



ADMINISTRATING

Web Servers, Security, & Maintenance

Interactive Workbook

Suranaree University of Technology



31051000656344

- ◆ Understand networks, Web servers, and clients
- ◆ Secure your site for e-commerce
- ◆ Work toward your Webmaster Certification

ERIC LARSON • BRIAN STEPHENS

CONTENTS

| | |
|--|--------------|
| From the Editor | xiii |
| Executive Foreword | xv |
| Introduction | xvii |
| About the Authors | xxiii |
| PART I WEB SERVER ADMINISTRATION | |
| CHAPTER 1 What Is a Web Server? | 1 |
| Lab 1.1 Client/Server Basics | 2 |
| 1.1.1 Understand Client/Server Concepts | 4 |
| 1.1.2 Describe Basic Functionality of Web Servers and Browsers | 5 |
| Lab 1.2 Electronic Publishing | 10 |
| 1.2.1 Understand the Basics of Creating Hypertext Documents | 13 |
| 1.2.2 Understand the Difference Between ASCII and Binary Files | 14 |
| 1.2.3 Give Examples of MIME Types | 14 |
| Lab 1.3 HTTP Overview | 19 |
| 1.3.1 Identify the Parts of an HTTP Transaction | 25 |
| 1.3.2 Identify HTTP Request Methods | 25 |
| 1.3.3 Identify HTTP Headers and Server Responses | 25 |
| Lab 1.4 Other Web-Related Servers | 29 |
| 1.4.1 Understand the Functionality of Proxy Servers | 34 |
| 1.4.2 Identify Other Services that May Run Alongside an HTTP Server | 34 |
| Test Your Thinking | 37 |

| | |
|---|---------------|
| CHAPTER 2 Planning Your Server | 39 |
| Lab 2.1 Hosting Your Site | 40 |
| 2.1.1 Determine How to Host Your Site | 46 |
| Lab 2.2 Hosting Your Own Server | 49 |
| 2.2.1 Understand What Is Required to Put a Server on the Internet | 54 |
| Lab 2.3 UNIX vs. NT | 57 |
| 2.3.1 Understand the Major Differences Between Windows NT and UNIX | 62 |
| 2.3.2 Determine Which Operating System Best Fits Your Needs | 62 |
| Lab 2.4 Sizing Your Server | 65 |
| 2.4.1 Determine Size and Bandwidth Requirements for Your Server | 68 |
| 2.4.2 Understand How to Spot and Resolve Performance Problems | 68 |
| Lab 2.5 Domain Names | 72 |
| 2.5.1 Register a Domain | 75 |
| Test Your Thinking | 78 |
| CHAPTER 3 Users and Documents | 81 |
| Lab 3.1 Server Users and Directories | 82 |
| 3.1.1 Enable Users to Publish Documents on a Server | 85 |
| 3.1.2 Understand How URLs Are Mapped to Files | 86 |
| Lab 3.2 Server Administrators | 88 |
| 3.2.1 Understand the Roles and Responsibilities of a System Administrator | 92 |
| Lab 3.3 Document Hierarchy | 94 |
| 3.3.1 Understand How Documents Are Linked and Organized in the File System | 97 |
| 3.3.2 Understand How the Web Server Locates a Requested Document | 98 |
| Lab 3.4 Directory Indexing | 100 |
| 3.4.1 Understand Directory Indexes | 102 |
| Lab 3.5 File and Directory Names | 106 |
| 3.5.1 Choose Appropriate Names for Files and Directories | 108 |

| | |
|--|-----|
| Lab 3.6 Transferring Files | 111 |
| 3.6.1 Understand How Files Are Transferred to a Web Server | 115 |
| 3.6.2 Understand FrontPage Extensions | 116 |
| Test Your Thinking | 120 |

CHAPTER 4 Server Configuration **121**

| | |
|---|-----|
| Lab 4.1 Choosing Web Server Software | 122 |
| 4.1.1 Understand What Options Are Available for Server Software | 132 |
| 4.1.2 Install a Web Server on Your Computer | 133 |
| Lab 4.2 Customizing Your Web Server | 137 |
| 4.2.1 Understand Typical Server Configuration Options | 140 |
| Lab 4.3 Controlling Access | 144 |
| 4.3.1 Set Proper Permissions on Files and Directories | 146 |
| 4.3.2 Limit Access on Your Server to Specific Users and Hosts | 146 |
| Lab 4.4 Secure Sockets Layer Configuration | 150 |
| 4.4.1 Understand How the Secure Sockets Layer Is Used | 153 |
| Lab 4.5 Virtual Hosts | 155 |
| 4.5.1 Understand the Basics of Virtual Hosting | 156 |
| 4.5.2 Understand How to Configure Virtual Hosts On Your Server | 156 |
| Test Your Thinking | 160 |

CHAPTER 5 Server-Side Programming **161**

| | |
|--|-----|
| Lab 5.1 Dynamic Documents | 162 |
| 5.1.1 Understand Why Programs Are Used to Generate Documents | 163 |
| Lab 5.2 CGI and Forms | 166 |
| 5.2.1 Understand What CGI Is and How CGI Programs Work | 169 |
| 5.2.2 Understand How HTML Forms Are Used | 170 |
| Lab 5.3 Server-Side Includes | 175 |
| 5.3.1 Understand Parsed HTML | 177 |

| | |
|--|----------------|
| Lab 5.4 Active Server Pages | 181 |
| 5.4.1 Understand How Active Server Pages Work | 182 |
| Lab 5.5 Servlets and Java Server Pages | 185 |
| 5.5.1 Understand the Benefits of Servlets and JSP | 187 |
| Test Your Thinking | 192 |
| CHAPTER 6 Log Files | 193 |
| Lab 6.1 Log File Formats | 194 |
| 6.1.1 Understand How to Configure Logging | 197 |
| 6.1.2 Understand How to Read Different Server Log Files | 197 |
| Lab 6.2 Referrers | 202 |
| 6.2.1 Understanding How People Are Getting to Your Site | 203 |
| Lab 6.3 Being Proactive | 207 |
| 6.3.1 Use Log File to Help Find Dead Links | 209 |
| 6.3.2 Understand How to Spot Suspicious Activity | 210 |
| Lab 6.4 Statistics | 213 |
| 6.4.1 Determine How Many People Have Been Visiting Your Site | 216 |
| Test Your Thinking | 220 |
| CHAPTER 7 Search Engines, Robots, and Automation | 221 |
| Lab 7.1 Search Engines | 222 |
| 7.1.1 Understand How to Create a Searchable Site | 225 |
| Lab 7.2 Publicizing Your Site | 228 |
| 7.2.1 Publicize Your Site Effectively | 230 |
| Lab 7.3 Robots and Spiders | 235 |
| 7.3.1 Control How Search Engines Access Your Site | 237 |
| Lab 7.4 Automation | 241 |
| 7.4.1 Determine How to Automate Administrative Tasks | 243 |
| Test Your Thinking | 246 |

PART II WEB SECURITY

CHAPTER 8 Introduction to Security 247

| | |
|--|-----|
| Lab 8.1 Why We Need Security | 248 |
| 8.1.1 Understand the Need for Security | 250 |
| Lab 8.2 Types of Attacks and Vulnerabilities | 255 |
| 8.2.1 Identify Various Types of Attacks | 258 |
| 8.2.2 Understand Various Types of Attacks | 259 |
| Lab 8.3 Security Resources | 266 |
| 8.3.1 Find the Security Risks that Pertain to Your Site | 270 |
| 8.3.2 Explore the CERT Coordination Center Advisories | 271 |
| 8.3.3 Find Other Security Resources | 272 |
| Lab 8.4 Security Basics | 280 |
| 8.4.1 Understand the Basic Rules of Security | 282 |
| Test Your Thinking | 286 |

CHAPTER 9 Network Security 287

| | |
|--|-----|
| Lab 9.1 Networking Basics | 288 |
| 9.1.1 Understand IP Addresses and Netmasks | 295 |
| 9.1.2 Identify IP Addresses on the Same Subnet | 296 |
| 9.1.3 Dissect an IP Packet | 296 |
| Lab 9.2 Packet Sniffing | 302 |
| 9.2.1 Use a Packet Sniffer | 304 |
| 9.2.2 Understand the Risks of Packet Sniffing | 305 |
| 9.2.3 Determine What Data is Sent in an HTTP Packet | 306 |
| Lab 9.3 Other Network Vulnerabilities | 313 |
| 9.3.1 Understand IP Spoofing | 317 |
| 9.3.2 Understand Network Denial of Service Attacks | 317 |
| 9.3.3 Understand Other Network Attacks | 318 |
| Lab 9.4 Firewalls and Proxies | 324 |
| 9.4.1 Understand the Benefit of Filtering by IP and Port | 327 |
| 9.4.2 Understand the Limitations of Firewalls | 329 |
| 9.4.3 Understand Other Benefits Firewalls Provide | 329 |
| Test Your Thinking | 334 |

| | |
|--|------------|
| CHAPTER 10 Web Server Security | 335 |
| Lab 10.1 Host/OS Hardening | 336 |
| 10.1.1 Determine What Is Running on Your Machine | 343 |
| 10.1.2 Determine Which Ports Accept Connections | 343 |
| Lab 10.2 Who to Run a Web Server As | 347 |
| 10.2.1 Set up a Safe User to Run the Web Server As | 349 |
| 10.2.2 Modify the User the Web Server Runs As | 350 |
| Lab 10.3 File Permissions and Ownership | 356 |
| 10.3.1 Understand File Permissions and Ownership | 358 |
| 10.3.2 Understand Risks of Web Server File Ownership | 360 |
| 10.3.3 Protect Against the Risks of Directory Browsing | 360 |
| Lab 10.4 Other Configuration Concerns | 369 |
| 10.4.1 Understand the Risks Symbolic Links Present | 373 |
| 10.4.2 Understand the Risks with Server Side Includes | 374 |
| Test Your Thinking | 378 |
| CHAPTER 11 CGI Security | 379 |
| Lab 11.1 Who to Run CGI As | 380 |
| 11.1.1 Determine a Safe User to Run CGI As | 382 |
| Lab 11.2 Poor CGI Programming | 389 |
| 11.2.1 Identify Risks from Poor Programming | 390 |
| Lab 11.3 Tainted CGI Variables | 396 |
| 11.3.1 Check for Unsafe Characters in CGI Input | 398 |
| 11.3.2 Check for Safe Characters in CGI Input | 399 |
| 11.3.3 Work Around Unsafe Characters in CGI Input | 400 |
| Lab 11.4 Buffer Overflows | 405 |
| 11.4.1 Understand What Happens with a Buffer Overflow | 408 |
| Lab 11.5 Other CGI Risks | 413 |
| 11.5.1 Use Referrers for Added CGI Protection | 416 |
| 11.5.2 Understand the Risks of .cgi File Extensions | 417 |
| Test Your Thinking | 422 |

| | |
|---|------------|
| CHAPTER 12 Web Client Security | 423 |
| Lab 12.1 Java Applets | 424 |
| 12.1.1 Understand What Applets Can and Can't Do | 426 |

| | |
|--|------------|
| CHAPTER 10 Web Server Security | 335 |
| Lab 10.1 Host/OS Hardening | 336 |
| 10.1.1 Determine What Is Running on Your Machine | 343 |
| 10.1.2 Determine Which Ports Accept Connections | 343 |
| Lab 10.2 Who to Run a Web Server As | 347 |
| 10.2.1 Set up a Safe User to Run the Web Server As | 349 |
| 10.2.2 Modify the User the Web Server Runs As | 350 |
| Lab 10.3 File Permissions and Ownership | 356 |
| 10.3.1 Understand File Permissions and Ownership | 358 |
| 10.3.2 Understand Risks of Web Server File Ownership | 360 |
| 10.3.3 Protect Against the Risks of Directory Browsing | 360 |
| Lab 10.4 Other Configuration Concerns | 369 |
| 10.4.1 Understand the Risks Symbolic Links Present | 373 |
| 10.4.2 Understand the Risks with Server Side Includes | 374 |
| Test Your Thinking | 378 |
| CHAPTER 11 CGI Security | 379 |
| Lab 11.1 Who to Run CGI As | 380 |
| 11.1.1 Determine a Safe User to Run CGI As | 382 |
| Lab 11.2 Poor CGI Programming | 389 |
| 11.2.1 Identify Risks from Poor Programming | 390 |
| Lab 11.3 Tainted CGI Variables | 396 |
| 11.3.1 Check for Unsafe Characters in CGI Input | 398 |
| 11.3.2 Check for Safe Characters in CGI Input | 399 |
| 11.3.3 Work Around Unsafe Characters in CGI Input | 400 |
| Lab 11.4 Buffer Overflows | 405 |
| 11.4.1 Understand What Happens with a Buffer Overflow | 408 |
| Lab 11.5 Other CGI Risks | 413 |
| 11.5.1 Use Referrers for Added CGI Protection | 416 |
| 11.5.2 Understand the Risks of .cgi File Extensions | 417 |
| Test Your Thinking | 422 |
| CHAPTER 12 Web Client Security | 423 |
| Lab 12.1 Java Applets | 424 |
| 12.1.1 Understand What Applets Can and Can't Do | 426 |

| | | |
|----------|--|-----|
| 12.1.2 | Understand What a Hostile Java Applet Is | 427 |
| 12.1.3 | Protect Yourself from Java Applets | 428 |
| Lab 12.2 | ActiveX | 437 |
| 12.2.1 | Understand the Risks ActiveX Poses | 440 |
| 12.2.2 | Protect Yourself from ActiveX | 441 |
| Lab 12.3 | JavaScript | 447 |
| 12.3.1 | Understand the Risks JavaScript Poses | 449 |
| 12.3.2 | Protect Yourself from JavaScript | 450 |
| Lab 12.4 | Cookies | 454 |
| 12.4.1 | Understand the Risk That Cookies Pose | 456 |
| 12.4.2 | Protect Yourself from Cookies | 457 |
| | Test Your Thinking | 464 |

CHAPTER 13 Secure Online Transactions **465**

| | | |
|----------|---------------------------------------|-----|
| Lab 13.1 | Encryption | 466 |
| 13.1.1 | Understand Weaknesses in Cryptography | 472 |
| Lab 13.2 | Secure Socket Layer | 477 |
| 13.2.1 | Understand the Advantage of SSL | 479 |
| 13.2.2 | Identify Careless Use of SSL | 480 |
| Lab 13.3 | Certificate Authorities | 483 |
| 13.3.1 | Understand What a Certificate Is | 485 |
| 13.3.2 | Obtain Your Own Certificate | 486 |
| Lab 13.4 | Access Control Lists | 490 |
| 13.4.1 | Understand How ACLs Work | 492 |
| 13.4.2 | Understand the Benefits ACLs Provide | 493 |
| | Test Your Thinking | 499 |

CHAPTER 14 Intrusion Detection and Recovery **501**

| | | |
|----------|--|-----|
| Lab 14.1 | Detecting an Attack | 502 |
| 14.1.1 | Monitor Logs for Strange Behavior | 504 |
| 14.1.2 | Determine if the System is Acting Abnormally | 505 |
| 14.1.3 | Detect a Change in the System Configuration | 506 |
| Lab 14.2 | Recovering from an Attack | 515 |
| 14.2.1 | Collect Evidence for Prosecution | 517 |

| | | |
|--------|--|-----|
| 14.2.2 | Report an Attack | 517 |
| 14.2.3 | Properly Restore to a Safe Configuration | 518 |
| | Test Your Thinking | 525 |

| | | |
|-------------------|---|------------|
| Appendix A | Answers to Self-Review Questions | 527 |
|-------------------|---|------------|

| | | |
|-------------------|---------------------|------------|
| Appendix B | ASCII Values | 549 |
|-------------------|---------------------|------------|

| | | |
|-------------------|--------------------------------|------------|
| Appendix C | Well-Known Port Numbers | 551 |
|-------------------|--------------------------------|------------|

| | | |
|-------------------|------------------------|------------|
| Appendix D | Base Conversion | 552 |
|-------------------|------------------------|------------|

| | | |
|-------------------|-----------------------|------------|
| Appendix E | Packet Formats | 557 |
|-------------------|-----------------------|------------|

| | | |
|--------------|--|------------|
| Index | | 559 |
|--------------|--|------------|