

Developing Web Applications

Ralph Moseley
Middlesex University



John Wiley & Sons, Ltd

Contents

Preface	xix
Introduction	xix
Features	xx
Additional Materials	xx
Trademarks	xx
Acknowledgments	xxi
CHAPTER 1: THE WAY THE WEB WORKS	1
<i>A basic introduction to how the WWW works within the context of the Internet with supporting protocols and applications.</i>	
1.1 History	2
1.1.1 The WWW	2
1.2 The Internet and the WWW	3
1.3 Protocols and Programs	6
1.3.1 Files	6
1.3.2 Problems with FTP	8
1.3.3 Email	9
1.3.4 Instant Messaging	10
1.3.5 Remote Machine Access	10
1.3.6 Web Pages	11
1.4 Secure Connections	14
1.5 Applications and Development Tools	15
1.6 The Web Browser	17
1.6.1 Choices	18
1.7 Chapter Summary	19

CHAPTER 2: THE CLIENT SIDE: HTML	23
<i>This chapter starts to look at the client side and static Web page development using HTML. You will learn how to develop simple Web pages and formatting, together with tables, images and frames.</i>	
2.1 Introduction	24
2.2 The Development Process	24
2.2.1 Requirements	24
2.2.2 Design	24
2.2.3 Write Code	24
2.2.4 Test	24
2.2.5 Upload	25
2.2.6 Re-Iterate	25
2.3 Basic HTML	25
2.3.1 Loading Pages with the Browser	25
2.3.2 A Page on the Web	26
2.3.3 HTML Document Structure	26
2.4 Formatting and Fonts	27
2.4.1 Using Types of Emphasis	28
2.4.2 Pre-Formatted Text	28
2.4.3 Font Sizes	29
2.5 Commenting Code	31
2.6 Color	31
2.7 Hyperlinks	33
2.8 Lists	34
2.8.1 Unordered Lists	34
2.8.2 Ordered Lists	35
2.8.3 Nested Lists	35
2.8.4 Definition Lists	36
2.9 Tables	36
2.9.1 Table Structure	37
2.9.2 Table Headers	38

2.9.3 Irregular Tables	38
2.9.4 Tables and Page Layout	40
2.10 Images	41
2.10.1 Positioning and Placing Images	41
2.10.2 Resizing an Image	42
2.10.3 Background Images	42
2.11 Simple HTML Forms	43
2.11.1 Making a Form	43
2.11.2 Types of Input	43
2.11.3 Text Areas	44
2.11.4 Drop Down Menus	45
2.12 Web Site Structure	47
2.13 Chapter Summary	48

CHAPTER 3: FROM HTML TO XHTML **51**

Here we continue the exploration of HTML into XHTML. You will learn about the various standards that have been developed for HTML. More advanced HTML will also be studied, and the ability to control search engines, cache refresh and meta information.

3.1 More History, More Standards	52
3.1.1 Changes	52
3.1.2 XML	53
3.2 The Move to XHTML	55
3.2.1 Document Structure	57
3.2.2 Some Other Differences	57
3.3 Meta Tags	58
3.3.1 Memory Cache	60
3.3.2 Formatting with scheme	60
3.4 Character Entities	61
3.5 Frames and Framesets	64
3.5.1 Rows	64
3.5.2 Alternative Content	66

3.5.3 Columns	66
3.5.4 Frames Using Columns and Rows	67
3.5.5 Nesting Frames	67
3.5.6 Inline Frames	69
3.6 What Is Inside a Browser?	71
3.7 Chapter Summary	73

CHAPTER 4: GETTING SOME STYLE: CSS **75**

In this chapter you will learn how to present and control the format of Web pages using CSS. This includes the ability to precisely control the positioning and attributes of content while maintaining the structure of the document itself.

4.1 The Need for CSS	76
4.2 Introduction to CSS	77
4.3 Basic Syntax and Structure	77
4.3.1 Rules	77
4.3.2 Classes	78
4.3.3 ID	79
4.3.4 Pseudo-Class Selectors	80
4.4 Using CSS	81
4.4.1 External Style Sheets	81
4.4.2 Embedded Style Sheets	82
4.5 Background Images, Colors and Properties	83
4.5.1 Background Color	83
4.5.2 Background Images	84
4.6 Manipulating Text	87
4.6.1 Text Decoration	88
4.6.2 Text Indentation	89
4.6.3 Text Case	90
4.7 Using Fonts	90
4.8 Borders and Boxes	91
4.9 Margins	93

4.10	Padding	94
4.11	Lists	95
4.12	Positioning Using CSS	96
4.12.1	Absolutely!	97
4.12.2	It's All Relative	98
4.12.3	The Z-Index	98
4.12.4	Shaping an Element	99
4.12.5	Floating Elements	100
4.12.6	Layout and Structure	100
4.13	CSS2	102
4.14	Chapter Summary	103

CHAPTER 5: JAVASCRIPT: INTRODUCTION TO CLIENT SIDE SCRIPTING **107**

This chapter will prepare you for developing with this popular scripting language, showing you the syntax and possibilities of use. The aims here are to show you how it is placed within a page, variables, strings, arrays and loops. Program flow is also discussed and how conditional operators and commands are used.

5.1	What Is JavaScript?	108
5.2	How to Develop JavaScript	109
5.3	Simple JavaScript	109
5.3.1	Embedded	109
5.3.2	External Scripts	110
5.4	Variables	111
5.4.1	Scope	112
5.4.2	Assignments	113
5.4.3	Strings	114
5.4.4	Arrays	115
5.5	Functions	117
5.6	Conditions	118
5.6.1	Switch	119
5.6.2	Conditional Operator	120

5.7	Loops and Repetition	121
5.8	Chapter Summary	122
CHAPTER 6: JAVASCRIPT: DEVELOPING MORE ADVANCED SCRIPTS		125
<i>In this chapter you will learn about using objects in JavaScript, both the built-in types and creating your own. You will also learn about the Document Object Model (DOM), which allows HTML documents to be manipulated and accessed. Forms and ways of validating information submitted are explored here too.</i>		
6.1	JavaScript and Objects	126
	6.1.1 What Is an Object?	126
6.2	JavaScript's Own Objects	126
	6.2.1 User-Defined Objects	128
	6.2.2 Adding a Constructor	129
	6.2.3 Methods	130
6.3	The DOM and the Web Browser Environment	133
	6.3.1 The document Object	136
6.4	Forms and Validation	139
	6.4.1 Using Regular Expressions for Validation	142
6.5	Chapter Summary	144
CHAPTER 7: DHTML		147
<i>The aim of this chapter is to bring dynamic aspects of site design together. You will learn about animation, caching, event driven scripting and browser compatibility. It's in this chapter you will also find out more about compatibility and the need to provide alternatives for different browsers.</i>		
7.1	Combining HTML, CSS and JavaScript	148
	7.1.1 Animation	148
	7.1.2 The Image Object	150
7.2	Events and Buttons	156
	7.2.1 The Window	157
	7.2.2 The Mouse	157

7.2.3 The Keyboard	157
7.2.4 Using Events	157
7.3 Controlling Your Browser	163
7.4 Chapter Summary	165

CHAPTER 8: XML: EXTENSIBLE MARKUP LANGUAGE 167

In this chapter you will learn about the basics of XML and how it can be used to store information away from the mechanism of processing or formatting of such data. You will learn how to build simple XML files, and be able to manipulate and refer to them.

8.1 Introduction to XML	168
8.2 The Many Uses of XML	168
8.3 Simple XML	168
8.4 XML Key Components	169
8.4.1 Elements	169
8.4.2 Attributes	170
8.4.3 Other Essentials	170
8.4.4 Namespaces	171
8.5 Document Type Definitions and Schemas	172
8.5.1 DTDs	172
8.5.2 Schemas	175
8.5.3 Elements	177
8.5.4 Attributes	178
8.6 Well Formed?	178
8.7 Using XML with Applications	179
8.8 Chapter Summary	180

CHAPTER 9: XML, XSL AND XSLT: TRANSFORMING XML 183

The aim of this chapter is to learn about and explore the possibilities of using XML as the starting point for data to be transformed into other target formats using XSLT. Style sheets are used and linked to documents. It is shown here that it is possible to process XML with a browser or a programming language on the client side.

9.1	Introducing XSL	184
9.2	XML Transformed	184
9.3	A Simple Example	185
	9.3.1 The XML	188
	9.3.2 The Style Sheet	188
	9.3.3 Linking	188
9.4	XSL Elements	189
	9.4.1 value-of	189
	9.4.2 for-each	189
	9.4.3 sort	189
	9.4.4 if	190
	9.4.5 Choices	191
	9.4.6 Applying Templates	192
9.5	Transforming with XSLT	194
	9.5.1 Using JavaScript	194
9.6	Chapter Summary	195

CHAPTER 10: WEB SERVICES, FEEDS AND BLOGS **197**

Here you will learn about three important areas of Web activity: how it is possible to create language- and platform-independent services that utilize common Web protocols and XML; how information can be disseminated automatically to interested people; and finally, the phenomenon of the blog!

10.1	The Need for Web Services	198
10.2	SOAP	198
10.3	SOAP, XML and HTTP	198
10.4	Web Feeds	201
	10.4.1 Reading a Web Feed	202
	10.4.2 Making Your Own RSS Feeds	205
10.5	Blogs	209
10.6	Chapter Summary	210

CHAPTER 11: THE SERVER SIDE 213

This chapter aims to give you your first contact with the server side and introduces you to the server; the various possible packages and platforms; how to set up and the options involved; testing your server; logging users and dealing with dynamic IPs.

11.1	What Is a Server?	214
11.2	Choices	215
11.2.1	Apache HTTPd Server	216
11.2.2	Internet Information Services	216
11.2.3	PHP, Perl, Python . . .	217
11.2.4	MySQL	217
11.3	Setting Up	217
11.3.1	XAMPP	218
11.3.2	Where Is the Server?	219
11.3.3	Testing	219
11.3.4	External Access to the Web Server	221
11.4	Unix and Linux Web Servers	222
11.5	Which OS?	224
11.6	Logging Users	225
11.7	Dynamic IPs	226
11.8	Chapter Summary	227

CHAPTER 12: PHP 1: STARTING TO SCRIPT ON THE SERVER SIDE 231

This chapter gives a basic introduction to PHP and dynamic programming on the server side. You will learn how to develop simple PHP, how to structure your programs and embed script within HTML.

12.1	Starting to Script with PHP	232
12.1.1	Good Programming Practices Apply Here!	233
12.2	Variables	235
12.2.1	Errors in PHP	236
12.3	Getting Some Input	237
12.4	Decisions	240

12.5	Looping	243
12.5.1	The for Loop	244
12.5.2	The while Loop	245
12.5.3	Using break and continue	246
12.6	Chapter Summary	248

CHAPTER 13: PHP 2: ARRAYS, FUNCTIONS AND FORMS **251**

Here, you learn how to further manipulate data within PHP and in the process get to grips with new functions, loop structures and the verification of data input through forms. Simple arrays to dynamic structures are discussed, along with the ability to manipulate strings through special functions. Attention is particularly given to how to enlist specific features of PHP when processing data and how these can be used to add security.

13.1	Arrays	252
13.1.1	Arrays and Loops	253
13.1.2	Keys and Values	255
13.1.3	Forms and Associative Arrays	256
13.2	Functions	259
13.3	Browser Control	260
13.4	Browser Detection	260
13.5	String Manipulation with PHP	261
13.6	Files	264
13.7	Passwords	265
13.8	Email	266
13.9	Uploading	267
13.10	Chapter Summary	270

CHAPTER 14: MORE ADVANCED PHP **273**

The aim here is to provide a glimpse of the further possibilities within PHP, including cookies, sessions, objects and more advanced file handling.

14.1	Further File Handling	274
14.1.1	Building a Visitor Log	276

14.2	Cookies	277
14.3	Sessions	280
14.4	Mobile Technologies	284
14.4.1	Browser Check	285
14.4.2	WAP and WML	286
14.4.3	PHP, WAP and WML	287
14.5	Other Advanced PHP Features	287
14.6	Object-Oriented Programing	288
14.6.1	What Is an Object?	288
14.6.2	Inheritance	291
14.7	Chapter Summary	294

CHAPTER 15: NETWORK AND WEB SECURITY

297

The aim of this chapter is to make you aware of threats to online security that you and your users must guard against. The most common forms of attack are studied, such as viruses and worms, cross site scripting, email problems, Trojan horses, phishing and many other mechanisms. Possible solutions are also looked into, including firewalls and anti-virus software.

15.1	Introduction	298
15.2	How Hacking Began	298
15.3	Who Is Hacking Now?	299
15.3.1	Motivations	299
15.4	Types of Attack and Intrusion	300
15.4.1	Denial of Service (DoS)	300
15.4.2	Cross Site Scripting (XSS)	301
15.4.3	Spam	301
15.4.4	Email Bomb	302
15.4.5	Spoofing	302
15.4.6	Phishing	302
15.4.7	CGI Insecurities	302
15.4.8	Session Hijacking	303
15.4.9	Key Logging	303

15.4.10 Identity Theft and Stalking	303
15.4.11 Trojan Horse	304
15.4.12 Social Engineering	305
15.4.13 Spyware/Malware/Adware and Popups	305
15.4.14 Viruses and Worms	305
15.5 Firewalls	309
15.6 Passwords	310
15.6.1 Password Policy	311
15.7 Defense!	311
15.8 Chapter Summary	312
CHAPTER 16: DATABASES	315
<i>The aim of this chapter is to help you understand databases so that they can easily be utilized in your Web applications and sites. The basic idea of the database is explored, together with how well it can be linked in with server side scripting. All the basic functions are studied, together with how these can be communicated directly to the database server.</i>	
16.1 Introduction	316
16.2 Relational Databases	317
16.2.1 Design and Modeling	319
16.2.2 What is Normalization?	320
16.3 SQL	322
16.3.1 MySQL	322
16.3.2 Starting, Stopping and Checking MySQL Server	323
16.3.3 The MySQL Monitor	323
16.4 Basic Commands with PHP Examples	325
16.4.1 Connection to the Server	325
16.4.2 Creating a Database	325
16.4.3 Selecting a Database	326
16.4.4 Listing Databases	326
16.4.5 Listing Table Names	326
16.4.6 Creating a Database Table	327

16.4.7 Inserting Data	327
16.4.8 Altering Tables	329
16.4.9 Queries	329
16.4.10 Deleting Databases	330
16.4.11 Deleting Data and Tables	330
16.5 phpMyAdmin	331
16.6 Database Bugs	334
16.7 Examples	334
16.8 Chapter Summary	337

CHAPTER 17: ALTERNATIVE SCRIPTING LANGUAGES **339**

The aim of this chapter is to have a look at the various technologies available for developing Web applications. This can be useful to familiarize you with legacy code that may be met while maintaining older applications and Web sites.

17.1 Legacy Code and Application Development Choices	340
17.1.1 CGI	340
17.1.2 Perl	340
17.1.3 ASP	341
17.1.4 Java	349
17.1.5 JSP	352
17.1.6 The .NET Framework	352
17.1.7 C#	353
17.1.8 Mono	354
17.1.9 IKVM	355
17.2 Chapter Summary	356

CHAPTER 18: FUTURE: GAINING A PERSPECTIVE **357**

This chapter's main focus is to acquaint the reader with the leading edge of Internet and Web technology, to give some idea of the currently active research areas and inspire interest for future study.

18.1 Introduction	358
-------------------	-----

18.2	Looking Back: Timeline	359
18.3	Looking Forward: Themes for the Future	362
18.3.1	Speed	362
18.3.2	Universal Access	362
18.3.3	Autonomic and Adaptable Systems	363
18.3.4	Unwired	363
18.3.5	Computers in Disguise?	363
18.3.6	Biological and Medical	364
18.3.7	Convergence	364
18.3.8	Multimedia	365
18.3.9	Military	365
18.4	Chapter Summary	366
	Glossary	369
	Sources	379
	Index	381