# Table of Contents

**Copyright**.................................................................................................................. 1
**Foreword**..................................................................................................................... 4
**About the Author**......................................................................................................... 5
**Acknowledgments**...................................................................................................... 6
**We Want to Hear from You!**.................................................................................... 7
**Introduction**.................................................................................................................. 9
  - About Code in This Book.......................................................................................... 9
  - One Year Older.......................................................................................................... 10
**Chapter 1. Introducing Silverlight**............................................................................ 11
  - Where Does Silverlight Come From?........................................................................ 12
  - Using Third-Party Plug-Ins....................................................................................... 15
  - Running on Multiple Platforms............................................................................. 17
  - Making the Web Application Secure..................................................................... 18
  - Introducing Silverlight.net..................................................................................... 19
  - What Do You Need to Run Silverlight?.................................................................... 19
  - Updating Your Runtime—Automatically.............................................................. 20
  - Trying Silverlight Demos....................................................................................... 20
  - What Do You Need to Develop Silverlight?............................................................ 24
  - Reading the Documentation.................................................................................... 25
  - Looking into Silverlight’s Future............................................................................ 27
  - Summary................................................................................................................... 28
**Chapter 2. Understanding XAML**.............................................................................. 29
  - Using XML for Data................................................................................................. 29
  - Using XML for User Interfaces.............................................................................. 31
  - Understanding XML Namespaces.......................................................................... 31
  - Defining Additional Namespaces........................................................................... 32
  - Creating a Canvas with Children........................................................................... 33
  - Attaching Properties: Canvas.Left and Canvas.Top........................................... 34
  - Documenting Your Markup with XML Comments.............................................. 35
  - Testing XAML Markup............................................................................................ 35
  - Setting Properties in XAML.................................................................................... 38
  - Changing Brushes................................................................................................... 40
  - Composing Scenes in XAML.................................................................................. 40
  - Saving Typing, Saving Space.................................................................................. 42
  - Summary................................................................................................................... 43
**Chapter 3. Playing with XAML Transforms and Animations**................................. 45
  - Transforming Visuals............................................................................................... 45
  - Types of Transforms............................................................................................... 47
  - Composing Transforms.......................................................................................... 52
  - Creating a Basic Animation.................................................................................... 54
  - Understanding the Animation’s Elements............................................................ 55
  - Adding a Scale Animation...................................................................................... 57
  - Using Other Types of Animations.......................................................................... 58
  - Deploying the Scene to a Web Page....................................................................... 60
  - Summary................................................................................................................... 60
**Chapter 4. Expression Blend**.................................................................................... 61
  - The Expression Studio in Short.............................................................................. 61
  - Installing Expression Blend.................................................................................... 62
  - Starting Expression Blend...................................................................................... 62
  - Setting Options........................................................................................................ 63
  - Creating a New Project............................................................................................ 64
  - Understanding the Panels...................................................................................... 65
  - Looking at the Files.................................................................................................. 66
Chapter 11. Progressing with Animations......................... 207
  Animating Elements in Blend............................................ 207
  Synchronizing Animations........................................... 212
  Reversing a Storyboard................................................... 214
  PointAnimation................................................................. 214
  Starting and Stopping the Animation.......................... 216
  Working on the Thumbnails Gallery............................ 218
  Summary........................................................................ 205

Chapter 12. Encoding Videos with Expression Encoder........ 231
  Before We Start............................................................... 231
  Introducing Expression Encoder.................................. 232
  Setting Options............................................................... 232
  Understanding the Panels............................................ 233
  Importing a Video........................................................... 234
  Saving your Changes..................................................... 235
  Specifying the Output Type.......................................... 235
  Testing Before Encoding............................................. 239
  Setting Metadata............................................................. 240
  Encoding the Video for Silverlight.............................. 243
  Checking the Result..................................................... 244
  Advanced Parameters.................................................. 245
  Summary........................................................................ 246

Chapter 13. Progressing with Videos................................. 247
  Why Streaming?............................................................... 247
  Publishing on Your Own Website.................................... 248
  Adding an Overlay.......................................................... 249
  Letting Your Users Choose the Player............................. 253
  Publishing on Microsoft Silverlight Streaming Servers...... 258
  Adding the Application in an Existing Web Page............... 260
  Firing Script Commands (and Catching Them)................ 262
  Modifying the Player Template in Blend........................ 264
  Summary........................................................................ 267

Chapter 14. Letting .NET and JavaScript Talk.................. 269
  Making .NET Available to JavaScript............................ 269
  Handling .NET Events in JavaScript............................... 271
  Calling JavaScript Methods from .NET.......................... 275
  Calling .NET Methods from JavaScript........................ 277
  Adding a “Login” Dialog to the Thumbnails Application..... 278
  Summary........................................................................ 278

Chapter 15. Digging into Silverlight Elements............... 299
  Exploring the Class Hierarchy........................................ 299
  Choosing XAML or Code-Behind..................................... 301
  Packing and Laying out with Panels............................. 304
  Scrolling and Bordering............................................... 315
  Using Pop-Ups................................................................. 318
  Drawing Shapes.............................................................. 319
  Summary........................................................................ 321

Chapter 16. Digging Deeper into Silverlight Elements......... 323
  Understanding the Control Class................................. 323
  Discovering Basic Controls......................................... 325
  Picking Dates with Calendar and DatePicker.................. 333
  Writing with Ink............................................................. 335
  Making a Simple Drawing Application........................ 336
  Presenting Data with ItemsControls............................. 343
Chapter 17. Using Resources, Styling, and Templating ........................................ 349
Storing Items in Collections................................................................................. 350
Using ResourceDictionaries in Silverlight ......................................................... 351
Styling a Control .................................................................................................. 356
Styling the Thumbnails Application .................................................................... 360
Embedding Fonts in the Application .................................................................... 362
Templating the Lookless Control ......................................................................... 364
Summary .............................................................................................................. 369

Chapter 18. Data Binding and Using Data Controls ....................................... 371
Understanding Data Binding ............................................................................... 371
Digging in the Binding Class ................................................................................ 377
Setting the DataContext ....................................................................................... 378
Using Data Controls .............................................................................................. 380
Using XML Data Sources ....................................................................................... 394
Summary .............................................................................................................. 394

Chapter 19. Creating User Controls and Custom Controls ......................... 395
Creating a Thumbnails Viewer User Control ....................................................... 395
Creating the Items and Designing a DataTemplate ............................................ 405
Creating a MediaInfoDisplay Custom Control ................................................... 413
Summary .............................................................................................................. 422

Chapter 20. Taking Silverlight 2 One Step Further .................................... 423
Creating a Default Template for the MediaInfoDisplay Control ...................... 423
Using the MediaInfoDisplay Control ................................................................ 425
Scrolling the Items ............................................................................................... 430
Creating a New RepeatButton Template ............................................................. 433
Exporting Classes to an External Assembly and Refactoring ............................ 437
Talking About the Application Object ................................................................. 442
Using Generics .................................................................................................... 444
Summary .............................................................................................................. 445

Chapter 21. Taking Silverlight 2 Even Further .......................................... 447
Registering Multiple JavaScript Event Handlers ............................................... 448
Finding Silverlight Elements in JavaScript ......................................................... 449
Accessing the HTML Page From .NET ............................................................... 451
Exchanging Data Between .NET and JavaScript .............................................. 453
Passing Initialization Parameters ....................................................................... 451
Attaching .NET Events to HTML Elements ....................................................... 452
Publishing Directly from Visual Studio ............................................................... 454
Debugging Your Silverlight Application ............................................................ 466
Summary .............................................................................................................. 473

Chapter 22. Connecting to the Web ............................................................... 475
Creating and Loading an XML File ..................................................................... 475
Loading a Zip File and Showing Progress ......................................................... 488
Making Requests to WCF Services ..................................................................... 496
More Connectivity ............................................................................................... 505
Summary .............................................................................................................. 506

Chapter 23. Placing Cross-domain Requests and Handling Exceptions ... 507
Placing Cross-domain Requests......................................................................... 507
Communicating with Third-Party Services ......................................................... 511
Placing POST Requests....................................................................................... 524
Throwing and Catching Exceptions .................................................................. 525
Summary .............................................................................................................. 533

Chapter 24. Silverlight: Continuing the Journey ......................................... 535
Updating a Service Reference ............................................................................. 535
Killing a Process ................................................................................................. 536
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>About Protecting Your Work</td>
<td>538</td>
</tr>
<tr>
<td>Binding in Special Configurations</td>
<td>539</td>
</tr>
<tr>
<td>Using the ASP.NET Controls Silverlight and MediaPlayer</td>
<td>544</td>
</tr>
<tr>
<td>Creating Unit Tests for Silverlight</td>
<td>549</td>
</tr>
<tr>
<td>Making or Buying XAML Resources</td>
<td>557</td>
</tr>
<tr>
<td>Using Third-Party Controls and Libraries</td>
<td>560</td>
</tr>
<tr>
<td>Reading Silverlight-Related Blogs</td>
<td>561</td>
</tr>
<tr>
<td>Summary</td>
<td>561</td>
</tr>
</tbody>
</table>
Laurent Bugnion

Silverlight

UNLEASHED

SAMS
800 East 96th Street, Indianapolis, Indiana 46240 USA
Dedication

How to write this book without your never-ending, ever patient support, Chi Meei... This was once again a crazy project, and I couldn't have done it without your approval and your help. By your constant support and the energy and dedication you put into shielding me from the small worries of life, you made this book possible. I love you.

To Alise and Laeticia, my two princesses. Before you appeared in my life, I thought I was happy. Now I know something big was missing. I love you both so much.

Un jour sans danser est un jour perdu  
Maurice Béjart

Je ne sais pas ce qui est beau, mais je sais ce que j'aime  
et je trouve ça amplement suffisant.  
Boris Vian

Le Poète est semblable au prince des nuées  
Qui hante la tempête et se rit de l'archer;  
Exilé sur le sol au milieu des huées,  
Ses ailes de géant l'empêchent de marcher.  
Baudelaire – L’Albatros
Foreword

There are two undeniable trends in the software development world. The first is toward web style deployment of applications. The web is quickly maturing as an application delivery platform, and increasingly, web applications are seen as the right solution for many styles of applications. The second is toward richness of applications. User experience is becoming increasingly important; consumer-facing applications attracting and retaining users has never been harder and even small usability improvements often make the difference. In business applications, CIOs are realizing that if they can save even a few seconds on every transaction by making employees more effective they can save millions of dollars.

Not surprisingly, Silverlight 2 sits squarely in this sweetspot.

Silverlight 2 is a web application technology. The Silverlight runtime itself is smaller than the average Britney Spears song and is seamless to install on any browser (Internet Explorer, Firefox, Safari, and so on) and on any platform (Windows, Mac, Linux). Silverlight applications are small and fast to deploy and have zero impact on the client machine. There is no install or uninstall step for Silverlight applications, and all these applications run in a sandbox that ensure they cannot harm user machines or other applications.

Silverlight 2 enables building great user experiences. Through the power of the convergence around video, vector graphics and a powerful developer framework, Silverlight is the ideal platform for UX. Developers have full expressiveness with the power of the CLR under the hood in Silverlight. The C# and VB languages allow developers to be productive today without learning new languages and development tools. The XAML markup allows designers to use Expression and other design tools to build great transitions and animations so that applications look and feel great. All of this together enables Silverlight applications to deliver more productive experiences to end users helping them get their jobs done faster.

This book unleashes Silverlight for you. Laurent not only has a deep understanding of Silverlight, where it is now and where it is going, but he also deeply understands real world programming concerns. This book will make learning Silverlight fun.

I can’t wait to see what you build with it.

Brad Abrams
Product Unit Manager
Microsoft Corporation
http://blogs.msdn.com/brada

September 2008
About the Author

Laurent Bugnion works as a senior software developer and architect in Switzerland, where he lives with his wife, Chi Meei, and his two daughters, Alise (2001) and Laeticia (2004). Originally an electronics engineer from the Engineering School of Yverdon (Switzerland), his interests quickly moved to software, and he achieved a post-graduate degree in software engineering in 1999 in the Engineering School of Rapperswil (Switzerland).

Currently, his interests are very much set on WPF, Silverlight, and other .NET 3.5 technologies, which he helped introduce, teach, and coach at Siemens for the past three years. Prior to that, he first wrote embedded C/C++, and then moved to desktop computers in Java, JavaScript, and eventually .NET (WinForms and ASP.NET). After more than 12 years spent developing various software products at Siemens, Laurent is employed since December 2008 by IdentityMine, one of the world's leading firms in WPF and Silverlight development and design.

Privately, Laurent has also been active, developing websites and web applications in HTML, JavaScript, CSS, ASP, and currently ASP.NET. He has done his best to contribute to various developers communities, first in the JavaScript newsgroups, and then in Microsoft's forums related to ASP.NET, C#, WPF, and Silverlight. He blogs regularly on http://blog.galasoft.ch and publishes articles, prototypes, and demos related to the mentioned technologies.

Laurent became a Microsoft Most Valuable Professional (MVP) in 2007 for ASP.NET and then in 2008 for Client Application Development. In 2008, he also earned an MCTS for Windows Presentation Foundation.
Acknowledgments

A book about a to-be-released technology cannot be written without strong support from the community, both within Microsoft and outside it. Making a complete list of all the people who encouraged me and helped me in this daunting task is impossible, but I want to mention and thank some people (and for some of them, friends) explicitly (and in no particular order):

- At Microsoft: Scott Guthrie, Tim Sneath, Ian Ellison-Taylor, Brad Abrams, Rob Relyea, Tim Heuer, Adam Kinney, Peter Blois, Unni Ravindranathan, Joe Stegman, Mike Harsh, Karen Corby, Kathy Kam, Corrina Barber, Beatriz Costa, James Clarke, John Gossmann, Karsten Januszewski, Adam Nathan, Christian Schormann, Mark Feinholz, Ted Hu, Jeff Wilcox, Justin Angel, and many others from the Dev Div, for building the stuff my dreams are made of (and for writing about it!). I've seen the “new Microsoft” at work, and I like it!

- In the Silverlight and WPF community: Josh Smith, Jonathan Russ, Brennon Williams, Karl Shifflett, Marlon Grech, Corrado Cavalli, Grant Hinkson, Nathan Dunlap, Josh Wagoner, Robby Ingebretsen, Kevin Moore, Shawn Wildermuth, Dave Campbell, Jon Galloway, Grant Hinkson, John Papa, and all the WPF Disciples for teaching me all I know (or so it feels).

- The team at Sams and especially Neil Rowe, Mark Renfrow, Mandie Frank, and Genell Breeze for their patience and support for this first-time author.

- The whole MVP community and especially the Client Application Development members, for welcoming me and making me feel worth it.

- All my friends, online and offline, who had to bear with me being either working on the book or talking about the book or thinking about the book or, you know, sleeping (and probably dreaming about the book).

A very special thanks to Brennon Williams who gave me such invaluable comments and advice; to J. Boyd Nolan for reviewing and editing, and for converting this book's examples from C# in VB.NET; to Adam Nathan who advised me about the book's outline before I even started writing it; to Shawn Wildermuth for pulling me out of many a technical hole; to Peter Blois for listening patiently to my bug reports and proposing solutions; to Tim Heuer and Adam Kinney, for clearly showing that Silverlight is more than just a job to them; to all the Silverlight Insiders for the always interesting and often life-saving discussions.

Software engineering is a passion. To all of you whom I learn from everyday, and to whom I try to teach a little through my blog, my site, or in conferences, thank you for making this more than a job: a way of life.
We Want to Hear from You!

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.

You can 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 author as well as your name and phone or email address. I will carefully review your comments and share them with the author and editors who worked on the book.

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Reader Services

Visit our website and register this book at www.informit.com/title/9780672330148 for convenient access to any updates, downloads, or errata that might be available for this book.
Introduction

With the release of Windows Presentation Foundation (a new graphical user interface framework for Windows desktop applications) in 2006 and of Silverlight in 2008, client application development took a turn for the best. Microsoft boldly decided to abandon some concepts and technologies that had been used since the first release of Windows and to do something new and better. While it sometimes seems difficult to keep up with the pace of change imposed on software developers, this one is really worth it. Microsoft’s bet on Silverlight and WPF is huge, and it cannot fail. These technologies represent the future of client application development.

Because it runs on multiple platforms in a web browser plug-in that will soon be available on most of the rich clients accessing the Internet, because it can be deployed as easily as any web content and be served from any web server without additional infrastructure, and because of the rich graphic interfaces it allows to be built and the amazingly easy connectivity to remote services that it offers, Silverlight will be a major player in the world of rich interactive applications (RIA). Silverlight is also a gateway to Windows Presentation Foundation, the client application technology that represents the future of Microsoft Windows programming for desktop computers.

In a World Wide Web where Adobe Flash currently has a leading edge, Silverlight represents much more than just an alternative: It is the .NET way! Every .NET programmer will feel at home with Silverlight, because the libraries, the programming languages (C#, VB.NET, Ruby, Python), and the development environment (Visual Studio, Expression Studio) are the same. In addition, new concepts developed and refined in Windows Presentation Foundation are made available to Silverlight programmers, such as data binding, separation of behavior and looks, lookless controls that can be styled and templated at will in powerful design tools such as Expression Blend, a rich animation system, media integration, and so on. XAML, the new XML-based Application Markup Language developed by Microsoft, can be leveraged as a bridge between developers and designers to enable new workflows.

This book is not and was never intended to be a complete reference of the Silverlight platform. Honestly, I am not even sure that you need a book for this: The Internet is at your disposal and has a better, more complete, and more actual reference base than any book can ever offer. No, this book is here to help you discover why programming is fun and why Silverlight is even more fun, and to contaminate you with the Silverlight virus. Complex concepts are explained in simple terms, with many hands-on demos and figures so that beginners as well as advanced developers quickly will feel at home.

About Code in This Book

We tried to keep formatting as consistent as possible throughout the book and to make the code look like it does in Visual Studio. The code is color coded to help you work faster.
and recognize key concepts in XAML, C#, JavaScript, and HTML in Studio and in Expression Blend.

The source code lines are only numbered where it is relevant, for example, when the text makes explicit reference to a line number.

The whole source code for this book is available online at www.galasoft.ch/SL2U/Code. For C# code, a translation in VB.NET is also available, courtesy of this book's technical editor, J. Boyd Nolan.

One Year Older

I started working on this book in September 2007, and I am now exactly one year older. Professionally speaking, it has been the most interesting year of my life. Since I started working as a developer in 1996, I have worked with many client technologies and programming languages, including C, VB, Java, HTML, CSS, JavaScript, ASP.NET, Windows Forms and finally Windows Presentation Foundation and Silverlight. In all these years, I have never been as excited about a new programming platform. Writing a book is hard, and it's a lot of work. But it was also fun and so interesting that I always felt right doing it. If I had to do it again, I would sign without hesitation. And now that it's going to be published, I can't wait to see what you, the reader, will create in Silverlight. Software has much to do with art, and Silverlight is the richest palette you can imagine. So grab the book and your computer, start coding and designing, and show the world what you can do. I will be waiting.

Happy coding!

Laurent
CHAPTER 1
Introducing Silverlight

It all started when Microsoft presented its revolutionary user interface (UI) framework, Windows Presentation Foundation, to an enthusiastic crowd of graphics designers, software developers, and businessmen in March 2006 at the new MIX conference in Las Vegas. Microsoft also added one session about a lesser-known technology with the rather barbarian name Windows Presentation Foundation Everywhere, or WPF/E. There was nothing much to see yet, but the abstract was enticing: “With WPF/E you’ll be able to build rich, interactive experiences that run in major Web browsers on major platforms as well as on mobile devices.”

A little more than a year later, at the second edition of the same MIX conference, Scott Guthrie (general manager at Microsoft, responsible for most of the .NET teams) climbed on stage and gave the crowd an amazing software demonstration. The barbarian WPF/E was gone; in its place was Silverlight (see Figure 1.1).

A bright new logo revolved on the screens. Gradients and animations were all over the place. Planes flew over the web browser’s window, connecting US cities while Scott was planning his next trips; a chess application let the browser’s JavaScript engine play against .NET, demonstrating without any doubt the superior power of the compiled .NET application over JavaScript’s interpreted code. Yes, the browser was running .NET!—not only in Internet Explorer but also on Firefox! And yes, even on a Macintosh computer.
It was an intense hour! Later that day, more demos of the new Expression Encoder were presented, which allows users to produce movies and run them in the web browser, after having copied them to a streaming (or to a nonstreaming) web server. Even better, with the Expression Encoder you can now change the look and feel of the video player completely, basing your work on predefined templates, but also changing everything from colors to shapes in Expression Blend.

These first demos were only the start of an amazing three days packed with Silverlight content. In a little less than a year, Silverlight had made it from little-known side attraction to major technology with a huge potential.

Where Does Silverlight Come From?

A little history can be interesting to understand where Silverlight came from, and how it is positioned among the many UI technologies available today. Depending on your past experience, you may be well aware of the facts presented in the next sections. In that case, feel free to skip ahead (the next interesting section for you will probably be “Running on Multiple Platforms”). If you don’t want to skip ahead, or if you feel like refreshing your memory, keep reading as this section and the next few sections fast forward from the antiquity of the World Wide Web to the magic of today.

Web pages have been around for a long time. In fact, HTML was presented to the world as early as 1992. (You know the old line about dog years being equal to seven human years? Well, 1992 in computer years is, like, Middle Age for humans!) Of course, HTML was limited in the beginning. Web pages were simple, composed mostly of text and hypertext (the most revolutionary idea of HTML, and the origin of the name Hypertext Markup Language).

Very quickly, however, the inventors of HTML saw the need for richer content to be made available in web pages. The first step in that direction was the invention of the IMG tag, allowing images to be placed inline. The basis for richer content was there, and the first popular web browser, Mosaic, displayed these pages.

Automating Web Pages with JavaScript

The next big step forward in the quest for rich content was the addition of a JavaScript engine running in the web browser.
This programming language (added in 1995 to the Netscape web browser, and then in 1996 in Microsoft Internet Explorer) enabled a much richer interaction with the user. Earlier, the only possible user action was through a postback to the web server, meaning that any data entered by the user had to be sent back to the server for handling, and the result was returned as a response. Obviously, this model was slow, especially at the time of dial-up connections.

With JavaScript, it was possible to provide a basic treatment of data on the client directly, without postback. A first obvious use for this client-side technology was a prevalidation of data, making sure that the user was not sending useless information to the server, wasting bandwidth and valuable server time. With JavaScript enabled, errors could be caught early, and faulty data would never leave the client. Of course, as soon as a web server interaction was needed, for example, to retrieve data, for complex calculations, to authenticate users, and so on, a postback was needed. This model still prevails in many websites even today.

Cascading Style Sheets

Another big step forward in the creation of rich web content has been the creation of Cascading Style Sheets (CSS). Finally a separation of content and layout was made possible. The look and feel of a web page could be extracted from the page itself and governed by the use of rules placed in external files. This model has many advantages:

- The responsibilities can easily be shared by various teams, depending on their skills. Graphics designers can be in charge of the look, developers of the functionality, while marketing is in charge of the content.
- In smaller projects, the developer can concentrate on the page’s structure and functionality first, and create the look later, after the content is fully known. This way of working is much more efficient than doing everything at the same time.
- The page’s look can be changed easily without touching the page itself.
- Same styles can be reused over and over again without having to rewrite the code. Classes can be located in a central location and referenced anywhere. In fact, it’s even possible to have styles on a central server and be used on other web servers, related or not.

As CSS became more and more sophisticated, the pages became more and more beautiful, to a point where the aspect of the pages, in some cases, becomes as important as the
content itself. One can argue endlessly whether that’s a good thing (after all, content is what users are really looking for, isn’t it?), but if you can choose between boring content and beautiful content, surely the beauty will make the experience more pleasurable.

### Progressing to DHTML

As the JavaScript and CSS engines became more advanced, some interaction was made possible between them. **DHTML (Dynamic HTML)** was born. Actually, DHTML is not a technology; it’s a combination of JavaScript and CSS used in the context of HTML.

Using JavaScript as a programming language, it is possible to access elements of the page itself (content and style), and to modify them. Since this is client-side technology, no interaction with the server is required for this kind of effect.

Because CSS allows the setting of an element’s opacity, it is possible to create fade-in/fade-out effects. With the possibility to set an element’s position in an absolute manner, JavaScript allows you to move an element across the screen. In addition to “just” adding some kind of intelligence and good looks to the web pages, the interaction between CSS and JavaScript enabled the creation of richer, smoother web pages.

Although this all sounds nice, DHTML is rather limited:

- Opacity is not supported in all browsers, and the ones that support it don’t use a standard syntax, making it kind of a maintenance nightmare.
- Moving elements across the screen can only be done at limited speed and is not as smooth as you would want.
- It is impossible to rotate elements. If you want to show a rotated button, you need to simulate this using multiple images, and the effect will not be smooth.
- Text (such as a title, in a logo, etc…) can only be rotated by using images. In that case, the localization becomes a nightmare, because you need to translate each image in each language you want to support.
- The “hit test area” for any element is always square. In other words, even if you have an image of a round button with a transparent background, you may activate the action even if you click outside the round area. The mouse cursor will turn to a hand even though the mouse is still on the transparent area.

Thankfully, Silverlight corrects all these shortcomings, and since it can be “blended” among HTML elements, it offers a real possibility to graphically enrich a web page.