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Beginning

# ASP.NET 4

in C# and VB

Imar Spaanjaars

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BEGINNING  
**ASP.NET 4**  
IN C# AND VB

Imar Spaanjaars



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# *About the Author*

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Imar Spaanjaars graduated in Leisure Management at the Leisure Management School in the Netherlands, but he quickly changed his career path into the Internet world.

After working in the Internet business at various web agencies for the past twelve years, he recently started up his own company called *De Vier Koeden* ([www.devierkoeden.nl](http://www.devierkoeden.nl)), a small Internet agency specializing in consultancy and development of Internet and intranet applications with Microsoft technologies such as ASP.NET 4.

Imar has written books on ASP.NET and Macromedia Dreamweaver, all published under the Wrox brand. He is also one of the top contributors to the Wrox Community Forum at [p2p.wrox.com](http://p2p.wrox.com), where he shares his knowledge with fellow programmers.

In 2008 and 2009, Imar received Microsoft's Most Valuable Professional (MVP) award for his contributions to the ASP.NET community.

Imar lives in Utrecht, the Netherlands, with his girlfriend, Fleur. You can contact him through his personal web site at <http://imar.spaanjaars.com> or by e-mail at [imar@spaanjaars.com](mailto:imar@spaanjaars.com).

# *Credits*

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# Acknowledgments

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Just as with my prior books, I really enjoyed writing this one. The process from an empty Word document at the very beginning to a printed copy as the final result is a really interesting one. Along the way, I discovered, understood and used a lot of the new features that ASP.NET 4 and Visual Web Developer 2010 bring. Since this book is a major update on the previous edition — *Beginning ASP.NET 3.5 in C# and VB* — I have been able to incorporate a lot of reader feedback into this edition. While working on this book, I went through the more than 450 threads in the book's forum, looking for feedback that could improve this edition. This allowed me to add clarification and more detailed instructions where needed. If you have the previous edition and posted a question in the Wrox forum, thanks for your valuable feedback; you've really helped to make this book better.

Besides my readers, I owe a lot to other people who helped me write this book.

First of all I'd like to thank Brian Herrmann for his editorial work. Just as before, it was a pleasure to work with you! I also want to thank Michael J. Apostol for his work as a technical editor, and the people from Wrox for their support and contributions to this book.

Another person I owe a lot to is my friend Anne Ward from Blue Violet, a UK-based web and graphic design company. Anne has done most of the new designs used in this book and I highly appreciate her input. Thanks again, Anne! The concert pictures you see in this book come from Nigel D. Nudds, who kindly let me use pictures from his collection.

Finally, I would like to thank my good friends Joost and René and my lovely girlfriend Fleur for their support during this project.

# Foreword

---

This is a very nice book written by one of ASP.NET's very own Most Valuable Professionals, Imar Spaanjaars. It takes a lot to be a Microsoft MVP — not only do you need expertise in the subject matter, you also need to be a great teacher and a technology philanthropist. Through his blog articles, and books, Imar has given a considerable amount of his time to benefit the web development community.

Imar has been active in the ASP.NET community for a long time and has written several books on web development, including the previous version of this book, *Beginning ASP.NET 3.5*. What makes this book so special is that it does not assume the reader has any prior knowledge of web development and at the same time it is a great book for anyone hoping to upgrade to ASP.NET 4. The book uses the free Visual Studio edition, Visual Web Developer Express 2010, starting from a chapter covering how to get started and then slowly introducing more advanced concepts in a seamless fashion.

In the process of helping create Visual Studio 2010 for Web Developers, I often interacted with community leaders to collect feedback on how we could make the product better for every web developer. Imar has been using ASP.NET 4 and VWD 2010 Express since their first Beta versions, and has been pouring in feedback on which bugs are important to fix and which features to emphasize. His passion for the technology is reflected in this book and I am positive that the readers of this book will feel that same passion.

ASP.NET 4 and Visual Studio 2010 have feature improvements in many areas, including building standards-compliant web sites, JScript IntelliSense, jQuery integration, Ajax, CSS improvements, HTML and markup snippets, Web Deployment, and data integration. I believe ASP.NET 4 and Visual Studio 2010 are great technologies to build fine web sites, and this book will be an excellent companion to these products, helping users excel in the world of web development.

—**Vishal R. Joshi** Senior Program Manager Lead Microsoft Web Platform  
Tools <http://vishaljoshi.blogspot.com>

# Introduction

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To build effective and attractive database-driven web sites, you need two things: a solid and fast framework to run your web pages on and a rich and extensive environment to create and program these web pages. With ASP.NET 4 and Visual Web Developer 2010 you get both. Together they form *the* platform to create dynamic and interactive web sites.

ASP.NET 4 builds on top of its popular predecessors ASP.NET 2.0 and ASP.NET 3.5. While maintaining backward compatibility with sites built using these older versions, ASP.NET 4 and Visual Web Developer 2010 introduce new, exciting features and bring many smaller, but much needed changes to the framework and development tools.

With each new release of Visual Studio (which includes Visual Web Developer) since Visual Studio 2003, I am surprised by the sheer amount of new functionality and changes Microsoft has been able to put in the product. Visual Studio 2010 is no exception. A major new feature in Visual Studio 2010 is the full integration of the ADO.NET Entity Framework 4 that lets you work with databases with very little code. Another great change in Visual Studio is the use of Windows Presentation Foundation (WPF) for the User Interface which brings a better user experience and new behavior in Visual Studio itself.

Although not a new feature by itself, the inclusion of jQuery in Visual Web Developer is an excellent decision that will help you write fancier web sites in less time. jQuery is a compelling client-side, cross-browser JavaScript framework and is discussed in detail in Chapter 11.

If you're familiar with earlier versions of ASP.NET, you'll be happy to find many small gems in this new version of the framework that will make your life as a developer easier. I'll mention and discuss these new features throughout this book where appropriate. For a complete list of all new features in ASP.NET, check out the following white paper at the official ASP.NET web site:

<http://www.asp.net/learn/whitepapers/aspnet4/>

Probably the best thing about Visual Web Developer 2010 is its price: it's still available for free. Although the commercial versions of Visual Studio 2010 ship with Visual Web Developer, you can also download and install the free Express edition. This makes Visual Web Developer 2010 and ASP.NET 4 probably the most attractive and compelling web development technologies available today.

## Who This Book Is For

This book is for anyone who wants to learn how to build rich and interactive web sites that run on the Microsoft platform. With the knowledge you gain from this book, you create a great foundation to build any type of web site, ranging from simple hobby-related web sites to sites you may be creating for commercial purposes.

Anyone new to web programming should be able to follow along because no prior background in web development is assumed, although it helps if you do have a basic understanding of HTML and the web in general. The book starts at the very beginning of web development by showing you how to obtain and install Visual Web Developer. The chapters that follow gradually introduce you to new technologies, building on top of the knowledge gained in the previous chapters.

Do you have a strong preference for Visual Basic over C# or the other way around? Or do you think

both languages are equally cool? Or maybe you haven't made up your mind yet and want to learn both languages? Either way, you'll like this book because *all* code examples are presented in both languages!

Even if you have some experience with prior versions of ASP.NET, you may gain a lot from this book. Although many concepts from previous versions are brought forward into ASP.NET 4, you'll discover there's a lot of new stuff to be found in this book, including an introduction to the ADO.NET Entity Framework, the inclusion of jQuery, ASP.NET AJAX, the many changes to the ASP.NET 4 Framework, and much more.

## What This Book Covers

This book teaches you how to create a feature-rich, data-driven, and interactive web site called Plan Wrox. Although this is quite a mouthful, you'll find that with Visual Web Developer 2010, developing such a web site isn't as hard as it seems. You'll see the entire process of building a web site, from installing Visual Web Developer 2010 in Chapter 1 all the way up to putting your web site on a live server in Chapter 19. The book is divided into 19 chapters, each dealing with a specific subject.

- **Chapter 1, “Getting Started with ASP.NET 4.”** In this chapter you'll see how to obtain and install Visual Web Developer 2010. You'll get instructions for downloading and installing the free edition of Visual Web Developer 2010, called the Express edition. You are also introduced to HTML, the language behind every web page. The chapter closes with an overview of the customization options that Visual Web Developer gives you.
- **Chapter 2, “Building an ASP.NET Web Site.”** This chapter shows you how to create a new web site and how to add new elements like pages to it. Besides learning how to create a well-structured site, you also see how to use the numerous tools in Visual Web Developer to create HTML and ASP.NET pages.
- **Chapter 3, “Designing Your Web Pages.”** Visual Web Developer comes with a host of tools that enable you to create well-designed and attractive web pages. In this chapter, you see how to make good use of these tools. Additionally, you learn about CSS, the language that is used to format web pages.
- **Chapter 4, “Working with ASP.NET Server Controls.”** ASP.NET Server Controls are one of the most important concepts in ASP.NET. They enable you to create complex and feature-rich web sites with very little code. This chapter introduces you to the large number of server controls that are available, explains what they are used for, and shows you how to use them.
- **Chapter 5, “Programming Your ASP.NET Web Pages.”** Although the built-in CSS tools and the ASP.NET Server Controls can get you a long way in creating web pages, you are likely to use a programming language to enhance your pages. This chapter serves as an introduction to programming with a strong focus on programming web pages. Best of all: all the examples you see in this chapter (and the rest of the book) are in both Visual Basic and C#, so you can choose the language you like best.
- **Chapter 6, “Creating Consistent Looking Web Sites.”** Consistency is important to give your web site an attractive and professional appeal. ASP.NET helps you create consistent-looking pages through the use of master pages, which enable you to define the global look and feel of a page. Skins and themes help you to centralize the looks of controls and other visual elements on your site. You also see how to create a base page that helps to centralize programming code throughout the site.

you need on all pages in your site.

- **Chapter 7, “Navigation.”** To help your visitors find their way around your site, ASP.NET comes with a number of navigation controls. These controls are used to build the navigation structure of your site. They can be connected to your site’s central site map that defines the pages in your web site. You also learn how to programmatically send users from one page to another.
- **Chapter 8, “User Controls.”** User controls are reusable page fragments that can be used on multiple web pages. As such, they are great for repeating content such as menus, banners, and so on. In this chapter, you learn how to create and use user controls and enhance them with some programmatic intelligence.
- **Chapter 9, “Validating User Input.”** A large part of interactivity in your site is defined by the input of your users. This chapter shows you how to accept, validate, and process user input using ASP.NET Server Controls. Additionally, you see how to send e-mail from your ASP.NET web site and how to read from text files.
- **Chapter 10, “ASP.NET AJAX.”** Microsoft ASP.NET AJAX enables you to create good-looking, flicker-free web pages that close the gap between traditional desktop applications and web sites. In this chapter you learn how to use the built-in Ajax features to enhance the presence of your web pages, resulting in a smoother interaction with the web site.
- **Chapter 11, “jQuery.”** jQuery is a popular, open source and cross-browser JavaScript library designed to make it easier to interact with web pages in the client’s browser. In this chapter you learn the basics of jQuery and see how to add rich visual effects and animations to your web pages.
- **Chapter 12, “Introducing Databases.”** Understanding how to use a database is critical when building web sites, as most modern web sites require the use of a database. You’ll learn the basics of SQL, the query language that enables you to access and alter data in a database. In addition, you are introduced to the database tools found in Visual Web Developer that help you create and manage your SQL Server databases.
- **Chapter 13, “Displaying and Updating Data.”** Building on the knowledge you gained in Chapter 12, this chapter shows you how to use the ASP.NET data-bound and data source controls to create a rich interface that enables your users to interact with the data in the database that the controls target.
- **Chapter 14, “LINQ and the ADO.NET Entity Framework.”** LINQ is Microsoft’s solution for accessing objects, databases, XML, and more. The ADO.NET Entity Framework (EF) is Microsoft’s new technology for database access. This chapter shows you what LINQ is all about, how to use the visual EF designer built into Visual Studio, and how to write LINQ to EF queries to get data in and out of your SQL Server database.
- **Chapter 15, “Working with Data — Advanced Topics.”** While earlier chapters focused mostly on the technical foundations of working with data, this chapter looks at the same topic from a front-end perspective. You see how to change the visual appearance of your data through the use of control styles. You also see how to interact with the data-bound controls and how to speed up your web site by keeping a local copy of frequently accessed data.
- **Chapter 16, “Security in Your ASP.NET 4 Web Site.”** Although presented quite late in the book, security is a first-class, important topic. This chapter shows you how to make use of the built-in ASP.NET features related to security. You learn about a number of application services that facilitate security. You also learn how to let users sign up for an account on your web site, how to distinguish between anonymous and logged-on users, and how to manage the users in your

system.

- **Chapter 17, “Personalizing Web Sites.”** Building on the security features introduced in Chapter 16, this chapter shows you how to create personalized web pages with content targeted to individual users. You see how to configure and use ASP.NET Profile that enables you to store personalized data for known and anonymous visitors.
- **Chapter 18, “Exception Handling, Debugging, and Tracing.”** In order to understand, improve, and fix the code you write for your ASP.NET web pages you need good debugging tools. Visual Web Developer ships with great debugging support that enables you to diagnose the state of your application at runtime, helping you find and fix problems before your users do.
- **Chapter 19, “Deploying Your Web Site.”** By the end of the book, you should have a web site that is ready to be shown to the world. But how exactly do you do that? What are the things you need to know and understand to put your web site out in the wild? This chapter gives the answers and provides you with a good look at configuring different production systems in order to run your final web site.

## How This Book Is Structured

This book takes the time to explain concepts step by step using working examples and detailed explanations. Using the famous Wrox Try It Out and How It Works sections, you are guided through a task step by step, detailing important things as you progress through the task. Each Try It Out task is followed by a detailed How It Works section that explains the steps you performed in the exercise.

At the end of each chapter, you find exercises that help you test the knowledge you gained in the chapter. You’ll find the answers to each question in Appendix A at the end of this book. Don’t worry if you don’t know all the answers to the questions. Later chapters do not assume you followed and carried out the tasks from the exercise sections of previous chapters.

Since this is a beginner’s book, I can’t go into great detail on a number of topics. For pretty much each chapter in this book, you’ll easily find numerous other books that exclusively deal with the topics discussed. Where appropriate, I have included references to these books so you can easily decide where to go to next if you want to deepen your knowledge on a specific subject.

## What You Need to Use This Book

This book assumes you have a system that meets the following requirements:

- Capable of running Visual Web Developer. For the exact system requirements, consult the readme file that comes with the software.
- Running Windows Vista or Windows 7 (both require at least the Home Premium edition), or one of the Windows Server 2008 editions.

Although you should be able to follow along with most of the exercises using another version of Windows such as Windows XP (as long as it’s supported by Visual Web Developer), the exercises in Chapter 19 on deployment require the use of Microsoft’s web server IIS 7 or later, which only ships with the Windows versions in the requirements list.

Chapter 1 shows you how to obtain and install Visual Web Developer 2010, which in turn installs the Microsoft .NET Framework version 4 and SQL Server 2008 Express edition; all you need is a good operating system and the drive to read this book!

## Conventions

To help you get the most from the text and keep track of what's happening, a number of conventions are used throughout the book.

### Try It Out Conventions

The Try It Out is an exercise you should work through, following the text in the book.

1. They usually consist of a set of steps.
2. Each step has a number.
3. Follow the steps through with your copy of the code.
4. Then read the How It Works section to find out what's going on.

### How It Works

After each Try It Out, the actions you carried out and the code you've typed in will be explained in detail.



**NOTE** Boxes like this one hold important, not-to-be forgotten information that is directly relevant to the surrounding text.



**COMMON MISTAKES** Mistakes that are easily made while following the exercises are presented in a box like this. Be sure to read these carefully when you get stuck in an exercise.

As for styles in the text:

- New terms and important words are *italicized* when they are introduced.
- Code within the text is presented like this: `Request.QueryString.Get("Id")`
- URLs that do not start with `www` are prefixed with <http://> to make it clear it's an Internet address. URLs within the text are presented like this: <http://imar.spaanjaars.com>.
- You'll see many URLs that start with [tinyurl.com](http://tinyurl.com) which is a handy, online service to make URLs shorter (and thus easier to type). Entering a [tinyurl.com](http://tinyurl.com) address in your browser should take you to its final destination.
- Menu items that require you to click multiple submenus have a special symbol that looks like this: `⇒`. For example: File ⇒ New ⇒ Folder.
- Code or content irrelevant to the discussion is either left out completely or replaced with ellipsis points (three dots), like this:

<tr>

```
<td style="white-space: nowrap;">
```

---

```
... Menu items go here; not shown
```

```
</td>
```

```
</tr>
```

The three dots are used regardless of the programming language used in the example, so you see it for C#, Visual Basic, HTML, CSS, and JavaScript. When you see it in code you're instructed to type into the code editor, you can simply skip the three dots and anything that follows them on the same line.

- Code shown for the first time, or other relevant code, is in the following format:

```
Dim roles As New ArrayList()
```

```
roles.Add("Administrators")
```

```
roles.Add("ContentManagers")
```

To put emphasis on a block of code surrounded by other code, I used a bolded font like this:

```
<appSettings>
```

```
  <add key="FromAddress" value="info@planetwrox.com"/>
```

```
</appSettings>
```

The surrounding code is used to make it easier to see where the bolded code should be placed.

- Quite often, white space in code is irrelevant, as is mostly the case with ASP.NET markup and HTML. To fit code within the boundaries of this book, I often wrap code over multiple lines and indent the part that should have been on the previous line like this:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
```

```
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

If you're typing this code yourself, you can put it all on one line, or use the same line breaks you prefer.

- Text that appears on screen often has Each Word Start With A Capital Letter, even though the original screen text uses a different capitalization. This is done to make the screen text stand out from the rest of the text.

## Source Code

As you work through the examples in this book, you may choose either to type in all the code manually or to use the source code files that accompany the book. All of the source code used in the



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