JAVASCRIPT JAVASCRIPT Developer's Resource

- Covers the JavaScript Development Environment including the new Netscape Navigator™ 3.0 browser
- Contains examples of advanced topics including Forms, Frames and LiveWire
- Special tips for optimizing your scripts
- © CD includes Macromedia®
 Shockwave™ and other Netscape
 plug-ins plus all code examples
 from the book



CLIENT-SIDE PROGRAMMING USING HTML NETSCAPE PLUG-INS AND JAVA APPLETS

Kamran Husain • Jason Levitt

JAYASCRIPT

Developer's Resource

CLIENT-SIDE PROGRAMMING USING HTML, NETSCAPE PLUG-INS AND JAVA APPLETS



Prentice Hall PTR Upper Saddle River, NJ 07458 http://www.prenhall.com Kamran Husain Jason Levitt

To join a Prentice Hall PTR mailing list, point to: http://www.prenhall.com/register Husain, Kamran, JavaScript developer's resource : client-side programming using HTML, Netscape plug-ins and Java applets / Kamran Husain, Jason Levitt. Includes index. ISBN 0-13-267923-X 1. JavaScript (Computer program language) 2. Client/server computing. I. Levitt, Jason. II. Title QA76.73.139H87 1997 96-38437 005.2—dc20

CIP

Editorial/Production Supervision: Raymond Pajek Acquisitions Editor: Mary Franz Development Editor: Ralph E. Moore Buyer: Alexis Heydt Cover Design: Anthony Gemmellaro Cover Design Direction: Jerry Votta Art Director: Gail Cocker-Bogusz Series Design: Meg VanArsdale



© 1997 Prentice Hall PTR Prentice-Hall. Inc. A Simon & Schuster Company Upper Saddle River, NJ 07458

All rights reserved. No part of this book may be reproduced, in any form or by any means, without permission in writing from the publisher.

The publisher offers discounts on this book when ordered in bulk quantities. For more information, contact

Corporate Sales Department Prentice Hall PTR One Lake Street Upper Saddle River, NI 07458 Phone: 800-382-3419; Fax: 201-236-714 E-mail (Internet): corpsales@prenhall.com

Printed in the United States of America

10987654321

ISBN 0-13-267923-X

Prentice-Hall International (UK) Limited, London Prentice-Hall of Australia Pty. Limited, Sydney Prentice-Hall Canada Inc., Toronto Prentice-Hall Hispanoamericana, S.A., Mexico Prentice-Hall of India Private Limited, New Delhi Prentice-Hall of Japan, Inc., Tokyo Simon & Schuster Asia Pte. Ltd., Singapore Editora Prentice-Hall do Brasil, Ltda., Rio de Janeiro

This book is dedicated to my father, Dr. Bilal Riaz Husain.

May he go to Heaven.

Kamran Husain

For the places: Flight Path, Ro, Flipnotics, and Ruta Maya;

And the people: Flint, Linda, and Natasha.

Jason Levitt

Trademarks are registered unless otherwise indicated

Adobe is a registered trademark of Adobe Systems Inc.

Apple, AppleScript, HyperCard, Macintosh, PowerBook, and the Apple logo are registered trademarks and Mac, MacOS, Chicago, Geneva, and System 7.0 are unregistered trademarks of Apple Computer, Inc.

Digital, DEC, ULTRIX, VAX, and VMS are registered trademarks of Digital Equipment Corporation

Informix is a registered trademark of Informix Software, Inc.

IBM, AIX, OS/2, and PowerPC are registered trademarks of International Business Machines Corporation

Hewlett-Packard, HP, and HP-UX are registered trademarks of Hewlett-Packard, Inc.

Helvetica and Times are registered trademarks of Linotype AG.

Metrowerks is a registered trademark and CodeWarrior is a trademark of Metrowerks

Microsoft and MS-DOS are registered trademarks and Windows 95, Windows NT and ActiveX are trademarks of Microsoft Corporation

MIPS is a registered trademark of MIPS Computer Systems, Inc.

Arial and Times New Roman are registered trademarks of Monotype Corporation PLC

Roaster is a registered trademark of Natural Intelligence

Netscape Navigator is a registered trademark of Netscape Communications Corporation

Nisus is a registered trademark of Nisus Software

Motif, OSF, and OSF/1 are registered trademarks of Open Software Foundation

Oracle is a registered trademark of Oracle

Quarterdeck Corporation

Unregistered

WebStar

IRIXis a registered trademark of Silicon Graphics Inc.

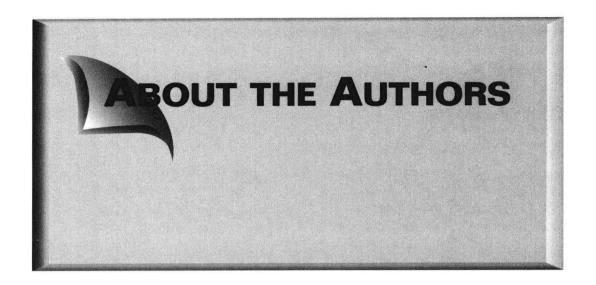
Java, HotJava, Java Developer's Kit, SPARC, SunOS, and SunSoft are registered trademarks and Sun Microsystems, Solaris, and NFS are trademarks of Sun Microsystems

Caf=E9 and Caf=E9 Lite are registered trademarks of Symantec

UNIX is a registered trademark of Unix Systems Laboratories

CKNOWLEDGMENTS

The authors would like to thank Mary Franz at Prentice Hall for her encouragement and tenacity. They would also like to thank Norreen, Ralph, and Ray for keeping up with strict deadlines and ever morphing versions of Navigator. Additionally, they would like to thank Brendan Eich, Fanny Wu, Len Feldman, and the brave Netscape Public Relations group for their technical assistance. And last, but definitely not least, Kamran thanks his wife Uzma, and his twin daughters, Haya and Hana, for putting up with odd schedules, deadlines, and missed trips to the swimming pool.



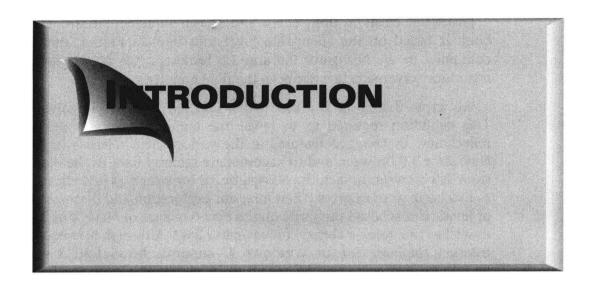
Kamran Husain

Kamran is an independent software consultant specializing in UNIX systems programming. He has developed applications and turn key systems in all sorts of software environments including C, C++, Real Time Systems, Windows NT, 95, Java, X Windows and Motif. He has a BSEE from the University of Texas at Austin and an MSCS from the University of Houston. He can be reached via e-mail at khusain@ikra.com

Jason Levitt

Jason Levitt started his career as a software developer and consultant before finally yielding completely to the joys of journalism. Before joining Open Systems Today in 1990, he freelanced technology reviews for such publications as Unix/World and Byte Magazine, and was a correspondent for Byte's MicroBytes Daily, one of the early online news services. He currently writes for InformationWeek Magazine in which he pens a bi-monthly column on Internet technology, entitled "InternetView." He can be reached at jlevitt@cmp.com

xviii



Welcome to the JavaScript Developer's Resource, a book designed for Web developers who desire a quick introduction to JavaScript and the technology behind it, along with in-depth discussions of its functionality and real examples intended to put that functionality to work. This book will provide you with the both the knowledge and the tools required to create powerful JavaScript scripts, enabling you to take full advantage of the capabilities inherent in JavaScript and to develop useful and interesting Web sites that push the limits of Web development.

JavaScript is a powerful scripting language that is quickly gaining mindshare among Internet users. Much of its popularity can be attributed to the ease with which developers and non-developers alike can tap into its power. A JavaScript interpreter is built into today's most popular Web browsers: Netscape's Navigator 2.0 and 3.0, and Microsoft's Internet Explorer 3.0. Unlike most other scripting and programming languages, you don't need any other tools, aside from one of these browsers, in order to get started writing and executing JavaScript scripts. JavaScript scripts, of course, are already all over the Internet, being used to enhance the impact and delivery of Web pages at countless sites and, after reading this book, you will have the skills to enable your site to compete with the best of them.

JavaScript exists in both client and server implementations. This book is based on the client-side JavaScript implementation that is contained in the Navigator 2.0 and 3.0 browsers. We do, however, introduce server-side JavaScript in the final chapter.

We wrote this book at a time when JavaScript was still evolving. This evolution required us to revise the contents several times to reflect new or changed features in the various beta releases of the Navigator 3.0 browser, and to accomodate security fixes in the Navigator 2.0 browser. In fact, the Navigator 3.0 browser was just released as this book went to press. Therefore, our exploration and discussion of JavaScript is based primarily on the beta 6 release of Navigator 3.0, as well as the release version of Navigator 2.02. Although Microsoft's Internet Explorer 3.0 for Windows 95 supports JavaScript, it was backwards-engineered by Microsoft to be compatible with the Java-Script implementation in Navigator 2.02. Some of the examples in this book don't work properly with it.

There are several audiences who may find this book useful. Web page developers and Internet application developers should find this book suitable both as a tutorial on the language and as a guide to its more advanced applications. Developers with limited programming experience, and even casual Web addicts, will find usable code and can go directly to those JavaScript features that interest them. Finally, seasoned developers will find interesting, and certainly more advanced, material in Part III.

How this Book is Organized

Part I of this book, "The JavaScript Basics," which contains Chapters 1 through 4, covers just that: the basics of JavaScript. This part is designed to get you grounded in the JavaScript language, including an introduction to the language and its tools and syntax, as well as a solid treatment of its variables, operators, statements, and objects. An understanding of the material presented in Part I will prepare you for the more advanced chapters contained in Parts II and III.

Part II, "The JavaScript Objects," contains Chapters 5 through 9, and picks up right where Chapter 4 left off. In this part, we get into heavy detail about the objects built in to JavaScript, including the basic navigational objects, event handlers that enable interactive Web pages, and more advanced uses of objects for creating on-the-fly

HTML, windows and frames, and even a section on creating your own objects. By the end of Part II, you should have everything you need to begin creating dynamic Web pages using JavaScript.

But wait, there's more . . . Part III, "Advanced JavaScript: Using Live-Connect and LiveWire," which contains Chapters 10 through 12, provides you with a beyond-the-basics look at what's probably the most powerful feature of JavaScript: its ability to interact within Netscape's Internet Application Architecture to create Internet applications that offer far greater capabilities than JavaScript alone can provide. With the introduction of Navigator 3.0 and it's LiveConnect capabilities, Netscape gave JavaScript developers the tools to let their scripts communicate with Java applets and plug-ins. In this part, we'll explore what this means to JavaScript developers who wish to add sound, video, animation, and more to their Web sites. Finally, we'll take a brief look at server-side JavaScript implementation with the LiveWire tool.

How to Use This Book

You'll notice as you read this book that there are a number of elements and we've tried to be consistent about attaching certain conventions to certain elements to make them stand out. These conventions have been used to make especially useful material easier to read and to find later on when referring back to our book during your programming sessions.

Source Code

All source code, whether it be complete Program listings or just code snippets, has been styled in a special font, as follows:

```
<#TML>
<BODY>
<APPLET CODE= XXXX>
</APPLET>
</BODY>
</HTML>
```

Please note also that all set-off source code appearing in the body of this book has been included on the accompanying CD-ROM for easy reference and use.

As well, we often use coding terms that run into the main text in our discussions. These terms have also been set in a special font, like so: "You can address the properties of the aHouse object using any number of myHouse statements." This applies to filenames and URLs as well.

Icons and Other Conventions

A number of special icons have been created and set in the margins of this book to call your attention to particularly useful and important information that might otherwise get lost in the running discussion of the text. As well, we've styled other key information distinctively so that you won't have to weed through the main text as you quickly scan for relevant Tips and Notes. These conventions are as follows:



This icon alerts readers to software bugs and possible methods of avoiding them.



This icon flags information that, while useful, may cause unexpected results or serious frustration.

Tip This convention is used to highlight particularly useful information that will save the reader time, emphasize a valuable technique, or offer some special advice.

Note
This convention highlights information that deserves special attention, such as an interesting fact about the topic at hand, or information that you may want to keep in mind while programming.

And Finally . . .

In the true spirit of online presentation, this book is accompanied by two forms of online media that we know you will find useful: the CD-ROM that accompanies this book, and a special Web supplement that has been created especially for this book.

Look for additional information related to JavaScript at this book's web site: www.prenhall.com/developers_resource_series

About the CD-ROM

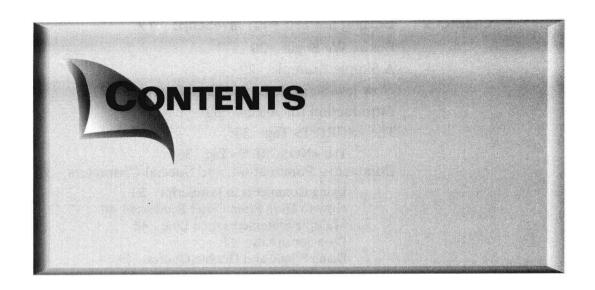
The CD-ROM contains the source code for all the code samples in this book. Hopefully, these samples will provide the basis for writing useful JavaScript applications. The code is provided for the Navigator 2.02 and 3.0 browsers running under Windows, Macintosh, and Unix, and has been tested to the best of our abilities.

Even though we made the best effort to get the source code on the CD-ROM to work across Windows, Macintosh, and Unix systems, you should be aware that the code will not always run consistently across platforms. That's because there are incompatibilities between the JavaScript implementation in Netscape's Navigator (versions 2.x and 3.0) and Microsoft's Internet Explorer 3.0. Alas, in some cases, even the same version of browser on different operating systems behaved differently! If you are running a Windows 95 system with the Netscape Navigator 3.0 browser, you are most likely to get all the examples to work right. Macintosh and Unix users should definitely read the errata files on the disc.

Perhaps when all the subtle and the not-so-subtle differences are ironed out, we can confirm that our JavaScript code will work regardless of platform for a given version number. There are still folks out there on the Net who use Navigator 2.02 because of all the "reported bugs" in Navigator 3.0.

Finally, writing JavaScript code is not a black art. It's a simple, yet uniquely powerful language to work with. Despite its power, Java-Script has its limitations and you should be aware of them before deciding to write a major application in it. JavaScript is simply a tool and you should know when to use it and when to use something else like Perl, Java or even C! Hopefully, this book will provide you with enough information to get you started.

Also, to help you along, we have added a number of shareware plug-ins. You should carefully read the notices and requirements for each plug-in before installation and use.



Acknowledgments xvii

About the Authors xviii

Introduction xix

Part One: The JavaScript Basics 1

Chapter I Javascript and the Internet Application Framework 3

What Is JavaScript? 4

A Bit of History 5

Netscape's Internet Application Framework 5

Development Components of Navigator 2.0 and 3.0 8

Developing With JavaScript 10

JavaScript Is Not Java 13

A Bit About JavaScript 14 A Bit About Java 15 Hello World in JavaScript and Java 15

Getting Started With JavaScript 19 Chapter 2 Before We Begin 20 A Simple Example 22 How JavaScript Is Loaded and Executed 27 Introduction to Objects 32 The <SCRIPT> Tag 33 The < NOSCRIPT > Tag 36 Comments, Punctuation, and Special Characters 37 Using Comments in JavaScript 39 How to Hide From Other Browsers Multiple Statements on a Line 44 Case Sensitivity 47 Using Single and Double Quotes 49 Special Characters in JavaScript 52 JavaScript in HTML Tags 54 JavaScript Entities 57 Chapter 3 JavaScript Language Basics 61 Variables 62 Statements 63 Operators 64 Arithmetic Operators 66 Bit Operators 67 Logical Operators 69 Comparison Operators 70 String Operations 71 Operator Precedence 78 Flow and Loop Control Segments 79 The if ... else Statement 80 For and While Looping Constructs 81 The Break and Continue Statements 84 The for...in Statement 85 Functions 86 A Small Example of Using Functions 88 Built-in Functions and Objects 93 String Object 93 Array Object 94 Math Object 95 Date Object 98 Converting Strings to Integers or Floating-Point Numbers 100

The eval() Function 100

Chapter 4 JavaScript and Objects 107

Using Objects 109

Creating Objects 110

More on Methods 121

Objects Within Objects 127

Adding New Members 133

JavaScript Object Model 134

Variable-Length Parameters 139

A Word on the Navigator Object 141

Part Two: The JavaScript Objects 148

Chapter 5 The History, Location, Link, and Anchor Objects 151

The History Object 152

History List Properties and Methods 152

The Back Button Problem 155

The Location Object 156

URL Components 158

URL Character Encoding 159

Setting Location Properties 161

Using the Location Object

for Backward Compatibility 162

Special Location Protocols 166

The javascript: protocol 167

The Link and Anchor Objects 171

The Resource Toolbar Example 174

Chapter 6 Events, Input, and Output 181

What are Events? 181

Types of Events 183

The onMouseOver Event Handler 184

The onClick Event Handlers 187

The OnChange, OnFocus, OnBlur

Event Handlers 191

Timed Events 200

The OnLoad and OnUnload Events 204

Multiple FORMS on One Page 207

Handling on Submit Events 209

Calling Event Handlers Explicitly 213

Chapter 7 JavaScript Documents 221

What's a Document? 222

Properties of Documents 223

Color Properties 224

The Anchors and Links Properties 233

Other Read-Only Properties 234

The Forms Property 235

The cookie property 240

How to Use Documents 241

Using Documents and Forms 241 A Short Point About Focus 246

Chapter 8 Windows in JavaScript 253

Window Objects 254

Creating a Window 254

Windows Methods 259

Declaring Frames 263

Example 1: Using Frames With JavaScript 268

Example 2: Using Variables for HTML 278

Example 3: Using FRAMEs and TABLEs 281

Colored Tables 294

Tainted Documents 295

Chapter 9 Applying JavaScript 299

Handling Images 299

Using XBM files 311

Using Image Maps 312

Using Objects and Frames 320

Using Cookies 329

Part Three: Advanced JavaScript: Using Live-Connect and LiveWire 356

Chapter 10 Working With Plug-Ins 359

The <EMBED> Tag 360

MIME Types and Plug-Ins 363

Plug-Ins in Navigator 2.0 364

Listing Your Installed Plug-ins 365 Using JavaScript to Pass Parameters to an <EMBED> Tag 365