

# **ASP.NET AJAX Programmer's Reference with ASP.NET 2.0 or ASP.NET 3.5**

Dr. Shahram Khosravi



**Wiley Publishing, Inc.**



# **ASP.NET AJAX Programmer's Reference**

## **with ASP.NET 2.0 or ASP.NET 3.5**

<b>Acknowledgments</b> . . . . .	<b>xi</b>
<b>Introduction</b> . . . . .	<b>xxix</b>
<b>Chapter 1: AJAX Technologies</b> . . . . .	<b>1</b>
<b>Chapter 2: JavaScript Base Type Extensions</b> . . . . .	<b>27</b>
<b>Chapter 3: Built-In and Custom Exception Types</b> . . . . .	<b>53</b>
<b>Chapter 4: JavaScript Object-Oriented Programming and Type Reflection Extensions</b> . . . . .	<b>77</b>
<b>Chapter 5: Event Programming Extensions</b> . . . . .	<b>131</b>
<b>Chapter 6: DOM Extensions</b> . . . . .	<b>161</b>
<b>Chapter 7: Component Development Infrastructure</b> . . . . .	<b>219</b>
<b>Chapter 8: Developing Client Controls</b> . . . . .	<b>281</b>
<b>Chapter 9: Event Bubbling and Button Client Control</b> . . . . .	<b>323</b>
<b>Chapter 10: Type Description Extensions</b> . . . . .	<b>349</b>
<b>Chapter 11: Data Classes</b> . . . . .	<b>407</b>
<b>Chapter 12: Client-Server Communications</b> . . . . .	<b>457</b>
<b>Chapter 13: Consuming Web Services Via Soap Messages</b> . . . . .	<b>511</b>
<b>Chapter 14: Consuming Web Services Via JSON Messages</b> . . . . .	<b>535</b>
<b>Chapter 15: Proxy Classes</b> . . . . .	<b>597</b>
<b>Chapter 16: Behaviors</b> . . . . .	<b>659</b>
<b>Chapter 17: Script and Extender Server Controls</b> . . . . .	<b>707</b>
<b>Chapter 18: Web Services Bridges and Transformers</b> . . . . .	<b>773</b>
<b>Chapter 19: UpdatePanel and ScriptManager</b> . . . . .	<b>857</b>
<b>Chapter 20: Using UpdatePanel in User Controls and Custom Controls</b> . . .	<b>911</b>
<b>Chapter 21: Page Life Cycle and Asynchronous Partial Page Rendering</b> . . .	<b>965</b>
<b>Chapter 22: ASP.NET AJAX Client-Side PageRequestManager</b> . . . . .	<b>1033</b>

*Continues*

<b>Chapter 23: Asynchronous Partial Page Rendering: Server Side Processing . . . . .</b>	<b>1105</b>
<b>Chapter 24: Asynchronous Partial Page Rendering: Client-Side Processing . . . . .</b>	<b>1179</b>
<b>Appendix A: XML Script . . . . .</b>	<b>1275</b>
<b>Appendix B: Binding . . . . .</b>	<b>1325</b>
<b>Appendix C: Actions . . . . .</b>	<b>1341</b>
<b>Appendix D: Data Control. . . . .</b>	<b>1357</b>
<b>Appendix E: Templated Controls. . . . .</b>	<b>1381</b>
<b>Appendix F: ListView . . . . .</b>	<b>1409</b>
<b>Index . . . . .</b>	<b>1481</b>

**ASP.NET AJAX Programmer's Reference  
with ASP.NET 2.0 or ASP.NET 3.5**



# **ASP.NET AJAX Programmer's Reference with ASP.NET 2.0 or ASP.NET 3.5**

Dr. Shahram Khosravi



**Wiley Publishing, Inc.**

# ASP.NET AJAX Programmer's Reference with ASP.NET 2.0 or ASP.NET 3.5

Published by  
**Wiley Publishing, Inc.**  
10475 Crosspoint Boulevard  
Indianapolis, IN 46256  
www.wiley.com

Copyright © 2007 by Wiley Publishing, Inc., Indianapolis, Indiana

Published simultaneously in Canada

ISBN: 978-0-470-10998-4

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600. Requests to the Publisher for permission should be addressed to the Legal Department, Wiley Publishing, Inc., 10475 Crosspoint Blvd., Indianapolis, IN 46256, (317) 572-3447, fax (317) 572-4355, or online at <http://www.wiley.com/go/permissions>.

**Limit of Liability/Disclaimer of Warranty:** The publisher and the author make no representations or warranties with respect to the accuracy or completeness of the contents of this work and specifically disclaim all warranties, including without limitation warranties of fitness for a particular purpose. No warranty may be created or extended by sales or promotional materials. The advice and strategies contained herein may not be suitable for every situation. This work is sold with the understanding that the publisher is not engaged in rendering legal, accounting, or other professional services. If professional assistance is required, the services of a competent professional person should be sought. Neither the publisher nor the author shall be liable for damages arising herefrom. The fact that an organization or Website is referred to in this work as a citation and/or a potential source of further information does not mean that the author or the publisher endorses the information the organization or Website may provide or recommendations it may make. Further, readers should be aware that Internet Websites listed in this work may have changed or disappeared between when this work was written and when it is read.

For general information on our other products and services or to obtain technical support, please contact our Customer Care Department within the U.S. at (800) 762-2974, outside the U.S. at (317) 572-3993 or fax (317) 572-4002.

Library of Congress Cataloging-in-Publication Data:

Khosravi, Shahram, 1963-

ASP.NET Ajax programmer's reference / Shahram Khosravi.

p. cm.

Includes index.

ISBN 978-0-470-10998-4 (paper/website)

1. Active server pages.
2. Internet programming.
3. Web site development.
4. Ajax (Web site development technology)
5. Microsoft .NET. I. Title.

TK5105.8885.A26K538 2007

005.2'76--dc22

2007024239

**Trademarks:** Wiley, the Wiley logo, Wrox, the Wrox logo, Wrox Programmer to Programmer, and related trade dress are trademarks or registered trademarks of John Wiley & Sons, Inc. and/or its affiliates, in the United States and other countries, and may not be used without written permission. All other trademarks are the property of their respective owners. Wiley Publishing, Inc., is not associated with any product or vendor mentioned in this book.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.



## About the Author

**Shahram Khosravi, Ph.D.**, is a senior software engineer, consultant, author, and instructor specializing in ASP.NET, Windows Communications Foundation (WCF), ASP.NET AJAX, Windows Workflow Foundation (WF), IIS7 and ASP.NET Integrated Programming, ADO.NET, Web services, .NET, and XML technologies such as XSD, XSLT, XPath, SOAP, and WSDL. He also has years of experience in object-oriented analysis, design, and programming, architectural and design patterns, service-oriented analysis, design, and programming, 3D computer graphics programming, user interface design, and usability.

Shahram is the author of the following four books: *Professional ASP.NET 3.5 and .NET 3.5 Programming (ASP.NET Internals plus ASP.NET AJAX, IIS 7.0, Enterprise Library Application Blocks, Windows Workflow Foundation, and Windows Communication Foundation)*, *ASP.NET AJAX Programmer's Reference with ASP.NET 2.0 or ASP.NET 3.5*, *Professional IIS7 and ASP.NET Integrated Programming*, and *Professional ASP.NET Server Control and Component Development*. He has written articles on the ASP.NET, ADO.NET, .NET, and XML technologies for the industry's leading magazines, such as *Dr. Dobb's Journal*, *asp.netPRO* magazine, and *Microsoft MSDN Online*.



# Credits

## **Senior Acquisitions Editor**

Jim Minatel

## **Development Editor**

Brian MacDonald

## **Technical Editors**

Alexei Gorkov

Darren J. Kindberg

Sam Judson

Dan Maharry

Cody Reichenau

## **Production Editor**

Eric Charbonneau

## **Copy Editors**

Kathryn Duggan

S. B. Kleinman

## **Editorial Manager**

Mary Beth Wakefield

## **Production Manager**

Tim Tate

## **Vice President and Executive Group Publisher**

Richard Swadley

## **Vice President and Executive Publisher**

Joseph B. Wikert

## **Project Coordinator, Cover**

Adrienne Martinez

## **Proofreader**

Ian Golder

## **Indexer**

Jack Lewis

## **Anniversary Logo Design**

Richard Pacifico



# Acknowledgments

First and foremost, I would like to greatly thank Jim Minatel, the senior acquisitions editor on the book, for giving me the opportunity to work on this exciting project and for all his support and guidance throughout the process. Huge thanks go to Brian MacDonald, the book's development editor. I greatly appreciate all your input, comments, and advice. Thanks, Brian, for everything! Special thanks go to the book's technical editors; Alexei Gorkov, Darren J. Kindberg, Sam Judson, Dan Maharry and Cody Reichenau. Thank you gentlemen, for all your input and comments.

Additional thanks go to Eric Charbonneau, the book's production editor. Thanks also go to Kathi Duggan and S.B. Kleinman, the copy editors; as well as Ian Golder, the proofreader.



# Contents

<b>Acknowledgments</b>	<b>xi</b>
<b>Introduction</b>	<b>xxix</b>
<b>Chapter 1: AJAX Technologies</b>	<b>1</b>
<b>Google Suggest</b>	<b>1</b>
<b>XMLHttpRequest</b>	<b>4</b>
<b>XML</b>	<b>16</b>
<b>JSON</b>	<b>20</b>
object	20
array	20
string	20
number	21
null, true, and false	21
<b>ASP.NET AJAX</b>	<b>24</b>
<b>Installing the ASP.NET AJAX Extensions and ASP.NET Futures</b>	<b>25</b>
<b>Summary</b>	<b>25</b>
<b>Chapter 2: JavaScript Base Type Extensions</b>	<b>27</b>
<b>ASP.NET AJAX Array Type Extensions</b>	<b>28</b>
add	28
addRange	29
clear	29
clone	30
contains	30
enqueue and dequeue	31
forEach	33
indexOf	34
insert	35
parse	36
remove	36
removeAt	37
<b>ASP.NET AJAX Boolean Type Extensions</b>	<b>37</b>
<b>ASP.NET AJAX Date Type Extensions</b>	<b>38</b>
<b>ASP.NET AJAX Object Type Extensions</b>	<b>38</b>

# Contents

---

<b>ASP.NET AJAX String Type Extensions</b>	<b>39</b>
endsWith	39
startsWith	40
trim	40
Formatting	41
<b>ASP.NET AJAX Error Type Extensions</b>	<b>41</b>
create	41
popStackFrame	45
Under the Hood of popStackFrame	48
<b>Summary</b>	<b>52</b>
<b>Chapter 3: Built-In and Custom Exception Types</b>	<b>53</b>
<hr/>	
<b>ASP.NET AJAX Built-In Exception Types</b>	<b>53</b>
ArgumentException	53
ArgumentNullException	56
ArgumentOutOfRangeException	58
ArgumentException	60
ArgumentUndefinedException	64
InvalidOperationException	66
NotImplementedException	66
ParameterCountException	68
<b>Implementing Custom Exception Types</b>	<b>70</b>
Recipe for Implementing Custom Exception Types	70
Using the Recipe	71
<b>Summary</b>	<b>76</b>
<b>Chapter 4: JavaScript Object-Oriented Programming and Type Reflection Extensions</b>	<b>77</b>
<hr/>	
<b>JavaScript Functions</b>	<b>78</b>
<b>JavaScript Classes</b>	<b>79</b>
<b>Type</b>	<b>80</b>
<b>registerClass</b>	<b>81</b>
<b>getName</b>	<b>83</b>
<b>isClass</b>	<b>84</b>
<b>registerNamespace</b>	<b>85</b>
<b>isNamespace</b>	<b>88</b>
<b>registerInterface</b>	<b>89</b>
<b>getInterfaces</b>	<b>92</b>
<b>isInterface</b>	<b>95</b>
<b>Inheritance</b>	<b>96</b>



---

<b>getBaseType</b>	<b>100</b>
<b>initializeBase</b>	<b>102</b>
<b>resolveInheritance</b>	<b>103</b>
<b>callBaseMethod</b>	<b>104</b>
<b>getBaseMethod</b>	<b>110</b>
<b>implementsInterface</b>	<b>113</b>
<b>inheritsFrom</b>	<b>118</b>
<b>isImplementedBy</b>	<b>121</b>
<b>getRootNamespaces</b>	<b>123</b>
<b>parse</b>	<b>125</b>
<b>registerEnum</b>	<b>127</b>
<b>isEnum</b>	<b>129</b>
<b>isFlags</b>	<b>129</b>
<b>Summary</b>	<b>130</b>
<b>Chapter 5: Event Programming Extensions</b>	<b>131</b>
<hr/>	
<b>Event Programming</b>	<b>131</b>
Sys.EventArgs	132
Sys.CancelEventArgs	132
EventHandlerList	133
<b>Using Event Programming</b>	<b>138</b>
Base Classes	138
Events	144
<b>Summary</b>	<b>159</b>
<b>Chapter 6: DOM Extensions</b>	<b>161</b>
<hr/>	
<b>DomElement</b>	<b>161</b>
getElementById	161
addClass	166
containsCssClass	167
removeClass	167
toggleCssClass	169
getLocation	171
setLocation	172
getBounds	175
<b>MouseButton</b>	<b>176</b>
<b>Key</b>	<b>176</b>
<b>Delegates</b>	<b>177</b>
Namespace	183
Mover	184

# Contents

---

TextProvider	184
ImageProvider	185
<b>DomEvent</b>	<b>185</b>
<b>Constructor</b>	<b>186</b>
Static Methods	189
Instance Methods	198
<b>Using the DomEvent Class</b>	<b>203</b>
Mover	209
TableProvider	216
<b>Summary</b>	<b>217</b>
<b>Chapter 7: Component Development Infrastructure</b>	<b>219</b>
<b>Interfaces</b>	<b>220</b>
IDisposable	220
INotifyDisposing	224
INotifyPropertyChanged	228
<b>Component</b>	<b>235</b>
<b>IContainer</b>	<b>238</b>
<b>Application</b>	<b>239</b>
addComponent	240
removeComponent	241
getComponents	242
findComponent	242
<b>Application Lifecycle</b>	<b>243</b>
<b>Component</b>	<b>248</b>
<b>Continuing the Application Journey</b>	<b>253</b>
endCreateComponents	253
raiseLoad	256
Summary of the Application Lifecycle	257
<b>Application Level Events</b>	<b>258</b>
init	258
load	259
unload	260
<b>Disposable Objects</b>	<b>260</b>
<b>Using the Application Object and Component Base Class</b>	<b>263</b>
dispose	264
initialize	267
id	269
raisePropertyChanged	270
get_events	271

---

INotifyPropertyChanged	272
INotifyDisposing	272
<b>Summary</b>	<b>280</b>
<b>Chapter 8: Developing Client Controls</b>	<b>281</b>
<b>Control</b>	<b>281</b>
Definition	281
get_element	283
get_id	283
set_id	284
set_parent	284
get_parent	285
get_visibilityMode	286
get_visible	286
set_visibilityMode	286
set_visible	287
addCssClass	288
removeCssClass	288
toggleCssClass	288
dispose	288
onBubbleEvent	289
raiseBubbleEvent	290
<b>Developing Custom Client Controls</b>	<b>290</b>
<b>Label Client Control</b>	<b>291</b>
Constructor	291
htmlEncode	291
text	292
prototype	294
descriptor	294
<b>Using Label Client Control</b>	<b>295</b>
<b>Image Client Control</b>	<b>297</b>
Constructor	298
prototype	298
imageURI	299
width	299
height	299
alternateText	300
<b>Using the Image Client Control</b>	<b>300</b>
<b>Extending Image Client Control</b>	<b>302</b>
Constructor	306
prototype	307

# Contents

---

imageURL	307
mouseOverImageURL	308
mouseOverCallback	308
mouseOutCallback	309
Duration	309
transition	310
Transition Enumeration	310
initialize	311
dispose	312
<b>Using Image2 Client Control</b>	<b>312</b>
<b>HyperLink Client Control</b>	<b>314</b>
Constructor	314
prototype	315
navigateURL	315
initialize	315
add_click	316
remove_click	317
_onClick	317
dispose	318
descriptor	318
<b>Using the HyperLink Client Control</b>	<b>319</b>
<b>Summary</b>	<b>321</b>
<b>Chapter 9: Event Bubbling and Button Client Control</b>	<b>323</b>
<b>CommandEventArgs</b>	<b>323</b>
<b>Button Client Control</b>	<b>325</b>
Constructor	325
prototype	325
argument	326
command	326
initialize	327
add_click	328
_onClick	328
dispose	329
descriptor	330
<b>Using Button Client Control</b>	<b>330</b>
Catching a Bubbled Event	330
Bubbling an Event	337
<b>Summary</b>	<b>348</b>