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## Introduction to JavaScript and the Web

In this introductory chapter, you look at what JavaScript is, what it can do for you, and what you need in order to use it. With these foundations in place, you will see throughout the rest of the book how JavaScript can help you to create powerful web applications for your web site.

The easiest way to learn something is by actually doing it, so throughout the book you'll create a number of useful example programs using JavaScript. This process starts in this chapter, by the end of which you will have created your first piece of JavaScript code.

### Introduction to JavaScript

In this section you take a brief look at what JavaScript is, where it came from, how it works, and what sorts of useful things you can do with it.

#### What Is JavaScript?

Having bought this book, you are probably already well aware that JavaScript is some sort of *computer language*, but what is a computer language? Put simply, a computer language is a series of instructions that tell the computer to do something. That something can be one of a wide variety of things, including displaying text, moving an image, or asking the user for information. Normally, the instructions, or what is termed *code*, are *processed* from the top line downward. This simply means that the computer looks at the code you've written, works out what action you want taken, and then takes that action. The act of processing the code is called *running* or *executing* it.

In natural English, here are instructions, or code, you might write to make a cup of instant coffee:

1. Put coffee crystals in cup.
2. Fill kettle with water.

# Chapter 1: Introduction to JavaScript and the Web

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3. Put kettle on to boil.
4. Has the kettle boiled? If so, then pour water into cup; otherwise, continue to wait.
5. Drink coffee.

You'd start running this code from the first line (instruction 1), and then continue to the next (instruction 2), then the next, and so on until you came to the end. This is pretty much how most computer languages work, JavaScript included. However, there are occasions when you might change the flow of execution or even skip over some code, but you'll see more of this in Chapter 3.

JavaScript is an interpreted language rather than a compiled language. What is meant by the terms *interpreted* and *compiled*?

Well, to let you in on a secret, your computer doesn't really understand JavaScript at all. It needs something to interpret the JavaScript code and convert it into something that it understands; hence it is an *interpreted language*. Computers understand only *machine code*, which is essentially a string of binary numbers (that is, a string of zeros and ones). As the browser goes through the JavaScript, it passes it to a special program called an *interpreter*, which converts the JavaScript to the machine code your computer understands. It's a bit like having a translator translate English to Spanish, for example. The important point to note is that the conversion of the JavaScript happens at the time the code is run; it has to be repeated every time this happens. JavaScript is not the only interpreted language; there are others, including VBScript.

The alternative *compiled language* is one in which the program code is converted to machine code before it's actually run, and this conversion has to be done only once. The programmer uses a compiler to convert the code that he wrote to machine code, and this machine code is run by the program's user. Compiled languages include Visual Basic and C++. Using a real-world analogy, it's a bit like having a Spanish translator verbally tell you in English what a Spanish document says. Unless you change the document, you can use it without retranslation as much as you like.

Perhaps this is a good point to dispel a widespread myth: JavaScript is not the script version of the Java language. In fact, although they share the same name, that's virtually all they do share. Particularly good news is that JavaScript is much, much easier to learn and use than Java. In fact, languages like JavaScript are the easiest of all languages to learn, but they are still surprisingly powerful.

## JavaScript and the Web

For most of this book you'll look at JavaScript code that runs inside a web page loaded into a browser. All you need in order to create these web pages is a text editor — for example, Windows Notepad — and a web browser, such as Firefox or Internet Explorer, with which you can view your pages. These browsers come equipped with JavaScript interpreters.

In fact, the JavaScript language first became available in the web browser Netscape Navigator 2. Initially, it was called LiveScript. However, because Java was the hot technology of the time, Netscape decided that JavaScript sounded more exciting. When JavaScript really took off, Microsoft decided to add its own brand of JavaScript, called JScript, to Internet Explorer. Since then, Netscape, Microsoft, and others have released improved versions and included them in their latest browsers. Although these different brands and versions of JavaScript have much in common, there are enough differences to cause problems if you're not careful. Initially you'll be creating code that'll work with most browsers, whether

# Chapter 1: Introduction to JavaScript and the Web

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Firefox, Internet Explorer, or Safari. Later chapters look at features available only to current browsers like Firefox 3 or later and Internet Explorer 7 and 8. You'll look into the problems with different browsers and versions of JavaScript later in this chapter and see how to deal with them.

You'll sometimes hear JavaScript referred to as ECMAScript. The ECMA (European Computer Manufacturers Association) is a private organization that develops standards in information and communication systems. One of the standards they control is for JavaScript, which they call ECMAScript. Their standard controls various aspects of the language and helps ensure that different versions of JavaScript are compatible. However, while the ECMA sets standards for the actual language, they don't specify how it's used in particular hosts. By *host*, we mean hosting environment; in this book, that will be the web browser. Other hosting environments include PDF files, web servers, Macromedia Flash applications, and many, many other places. In this book, we discuss only its use within the web browser. The organization that sets the standards for web pages is the World Wide Web Consortium (W3C). They not only set standards for HTML, XHTML, and XML, but also for how JavaScript interacts with web pages inside a web browser. You'll learn much more about this in later chapters of the book. Initially, you'll look at the essentials of JavaScript before the more advanced stuff. In the appendices of this book, you'll find useful guides to the JavaScript language and how it interacts with the web browser.

The majority of the web pages containing JavaScript that you create in this book can be stored on your hard drive and loaded directly into your browser from the hard drive itself, just as you'd load any normal file (such as a text file). However, this is not how web pages are loaded when you browse web sites on the Internet. The Internet is really just one great big network connecting computers. Access to web sites is a special service provided by particular computers on the Internet; the computers providing this service are known as *web servers*.

Basically, the job of a web server is to hold lots of web pages on its hard drive. When a browser, usually on a different computer, requests a web page contained on that web server, the web server loads it from its own hard drive and then passes the page back to the requesting computer via a special communications protocol called *Hypertext Transfer Protocol (HTTP)*. The computer running the web browser that makes the request is known as the *client*. Think of the client/server relationship as a bit like a customer/shopkeeper relationship. The customer goes into a shop and says, "Give me one of those." The shopkeeper serves the customer by reaching for the item requested and passing it back to the customer. In a web situation, the client machine running the web browser is like the customer, and the web server providing the page requested is like the shopkeeper.

When you type an address into the web browser, how does it know which web server to get the page from? Well, just as shops have addresses, say, 45 Central Avenue, Sometownsville, so do web servers. Web servers don't have street names; instead, they have *Internet protocol (IP) addresses*, which uniquely identify them on the Internet. These consist of four sets of numbers, separated by dots (for example, 127.0.0.1).

If you've ever surfed the net, you're probably wondering what on earth I'm talking about. Surely web servers have nice `www.somewebsite.com` names, not IP addresses? In fact, the `www.somewebsite.com` name is the "friendly" name for the actual IP address; it's a whole lot easier for us humans to remember. On the Internet, the friendly name is converted to the actual IP address by computers called *domain name servers*, which your Internet service provider will have set up for you.

One last thing: Throughout this book, we'll be referring to the Internet Explorer browser as IE.

### **Why Choose JavaScript?**

JavaScript is not the only scripting language; there are others such as VBScript and Perl. So why choose JavaScript over the others?

The main reason for choosing JavaScript is its widespread use and availability. Both of the most commonly used browsers, IE and Firefox, support JavaScript, as do almost all of the less commonly used browsers. So you can assume that most people browsing your web site will have a version of JavaScript installed, though it is possible to use a browser's options to disable it.

Of the other scripting languages already mentioned, VBScript, which can be used for the same purposes as JavaScript, is supported only by Internet Explorer running on the Windows operating system, and Perl is not used at all in web browsers.

JavaScript is also very versatile and not just limited to use within a web page. For example, it can be used in Windows to automate computer-administration tasks and inside Adobe Acrobat PDF files to control the display of the page just as in web pages, although Acrobat uses a more limited version of JavaScript. However, the question of which scripting language is more powerful and useful has no real answer. Pretty much everything that can be done in JavaScript can be done in VBScript, and vice versa.

### **What Can JavaScript Do for Me?**

The most common uses of JavaScript are interacting with users, getting information from them, and validating their actions. For example, say you want to put a drop-down menu on the page so that users can choose where they want to go to on your web site. The drop-down menu might be plain old HTML, but it needs JavaScript behind it to actually do something with the user's input. Other examples of using JavaScript for interactions are given by forms, which are used for getting information from the user. Again, these may be plain HTML, but you might want to check the validity of the information that the user is entering. For example, if you had a form taking a user's credit card details in preparation for the online purchase of goods, you'd want to make sure he had actually filled in those details before you sent the goods. You might also want to check that the data being entered are of the correct type, such as a number for his age rather than text.

JavaScript can also be used for various tricks. One example is switching an image in a page for a different one when the user rolls her mouse over it, something often seen in web page menus. Also, if you've ever seen scrolling messages in the browser's status bar (usually at the bottom of the browser window) or inside the page itself and wondered how that works, this is another JavaScript trick that you'll learn about later in the book. You'll also see how to create expanding menus that display a list of choices when a user rolls his or her mouse over them, another commonly seen JavaScript-driven trick.

Advances in browser sophistication and JavaScript mean that modern JavaScript is used for much more than a few clever tricks. In fact, quite advanced applications can be created. Examples of such applications include Google Maps, Google Calendar, and even a full-fledged word processor, Google Docs. These applications provide a real service. With a little inventiveness, you'll be amazed at what can be achieved. Of course, while JavaScript powers the user interface, the actual data processing is done in the background on powerful servers. JavaScript is powerful but still has limits.

## **Tools Needed to Create JavaScript Web Applications**

The great news is that getting started learning JavaScript requires no expensive software purchases; you can learn JavaScript for free on any PC or Mac. You'll learn in this section what tools are available and how to obtain them.

### **Development Tools**

All that you need to get started creating JavaScript code for web applications is a simple text editor, such as Windows Notepad, or one of the many slightly more advanced text editors that provide line numbering, search and replace, and so on. An alternative is a proper HTML editor; you'll need one that enables you to edit the HTML source code, because that's where you need to add your JavaScript. A number of very good tools specifically aimed at developing web-based applications, such as the excellent Dreamweaver from Adobe, are also available. However, this book concentrates on JavaScript rather than any specific development tool. When it comes to learning the basics, it's often best to write the code by hand rather than rely on a tool to do it for you. This helps you understand the fundamentals of the language before you attempt the more advanced logic that is beyond a tool's capability. When you have a good understanding of the basics, you can use tools as timesavers so that you can spend more time on the more advanced and more interesting coding.

Once you become more proficient, you may find that a web page editor makes life easier by inclusion of features such as checking the validity of your code, color-coding important JavaScript words, and making it easier to view your pages before loading them into a web browser. One example of free web development software is Microsoft's Visual Web Developer 2008 Express Edition, which you can download at <http://www.microsoft.com/express/vwd/>.

There are many other, equally good, free web page editors. A Google search on web editing software will bring back a long list of software you can use. Perhaps the most famous paid-for software is Adobe Dreamweaver.

As you write web applications of increasing complexity, you'll find useful tools that help you spot and solve errors. Errors in code are what programmers call bugs, though when our programs go wrong, we prefer to call them "unexpected additional features." Very useful in solving bugs are development tools called debuggers. Debuggers let you monitor what is happening in your code as it's running. In Chapter 4, you take an in-depth look at bugs and debugger development tools.

### **Web Browsers**

In addition to software that lets you edit web pages, you'll also need a browser to view your web pages. It's best to develop your JavaScript code on the sort of browsers you expect visitors to use to access your web site. You'll see later in the chapter that although browsers are much more standards based, there are differences in how they view web pages and treat JavaScript code. All the examples provided in this book have been tested on Firefox version 3+ and IE versions 7 and 8. Wherever a piece of code does not work on any of these browsers, a note to this effect has been made in the text.

If you're running Windows, you'll almost certainly have IE installed. If not, a trip to <http://www.microsoft.com/windows/internet-explorer/default.aspx> will get you the latest version.

Firefox can be found at [www.mozilla.com/firefox/all.html](http://www.mozilla.com/firefox/all.html).

# Chapter 1: Introduction to JavaScript and the Web

By default, most browsers have JavaScript support enabled. However, it is possible to disable this functionality in the browser. So before you start on your first JavaScript examples in the next section, you should check to make sure JavaScript is enabled in your browser.

To do this in Firefox, choose Tools ⇨ Options on the browser. In the window that appears, click the Content tab. From this tab, make sure the Enable JavaScript check box is selected, as shown in Figure 1-1.



Figure 1-1

It is harder to turn off scripting in Internet Explorer. Choose Tools ⇨ Internet Options on the browser, click the Security tab, and check whether the Internet or Local intranet options have custom security settings. If either of them does, click the Custom Level button and scroll down to the Scripting section. Check that Active Scripting is set to Enable.

A final point to note is how to open the code examples in your browser. For this book, you simply need to open the file on your hard drive in which an example is stored. You can do this in a number of ways. One way in IE6 is to choose File ⇨ Open and click the Browse button to browse to where you stored the code. Similarly, in Firefox, choose File ⇨ Open File, browse to the file you want, and click the Choose File button.

IE7 and IE8, however, have a new menu structure, and this doesn't include an Open File option. You can get around this by typing the drive letter of your hard drive followed by a colon in the address bar (for example, C: for your C drive). In Microsoft Windows, you can press Ctrl+O for the Open file menu to appear. Alternatively, you can switch back to the Classic menu of earlier versions of IE. To do this, you can click Tools ⇨ Toolbars, and ensure the Menu Bar option is selected (see Figure 1-2).

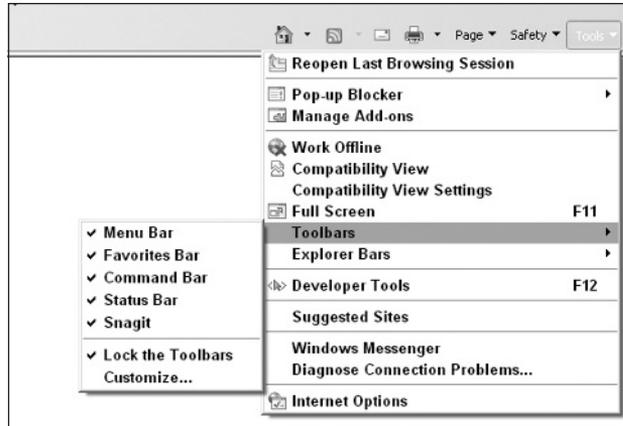


Figure 1-2

## Where Do My Scripts Go?

Enough talk about the subject of JavaScript; it's time to look at how to put it into your web page. In this section, you'll find out how you add JavaScript code to your web page.

Including the `type` attribute is good practice, but within a web page it can be left off. Browsers such as IE and Firefox use JavaScript as their default script language. This means that if the browser encounters a `<script>` tag with no `type` attribute set, it assumes that the script block is written in JavaScript. However, use of the `type` attribute is specified as mandatory by W3C (the World Wide Web Consortium), which sets the standards for HTML.

## Linking to an External JavaScript File

The `<script>` tag has another arrow in its quiver: the ability to specify that the JavaScript code is not inside the web page but inside a separate file. Any external files should be given the file extension `.js`. Though it's not compulsory, it does make it easier for you to work out what is contained in each of your files.

To link to an external JavaScript file, you need to create a `<script>` tag as described earlier and use its `src` attribute to specify the location of the external file. For example, imagine you've created a file called `MyCommonFunctions.js` that you wish to link to, and the file is in the same directory as your web page. The `<script>` tag would look like this:

```
<script type="text/javascript" src="MyCommonFunctions.js"></script>
```

The web browser will read this code and include the file contents as part of your web page. When linking to external files, you must not put any code within the `<script>` tags; for example, the following would be invalid:

```
<script type="text/javascript" src="MyCommonFunctions.js">  
var myVariable;
```

## Chapter 1: Introduction to JavaScript and the Web

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```
if ( myVariable == 1 )
{
    // do something
}
</script>
```

If your web page is an XHTML document, you can omit the closing `</script>` tag and instead write this:

```
<script type="text/javascript" src="MyCommonFunctions.js" />
```

Generally, you use the `<script>` tag to load local files (those on the same computer as the web page itself). However, you can load external files from a web server by specifying the web address of the file. For example, if your file was called `MyCommonFunctions.js` and was loaded on a web server with the domain name `www.mysite.com`, the `<script>` tag would look like this:

```
<script type="text/javascript" src="http://www.mysite.com/MyCommonFunctions.js">
</script>
```

However, beware of linking to external files if they are controlled by other people. It would give those people the ability to control and change your web page, so you need to be very sure you trust them!

### Try It Out **Painting the Page Red**

This is a simple example of using JavaScript to change the background color of the browser. In your text editor (we're using Windows Notepad), type the following:

```
<html>
<body bgcolor="WHITE">
<p>Paragraph 1</p>
<script type="text/javascript">
    document.bgColor = "RED";
</script>
</body>
</html>
```

Save the page as `ch1_examp1.htm` to a convenient place on your hard drive. Now load it into your web browser. You should see a red web page with the text `Paragraph 1` in the top-left corner. But wait — don't you set the `<body>` tag's `BGCOLOR` attribute to white? Okay, let's look at what's going on here.

The page is contained within `<html>` and `</html>` tags. This block contains a `<body>` element. When you define the opening `<body>` tag, you use HTML to set the page's background color to white.

```
<body bgcolor="WHITE">
```

Then you let the browser know that your next lines of code are JavaScript code by using the `<script>` start tag.

```
<script type="text/javascript">
```

Everything from here until the close tag, `</script>`, is JavaScript and is treated as such by the browser. Within this script block, you use JavaScript to set the document's background color to red.

```
document.bgColor = "RED";
```

What you might call the *page* is known as the *document* for the purpose of scripting in a web page. The document has lots of properties, including its background color, `backgroundColor`. You can reference properties of the document by writing `document`, followed by a dot, followed by the property name. Don't worry about the use of `document` at the moment; you look at it in greater depth later in the book.

Note that the preceding line of code is an example of a JavaScript *statement*. Every line of code between the `<script>` and `</script>` tags is called a statement, although some statements may run on to more than one line.

You'll also see that there's a semicolon (;) at the end of the line. You use a semicolon in JavaScript to indicate the end of a statement. In practice, JavaScript is very relaxed about the need for semicolons, and when you start a new line, JavaScript will usually be able to work out whether you mean to start a new line of code. However, for good coding practice, you should use a semicolon at the end of statements of code, and a single JavaScript statement should fit onto one line rather than continue on to two or more lines. Moreover, you'll find there are times when you must include a semicolon, which you'll come to later in the book.

Finally, to tell the browser to stop interpreting your text as JavaScript and start interpreting it as HTML, you use the script close tag:

```
</script>
```

You've now looked at how the code works, but you haven't looked at the order in which it works. When the browser loads in the web page, the browser goes through it, rendering it tag by tag from top to bottom of the page. This process is called *parsing*. The web browser starts at the top of the page and works its way down to the bottom of the page. The browser comes to the `<body>` tag first and sets the document's background to white. Then it continues parsing the page. When it comes to the JavaScript code, it is instructed to change the document's background to red.

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### ***Advantages of Using an External File***

The biggest advantage of external files is code reuse. Say you write a complex bit of JavaScript that performs a general function you might need in lots of pages. If you include the code inline (within the web page rather than via an external file), you need to cut and paste the code into each of your web pages that use it. This is fine as long as you never need to change the code, but the reality is you probably will need to change or improve the code at some point. If you've cut and pasted the code to 30 different web pages, you'll need to update it in 30 different places. Quite a headache! By using one external file and including it in all the pages that need it, you only need to update the code once and instantly all the 30 pages are updated. So much easier!

Another advantage of using external files is the browser will cache them, much as it does with images shared between pages. If your files are large, this could save download time and also reduce bandwidth usage.

### **Your First Simple JavaScript Programs**

Enough talk about the subject of JavaScript; it's time to look at how to put it into your web page. In this section, you write your first piece of JavaScript code.

## Chapter 1: Introduction to JavaScript and the Web

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Inserting JavaScript into a web page is much like inserting any other HTML content; you use tags to mark the start and end of your script code. The tag used to do this is `<script>`. This tells the browser that the following chunk of text, bounded by the closing `</script>` tag, is not HTML to be displayed but rather script code to be processed. The chunk of code surrounded by the `<script>` and `</script>` tags is called a *script block*.

Basically, when the browser spots `<script>` tags, instead of trying to display the contained text to the user, it uses the browser's built-in JavaScript interpreter to run the code's instructions. Of course, the code might give instructions about changes to the way the page is displayed or what is shown in the page, but the text of the code itself is never shown to the user.

You can put the `<script>` tags inside the header (between the `<head>` and `</head>` tags) or inside the body (between the `<body>` and `</body>` tags) of the HTML page. However, although you can put them outside these areas — for example, before the `<html>` tag or after the `</html>` tag — this is not permitted in the web standards and so is considered bad practice.

The `<script>` tag has a number of attributes, but the most important one is `type`. As you saw earlier, JavaScript is not the only scripting language available, and different scripting languages need to be processed in different ways. You need to tell the browser which scripting language to expect so that it knows how to process that language. Your opening script tag will look like this:

```
<script type="text/javascript">
```

Including the `type` attribute is good practice, but within a web page it can be left off. Browsers such as IE and Firefox use JavaScript as their default script language. This means that if the browser encounters a `<script>` tag with no `type` attribute set, it assumes that the script block is written in JavaScript. However, use of the `type` attribute is specified as mandatory by W3C, which sets the standards for HTML.

Okay, let's take a look at the first page containing JavaScript code.

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### Try It Out    The Way Things Flow

Let's extend the previous example to demonstrate the parsing of a web page in action. Type the following into your text editor:

```
<html>
<body bgcolor="WHITE">
<p>Paragraph 1</p>
<script type="text/javascript">
  // Script block 1
  alert("First Script Block");
</script>
<p>Paragraph 2</p>
<script type="text/javascript">
  // Script block 2
  document.bgColor = "RED";
  alert("Second Script Block");
</script>
```

```
<p>Paragraph 3</p>
</body>
</html>
```

Save the file to your hard drive as `ch1_examp2.htm` and then load it into your browser. When you load the page, you should see the first paragraph, `Paragraph 1`, followed by a message box displayed by the first script block. The browser halts its parsing until you click the OK button. As you see in Figure 1-3, the page background is white, as set in the `<body>` tag, and only the first paragraph is displayed.



Figure 1-3

Click the OK button, and the parsing continues. The browser displays the second paragraph, and the second script block is reached, which changes the background color to red. Another message box is displayed by the second script block, as shown in Figure 1-4.

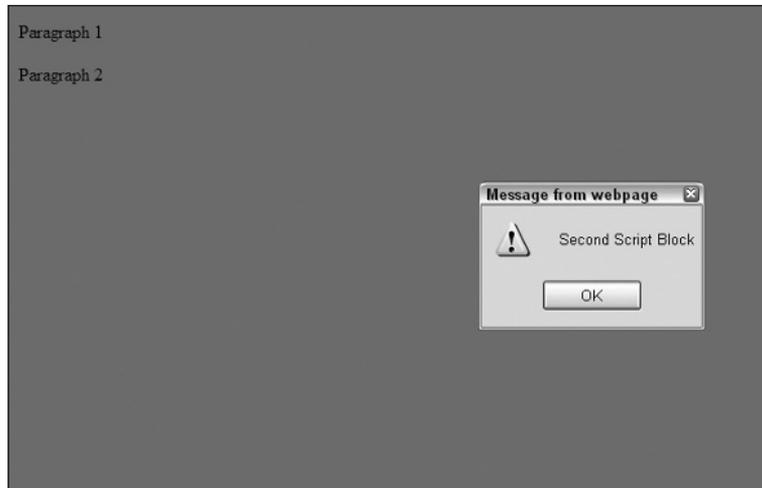


Figure 1-4

# Chapter 1: Introduction to JavaScript and the Web

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Click OK, and again the parsing continues, with the third paragraph, `Paragraph 3`, being displayed. The web page is complete, as shown in Figure 1-5.



**Figure 1-5**

The first part of the page is the same as in our earlier example. The background color for the page is set to white in the definition of the `<body>` tag, and then a paragraph is written to the page.

```
<html>
<body bgcolor="WHITE">
<p>Paragraph 1</p>
```

The first new section is contained in the first script block.

```
<script type="text/javascript">
  // Script block 1
  alert("First Script Block");
</script>
```

This script block contains two lines, both of which are new to you. The first line —

```
// Script block 1
```

is just a *comment*, solely for your benefit. The browser recognizes anything on a line after a double forward slash (`//`) to be a comment and does not do anything with it. It is useful for you as a programmer because you can add explanations to your code that make it easier to remember what you were doing when you come back to your code later.

The `alert()` function in the second line of code is also new to you. Before learning what it does, you need to know what a *function* is.

Functions are defined more fully in Chapter 3, but for now you need only think of them as pieces of JavaScript code that you can use to do certain tasks. If you have a background in math, you may already have some idea of what a function is: A *function* takes some information, processes it, and gives you a result. A function makes life easier for you as a programmer because you don't have to think about how the function does the task — you can just concentrate on when you want the task done.

In particular, the `alert()` function enables you to alert or inform the user about something by displaying a message box. The message to be given in the message box is specified inside the parentheses of the `alert()` function and is known as the function's *parameter*.

The message box displayed by the `alert()` function is *modal*. This is an important concept, which you'll come across again. It simply means that the message box won't go away until the user closes it by clicking the OK button. In fact, parsing of the page stops at the line where the `alert()` function is used and doesn't restart until the user closes the message box. This is quite useful for this example, because it enables you to demonstrate the results of what has been parsed so far: The page color has been set to white, and the first paragraph has been displayed.

When you click OK, the browser carries on parsing down the page through the following lines:

```
<p>Paragraph 2</p>
<script type="text/javascript">
  // Script block 2
  document.bgColor = "RED";
  alert("Second Script Block");
</script>
```

The second paragraph is displayed, and the second block of JavaScript is run. The first line of the script block code is another comment, so the browser ignores this. You saw the second line of the script code in the previous example — it changes the background color of the page to red. The third line of code is the `alert()` function, which displays the second message box. Parsing is brought to a halt until you close the message box by clicking OK.

When you close the message box, the browser moves on to the next lines of code in the page, displaying the third paragraph and finally ending the web page.

```
<p>Paragraph 3</p>
</body>
</html>
```

Another important point raised by this example is the difference between setting properties of the page, such as background color, via HTML and doing the same thing using JavaScript. The method of setting properties using HTML is *static*: A value can be set only once and never changed again by means of HTML. Setting properties using JavaScript enables you to dynamically change their values. The term *dynamic* refers to something that can be changed and whose value or appearance is not set in stone.

This example is just that, an example. In practice, if you want the page's background to be red, you can set the `<body>` tag's `BGColor` attribute to "RED" and not use JavaScript at all. Where you want to use JavaScript is where you want to add some sort of intelligence or logic to the page. For example, if the user's screen resolution is particularly low, you might want to change what's displayed on the page; with JavaScript, you can do this. Another reason for using JavaScript to change properties might be for special effects — for example, making a page fade in from white to its final color.

### Try it Out    Displaying Results in a Web Page

In this final example, you'll discover how to write information directly to a web page using JavaScript. This proves more useful when you're writing the results of a calculation or text you've created using JavaScript, as you'll see in the next chapter. For now, you'll just write "Hello World!" to a blank page using JavaScript:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<body >

<p id="ResultsP"></p>

<script type="text/javascript">
  // Script block 1
  document.getElementById('ResultsP').innerHTML = 'Hello World!';
</script>

</body>
</html>
```

Save the page as `ch1_exam3.htm` to a convenient place on your hard drive. Now load it into your web browser and you'll see Hello World! in the page. Although it would be easier to use HTML to do the same thing, this technique will prove useful in later chapters.

The first part of the page is the same as in our earlier examples, except the following line has been added:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
```

This lets the web browser know that you're using XHTML, the standard used throughout this book. It doesn't actually make any difference to the code; it would work just fine without the extra lines.

Consider this line:

```
<p id="ResultsP"></p>
```

You'll notice the `<p>` tag has been given an `id` using the `id` attribute. This `id` must be unique in the web page, because it is used by the JavaScript to identify the specific HTML element in the following line:

```
document.getElementById('ResultsP').innerHTML = 'Hello World!';
```

Don't worry if this seems complex at the moment; you'll learn more about how this works in later chapters, especially Chapters 6 and 12. Basically, the code is saying, "Get me the document element with `id ResultsP` and set the HTML inside that element to Hello World!"

It's important in your example that the code accessing the paragraph is after the paragraph. Otherwise, the code would be attempting to access a paragraph before it existed in the page and would throw an error.

---

## A Brief Look at Browsers and Compatibility Problems

You've seen in the preceding example that by using JavaScript you can change a web page's document background color using the `bgColor` property of the `document`. The example worked whether you used a Netscape or Microsoft browser, because both types of browsers support a `document` with a `bgColor` property. You can say that the example is *cross-browser compatible*. However, it's not always the case that the property or language feature available in one browser will be available in another browser. This is even sometimes the case between versions of the same browser.

*The version numbers for Internet Explorer and Firefox browsers are usually written as a decimal number; for example, Firefox has a version 1.5. This book uses the following terminology to refer to these versions: By version 1.x we mean all versions starting with the number 1; by version 1.0+ we mean all versions with a number greater than or equal to 1.*

One of the main headaches involved in creating web-based JavaScript is the differences between different web browsers, the level of HTML they support, and the functionality their JavaScript interpreters can handle. You'll find that in one browser you can move an image using just a couple of lines of code but that in another it'll take a whole page of code or even prove impossible. One version of JavaScript will contain a method to change text to uppercase, and another won't. Each new release of IE or Firefox browsers sees new and exciting features added to its HTML and JavaScript support. The good news is that to a much greater extent than ever before, browser creators are complying with standards set by organizations such as the W3C. Also, with a little ingenuity, you can write JavaScript that will work with both IE and Firefox browsers.

Which browsers you want to support really comes down to the browsers you think the majority of your web site's visitors, that is, your *user base*, will be using. This book is aimed at both IE7 and later and Firefox 2 and later.

If you want your web site to be professional, you need to somehow deal with older browsers. You could make sure your code is backward compatible — that is, it only uses features available in older browsers. However, you may decide that it's simply not worth limiting yourself to the features of older browsers. In this case you need to make sure your pages degrade gracefully. In other words, make sure that although your pages won't work in older browsers, they will fail in a way that means the user is either never aware of the failure or is alerted to the fact that certain features on the web site are not compatible with his or her browser. The alternative to degrading gracefully is for your code to raise lots of error messages, cause strange results to be displayed on the page, and generally make you look like an idiot who doesn't know what you're doing!

So how do you make your web pages degrade gracefully? You can do this by using JavaScript to determine which browser the web page is running in after it has been partially or completely loaded. You can use this information to determine what scripts to run or even to redirect the user to another page written to make best use of her particular browser. In later chapters, you see how to find out what features the browser supports and take appropriate action so that your pages work acceptably on as many browsers as possible.

### Summary

At this point, you should have a feel for what JavaScript is and what it can do. In particular, this brief introduction covered the following:

- ❑ You looked into the process the browser follows when interpreting your web page. It goes through the page element by element (parsing) and acts upon your HTML tags and JavaScript code as it comes to them.
- ❑ Unlike many programming languages, JavaScript requires just a text editor to start creating code. Something like Windows Notepad is fine for getting started, though more extensive tools will prove valuable once you get more experience.
- ❑ JavaScript code is embedded into the web page itself, along with the HTML. Its existence is marked out by the use of `<script>` tags. As with HTML, script executes from the top of the page and works down to the bottom, interpreting and executing the code statement by statement.