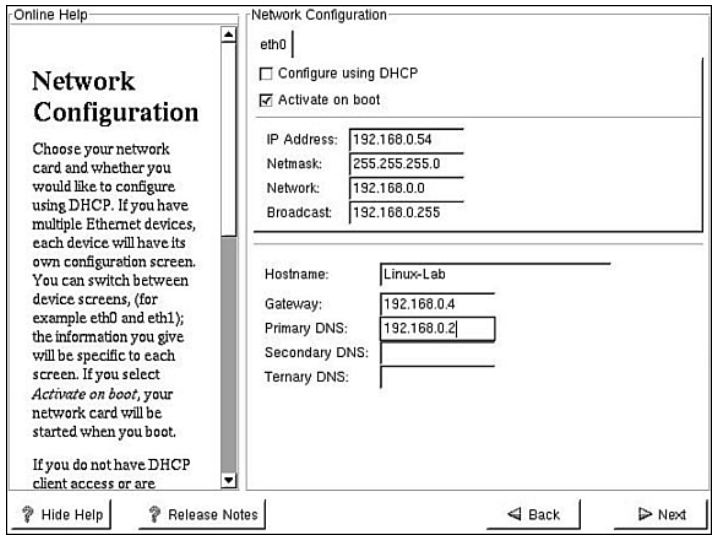
NOTES

51. In the **GRUB Password** screen, click **Next** to proceed.



52. In the **Network Configuration** screen, uncheck the **Configure Using DHCP** check box. Enter the following values:

    IP address: 192.168.0.54
    Netmask: 255.255.255.0
    Network: 192.168.0.0
    Broadcast: 192.168.0.255
    Hostname: Linux-Lab
    Gateway: 192.168.0.4
    Primary DNS: 192.168.0.2



53. In the **Firewall Configuration** screen, click the **Medium** and **Customize** radio buttons. Click the **eth0**, **SSH**, **Telnet**, **WWW (HTTP)**, **Mail (SMTP)**, and **FTP** check boxes.