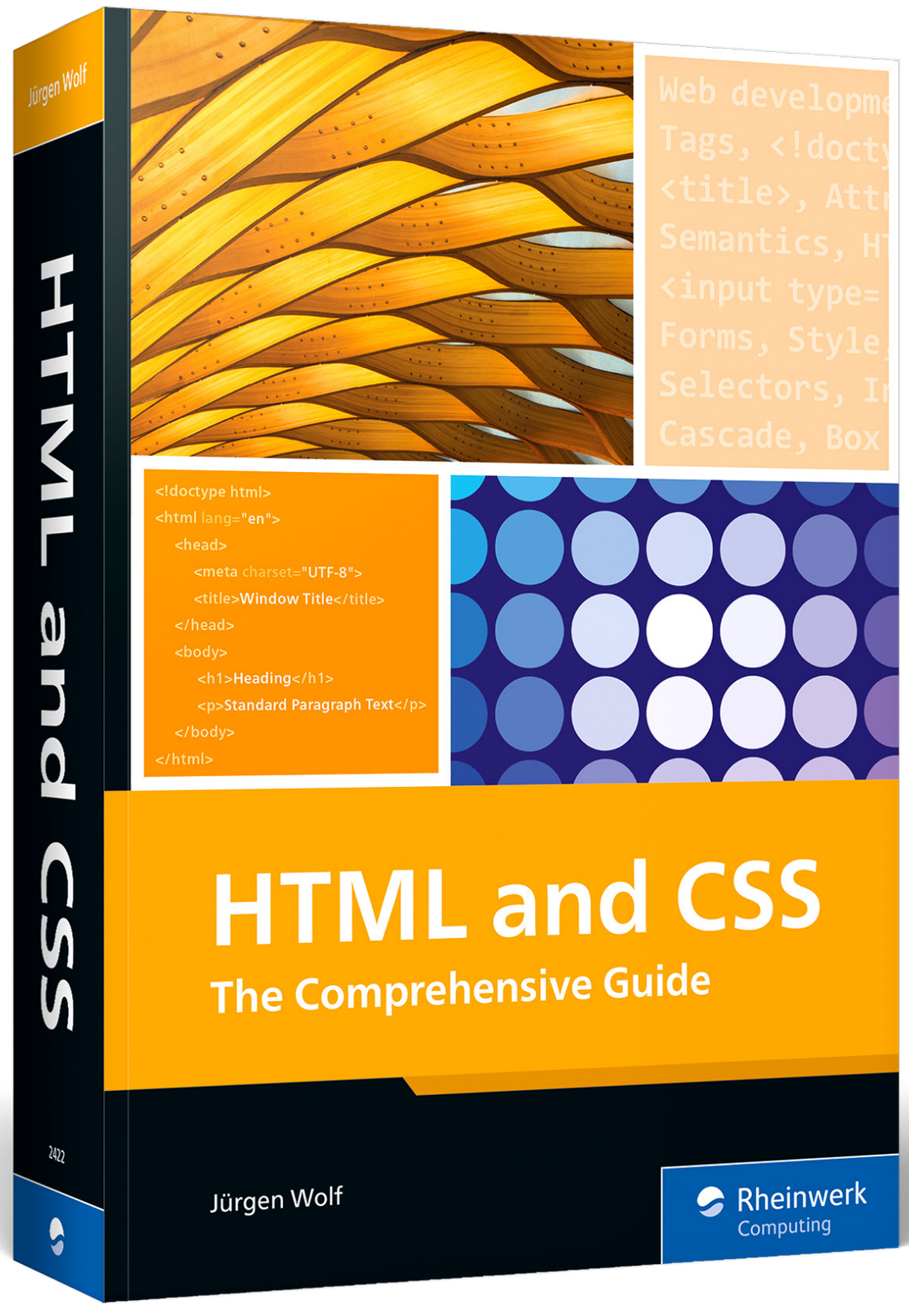

Reading Sample

This chapter describes the displayable elements of HTML that you can use between <body> and </body>. It discusses how to create a single web page using HTML and mark it up with the appropriate elements. Topics covered include splitting an HTML document into separate and meaningful section, using headings in a predetermined order, implementing a header and footer, splitting and grouping text content, tagging semantic elements, and using and displaying unordered and ordered lists.

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Chapter 4
The Visible Part of an HTML Document

This chapter describes the displayable elements of HTML that you can use between <body> and </body>. For designing or laying out websites, you should use CSS instead. Before you learn how to make a website more beautiful, you need to have the basic knowledge of how to create a single web page using HTML and mark it up with the appropriate elements.

Even if you've already created web pages in HTML 4.01 (or even earlier) and are already familiar with the handling of HTML elements, it's worth working through this chapter because semantic elements have been added with the current HTML and many existing elements have been given a different semantic meaning.

Here's what you'll learn in this chapter:

- Splitting an HTML document into separate and meaningful sections with new HTML elements such as `<section>`, `<article>`, `<aside>`, or `<nav>`
- Using headings in a certain order and implementing a header and/or footer with the new `<header>` and `<footer>` elements
- Splitting and grouping text content with HTML elements
- Semantic tagging of text such as single letters, words, or parts of sentences with HTML elements
- Using and displaying unordered and ordered lists via `<ul>` and `<ol>`

4.1 HTML Elements for Structuring Pages

In this chapter, you'll learn about the various HTML elements that you can use to divide a web page into useful sections. If you've used HTML 4.01 so far, you'll find many new elements here, as the current HTML also introduces a new content model to combat the rampant use of `div` elements with `class` attributes.

HTML Element	Meaning
`<body>`	Displayable content section of the HTML document
`<section>`	Subdivision of the HTML document into different sections

Table 4.1 Quick Overview of the Section Elements Covered Here

HTML Element	Meaning
`<article>`	Subdivision of content into a self-contained topic-specific block
`<aside>`	Marginal information of a content such as a sidebar or for additional information about an article
`<nav>`	Element used to mark up navigation(s) such as a sitemap or the main navigation of the website
`<h1>`, `<h2>`, `<h3>`, `<h4>`, `<h5>`, `<h6>`	Headings of the first through sixth order
`<header>`	Header of a content
`<footer>`	Footer of a content
`<address>`	Contact information for the author of the content

Table 4.1 Quick Overview of the Section Elements Covered Here (Cont.)

4.1.1 Using <body>: The Displayable Content Section of an HTML Document

Everything you write between the opening `<body>` tag and the closing `</body>` tag is referred to as the *HTML document body*. Between `<body>` and `</body>`, you can write all HTML elements, such as text, hypertext links, images, tables, and lists, to define the structure of the web page. All elements written between `<body>` and `</body>` are rendered by the web browser and displayed accordingly.

```
<!doctype html>
<html lang="en">
  <head>
    <title>Title of the document</title>
    <meta charset="UTF-8">
  </head>
  <body>
    This is the content of the document, which is to be
    rendered and displayed by the web browser.
  </body>
</html>
```

4.1.2 Introducing the Section Elements of HTML

The following sections introduce the section elements of HTML, that is, `<section>`, `<article>`, `<aside>`, and `<nav>`. If you're perhaps just getting into HTML, using section elements is still a bit confusing or disappointing at first because they change almost

nothing visually. Primarily, these elements only serve to divide the content into semantic (i.e., meaningful) areas.

Even if these new elements don't seem to make sense to you yet, just remember that they aren't of interest to the normal user of the website, but are mainly used to give meaning to the content, which is particularly useful for the developer, the search engines, and the screen readers.

Dividing Content into Topic-Based Sections Using <section>

The `<section>` element allows you to divide the content of a document into topic-based sections. This is helpful, for example, if you want to divide a document into individual chapters or even subchapters—just like this book was divided into individual sections. Even on an ordinary homepage, you can use this element to create individual content and sense sections, such as a section with the description about the owner of the website, another section with news, and one with contact information. Here's a simple example, the result of which you can see in Figure 4.1:

```
...
  <body>
    <section>
      <h1>Chapter 1</h1>
      <p>The first chapter</p>
    </section>
    <section>
      <h1>Chapter 2</h1>
      <p>The second chapter</p>
      <section>
        <h2>Chapter 2.1</h2>
        <p>A subchapter of Ch. 2</p>
      </section>
    </section>
  </body>
...
```

Listing 4.1 /examples/chapter004/4_1_3/index.html

In this example, the `<section>` element has been used to divide the document into meaningful sections—in this case, Chapter 1 and Chapter 2—with each chapter consisting of a heading `<h1>` and paragraph text `<p>`. Furthermore, it's possible to nest `<section>` elements, as shown within the `<section>` element of Chapter 2, Section 2.1.

Figure 4.1 Between <section> and </section>, You Can Divide the Content of a Document into Meaningful and Logical Units

Dividing Content into a Self-Contained Block Using <article>

You should use the `article` element to summarize a piece of content in a self-contained topic-specific block. The `article` element is in itself quite similar to the `<section>` element, which you use to divide the content into meaningful sections. However, it's recommended that you use the `article` element for a standalone composition, which would be ideal for individual news items, blog or forum entries, or comments on a blog post or news, for example.

Here's an example of an HTML code snippet that shows you what such a blog entry with the `article` element could look like. The result is shown in Figure 4.2.

```
...
  <body>
  <h1>My Blog</h1>
  <p>Latest reports on HTML</p>
  <article>
     <header>
       <h2>New HTML elements on the horizon</h2>
     </header>
     <p>Published on <time>2023-05-05</time></p>
     <p>As already suspected ...</p>
     <footer>
       <a href="comments.html">View comments ...</a>
     </footer>
  </article>
  </body>
...
```

Listing 4.2 /examples/chapter004/4_1_4/index.html

Figure 4.2 The Example Shows a Meaningful and Logical <article> Composition of a Blog Entry

Everything between `<article>` and `</article>` is the composition of a self-contained block consisting of a heading, a timestamp, the actual content section, and a footer. It's up to you to decide which HTML elements you want to use to create such a composition with `<article>`, but the example shown here already makes sense semantically.

> **What to Use: <article> or <section>?**
>
> You're probably wondering which of the two elements you should use for a semantic separation of content because the two are somewhat similar in some respects. Nevertheless, the HTML specification also makes a differentiation here and recommends using `<article>` if certain semantics are to be used multiple times, as is the case with a news or blog entry. Thus, `<article>` is a self-contained block—a composition of repeatedly used content following the same pattern—whereas `<section>` is suitable for a separation into content sections, which should contribute to a better overview of the entire document.

Adding Content with Additional Information Using <aside>

With `<aside>`, you can usually supplement or expand content with additional information. Strictly speaking, you can use the `aside` element for two different semantic things: a sidebar or an additional piece of information (e.g., a citation) to a content item, for example, within an `article` element.

Referring to the */examples/chapter004/4_1_4/index.html* example from the previous section, for example, you would use `<aside>` for a separate logical section in the document:

```
...
  <body>
  <h1>My Blog</h1>
```

```
  <p>Latest reports on HTML</p>
  <article>
...
  </article>
  <aside>
  <h3>Partner websites</h3>
      <ul>
      <li><a href="#">Blog XY</a></li>
      <li><a href="#">Magazine X</a></li>
      <li><a href="#">Website Z</a></li>
    </ul>
  </aside>
  </body>
...
```

Listing 4.3 /examples/chapter004/4_1_5/index.html

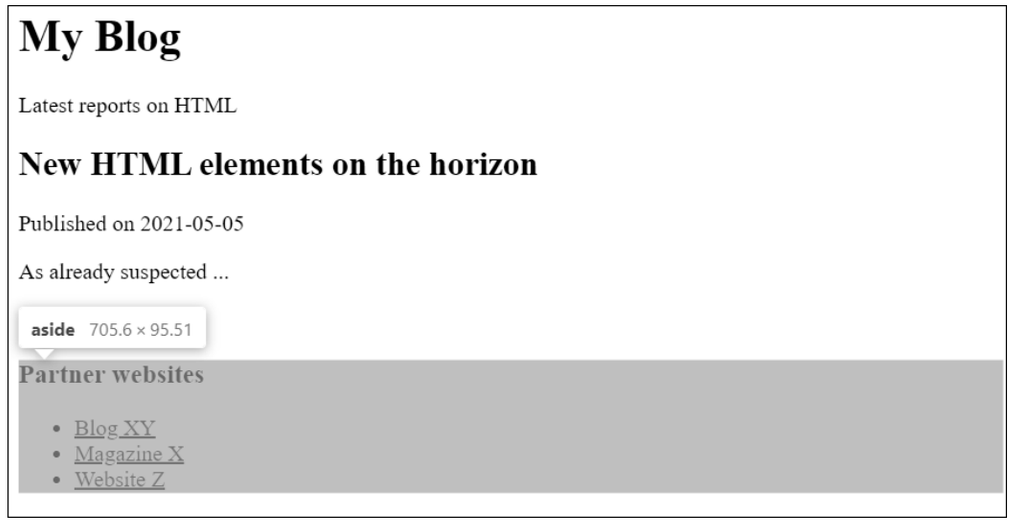


Figure 4.3 The <aside> Element Is Used as a Separate Logical Section in the HTML Document

> **Note**
>
> The # character in HTML is a reference to a jump mark in the same document, but it has no meaning yet in this example and was used instead of a real destination address.

In addition to the option just shown, using `<aside>` as a sidebar would also be suitable as additional information in the form of a quote or within an `article` element. In the example that contains the blog entry, it would be suitable within the `article` element for an entry with further links to the blog entry.

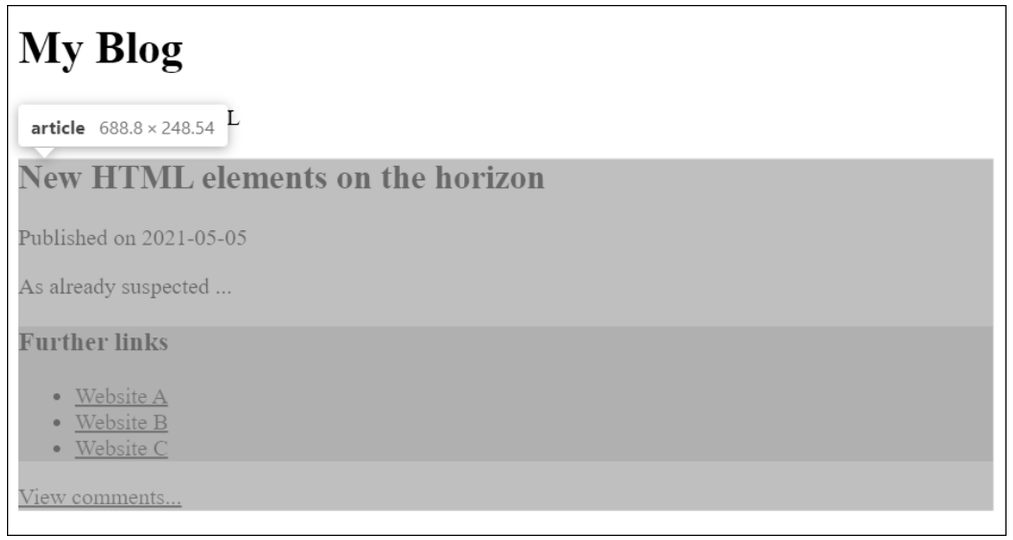


Figure 4.4 The <aside> Element (Colored Here) Was Noted as Additional Information inside an <article> Element

Let's take a look at the following code snippet in this regard:

```
...
  <body>
...
  <article>
    <header>
      <h1>New HTML elements on the horizon</h1>
    </header>
    <p>Published on <time>2023-05-05</time></p>
    <p>As already suspected ...</p>
    <aside>
    <h3>Further links</h3>
      <ul>
        <li><a href="#">Website A</a></li>
        <li><a href="#">Website B</a></li>
        <li><a href="#">Website C</a></li>
      </ul>
    </aside>
    <footer>
      <a href="comments.html">View comments...</a>
    </footer>
  </article>
  <aside>
...
```

```
  </aside>
  </body>
...
```

Listing 4.4 /examples/chapter004/4_1_5/index2.html

Declaring Content as a Page Navigation Bar Using <nav>

As you might guess from its name, the `nav` element enables you to divide navigation elements into blocks. We're not talking about web link collections here, but about a list of links for a sitemap or the main navigation of your own website. Like the `aside` element, you can use the `nav` element for its own section or within another HTML element to combine a group of links into a block.

To use the blog entry again as an example, the `nav` element would be suitable for summarizing the main navigation or the list of related links from similar articles within the same web page. In any case, you should use the `nav` element for entire blocks of links. The following code snippet demonstrates the `nav` element in a small theoretical blog:

```
...
  <body>
  <nav>
    <a href="#">Blog</a> |
    <a href="#">Links</a> |
    <a href="#">About me</a> |
    <a href="#">Legal Notes</a>
  </nav>
  <h1>My Blog</h1>
  <p>Latest reports on HTML</p>
  <article>
...
    <aside>
    <h3>Similar articles</h3>
      <nav>
        <ul>
          <li><a href="#">HTML6 will not exist</a></li>.
          <li><a href="#">W3C and WHATWG agree</a></li>
          <li><a href="#">What comes after the Living Standard?</a></li>
        </ul>
      </nav>
    </aside>
...
  </article>
  <aside>
  <h3>Sitemap</h3>
    <nav>
```



```
    <ul>
      <li><a href="#">Blog</a>
        <ul>
          <li><a href="#">HTML</a></li>
          <li><a href="#">CSS</a></li>
        </ul>
      </li>
      <li><a href="#">Links</a></li>
      <li><a href="#">About me</a>
        <ul>
          <li><a href="#">Bio</a></li>
          <li><a href="#">Portfolio</a></li>
        </ul>
      </li>
      <li><a href="#">Legal Notes</a></li>
    </ul>
    </nav>
  </aside>
  </body>
...
```

Listing 4.5 /examples/chapter004/4_1_6/index.html

Figure 4.5 The <nav> Element (Colored Here) Can Be Used to Divide a Separate (Navigation) Section or to Group Blocks of Links within Other HTML Elements

In the first example, <nav> was used to define a main navigation as a separate section of the HTML document. In the second example, the nav element was used to link a block of links to similar articles on the same web page. In the last example, a sitemap of the web page was summarized via the nav element.

In addition, the last two examples were grouped within <aside> and </aside>. In them, bulleted lists (ul and li elements) were used within the nav element.

Using <nav> Only for Main Navigation?

The specification suggests using the nav element specifically for the main navigation. That doesn't include external additional links or affiliate links to external websites. Likewise, it's not recommended to put legal stuff such as copyright, contact information, and legal notes in the nav section; instead, use the footer section for that purpose (see Section 4.1.4).

In the */examples/chapter004/4_1_6/index.html* example, this means you only have two main navigation points with Blog and Links within the nav element and would write About me and Legal Notes outside of it (e.g., in the footer). I don't see any point in separating this because there's no difference between the first two links (**Blog** and **Links**) and the other two links (**About me** and **Legal Notes**) as both are linked to different websites, and both belong to the internal website in this case. So, it's up to you to what extent you want to follow these recommendations. In any case, you should refrain from using the nav element for external links to third-party websites and, if possible, use it only selectively and sensibly on your own website.

4.1.3 Using Headings with the HTML Elements from <h1> to <h6>

The HTML element for headings of a certain order is <h1> to <h6>. The number (1 to 6) represents the heading level. Thus, everything you write between <h1> and </h1> is used as a top-level heading, everything between <h2> and </h2> belongs to a second-level heading, and so on down to the lowest level with <h6> and </h6> as a sixth-level heading.

The HTML elements <h1> through <h6> should not be misused to emphasize a text, but rather to define the content structure of a document. Consider the following HTML structure:

```
...
  <h1>Heading 1</h1>
  <h2>Heading 1.1</h2>
  <h3>Heading 1.1.1</h3>
  <h2>Heading 1.2</h2>
  <h2>Heading 1.3</h2>
  <h3>Heading 1.3.1</h3>
```



```
  <h1>Heading 2</h1>
...
```

Based on this sequence of headings, the following content structure (or *document outline*) will be mapped:

```
1. Heading 1
   1.1. Heading 1.1
      1.1.1. Heading 1.1.1
   1.2. Heading 1.2
   1.3. Heading 1.3
      1.3.1. Heading 1.3.1
2. Heading 2
```

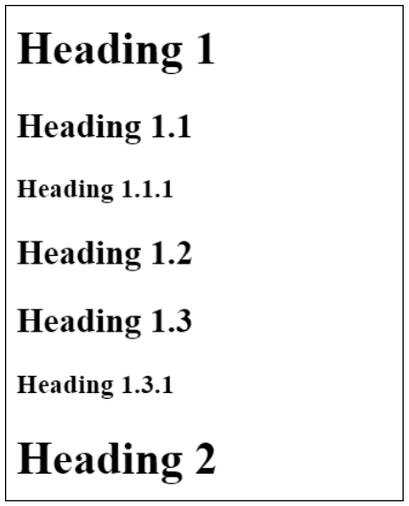


Figure 4.6 This Is What the Web Browser Will Make of It

What Happens to the Headings in the Section Elements?

You're probably wondering what happens to the content structure of headings when you use the section elements from Section 4.1.2. That question is well justified. If you use the <section>, <article>, <aside>, or <nav> section elements, the content structure of the headings will also be affected. Within each new section element, the heading level count starts from the beginning, but always at a lower hierarchy level. The following HTML code illustrates this:

```
...
  <body>
  <h1>My Blog</h1>
  <p>A simple blog ...</p>
  <section>
```

```
    <h1>News on HTML</h1>
    <article>
      <h1>A preview of the new HTML elements</h1>
      <p>It looks like ...</p>
    </article>
  </section>
  <section>
    <h1>News on CSS</h1>
    <article>
      <h1>New Styles at Last</h1>
      <p>After a long time of development ...</p>
    </article>
  </section>
  </body>
...
```

Listing 4.6 /examples/chapter004/4_1_7/index.html

Here, five <h1> headings of the first order were used. If you look at the HTML code, you can see several sections. Next to the top section with <body>, you can find two additional <section> elements, each of which contains an <article> element in which headings of the first order have also been defined.

This is a blog that's been divided into two content sections with <section> containing the topics HTML and CSS. Within these sections, you can find the news articles included within <article>.

Figure 4.7 All Headings with <h1> Are Adjusted and Output Corresponds to the Section due to the Section Elements of HTML That Are Based on the Outline Algorithm

Due to the use of the new HTML elements <article> and <section>, the following content structure (or document outline) results:

```
1. My Blog
   1. News on HTML
      1. A preview of the new HTML elements
   2. News on CSS
      1. New Styles at Last
```

Document Outline for Advanced Users

The term *outline* or *document outline* refers to the structure of the document, which can be generated and represented by the headings, among other things—as in the case of the table of contents of this book, for example. The document outline can be quite useful. For example, the web browser might offer you a table of contents, letting you jump from one heading to another. Search engines can also use such a table of contents to create better page previews or even improve search results. Screen reader users probably have the biggest advantage here because they can be guided through deeply nested hierarchies and sections.

In Figure 4.8, you can see the JavaScript HTML5 outliner (h5o) to test the document outline during execution. Here, the document outline is displayed in the upper-right corner, and you can jump to the individual headings via hypertext links.

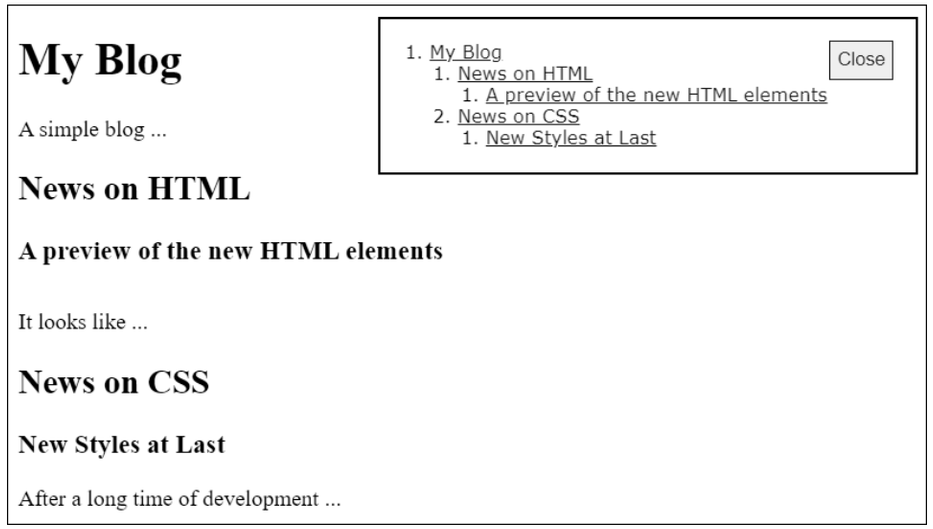


Figure 4.8 JavaScript h5o from Google during Execution

Section elements such as <section>, <article>, <aside>, and <nav> allow you to refine the document outline even more, as you've seen in the example, */examples/chapter004/4_1_7/index.html*.

Even if not all web browsers support document outlines directly, it won't do any harm to pay attention to a proper outline of the HTML document because basically that's no extra work. Screen reader users will thank you for it, and search engine robots may reward you for it because a good document outline can improve a page index, which in turn could mean a higher ranking in search results. Besides, a neatly structured web page is easier to read than an unstructured one.

Keeping Track of the Document Outline

When the website becomes more extensive and the document contains many headings and perhaps different sections, it often isn't easy to keep track of whether the document outline still makes sense and is neatly structured with regard to its contents. Outlining tools that output the headline structure of the web page in the existing structure can assist you here. For example, Google offers the JavaScript h5o, mentioned in the previous section, at *https://h5o.github.io*. Alternatively, you can find an online service at *http://gsnedders.html5.org/outliner/*. Meanwhile, the validation checker at *https://validator.w3.org/nu/#textarea* also provides an outline option for HTML documents.

4.1.4 Creating a Header Using <header> and a Footer Using <footer>

The `<header>` and `<footer>` are two additional semantic HTML elements that you can use for implementing a header and footer in an HTML document. Like section elements, these elements initially have no visual effect on the HTML document apart from a line break. Again, these are initially just elements that you can use to give a piece of content a better and cleaner structure. The styling here is usually done via CSS. However, unlike section elements such as `<section>`, `<article>`, `<aside>`, or `<nav>`, these two elements don't affect the hierarchical structuring (or document outline) of the document.

You should use the `header` element for introductory elements such as a page heading, the name of the web page, or a navigation bar of the HTML document. There may well be other HTML elements between `<header>` and `</header>`. However, you mustn't nest any other `header` elements in it. Although it seems obvious, `<header>` doesn't necessarily have to be in the header, and you can use it more than once in the document.

> **Invalid Positions of <header>**
>
> A `<header>` tag mustn't be used inside a `footer`, `address`, or another `header` element.

The counterpart to the `header` element for the header section is the `footer` element for the footer or also the footer section, which also doesn't necessarily have to be the last element in the document. Useful content for the footer of a website is often legal

information, legal notes, or terms and conditions, but you can also use a sitemap or a special navigation bar here. You can't use any other `<footer>` tag within a `footer`

Here's an example that demonstrates the `header` and `footer` elements in a meaningful structure:

```
...
  <body>
  <header>
    <hr /><small>Blog Version 1.0</small>
    <h1>My Blog</h1>
    <p>A simple blog...</p><hr />
  </header>
  <h2>News on HTML</h2>
  <article>
    <h3>A preview of the new HTML elements</h3>
    <p>It looks like ...</p>
  </article>
  <footer>
    <hr /><a href="#">Legal</a> |
    <a href="#">Legal Notes</a> |
    <a href="#">T&Cs</a> |
    <a href="#">About me</a><hr />
  </footer>
  </body>
...
```

Listing 4.7 /examples/chapter004/4_1_8/index.html

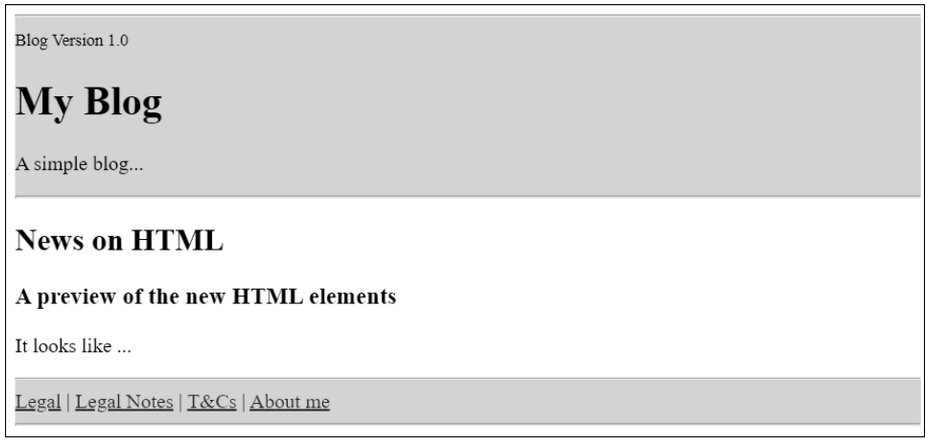


Figure 4.9 The Header and Footer with the <header> and <footer> Elements (Shown in Gray for Clarity)

Between <header> and </header>, you can find a summary of the entire information for the header section of a web page. In the example, this is the version of the blog, the headline, and a short description of the website. This is followed by the articles of the blog. Finally, the footer between <footer> and </footer> contains forwarding hyperlinks with legal information and so on.

4.1.5 Marking Contact Information Using <address>

You should use the address element only for contact information about the author of the HTML document or article. If the address element is used within the body element, it should only contain the contact information for the owner or author of the entire document or article. If the address element is positioned inside an article element, the contact information for the author of the document should be written there. Usually, the web browser displays this text in italics with a new line before and after the address element.

The best location for this contact information for the author, an organization, or the person responsible for the document or article is usually likely to be at the end of the article or at the end of the document (e.g., between <footer> and </footer>).

Here's an example in which the address element was used for contact information about the author of an article at the end inside the footer element. You can see the example at execution in Figure 4.10.

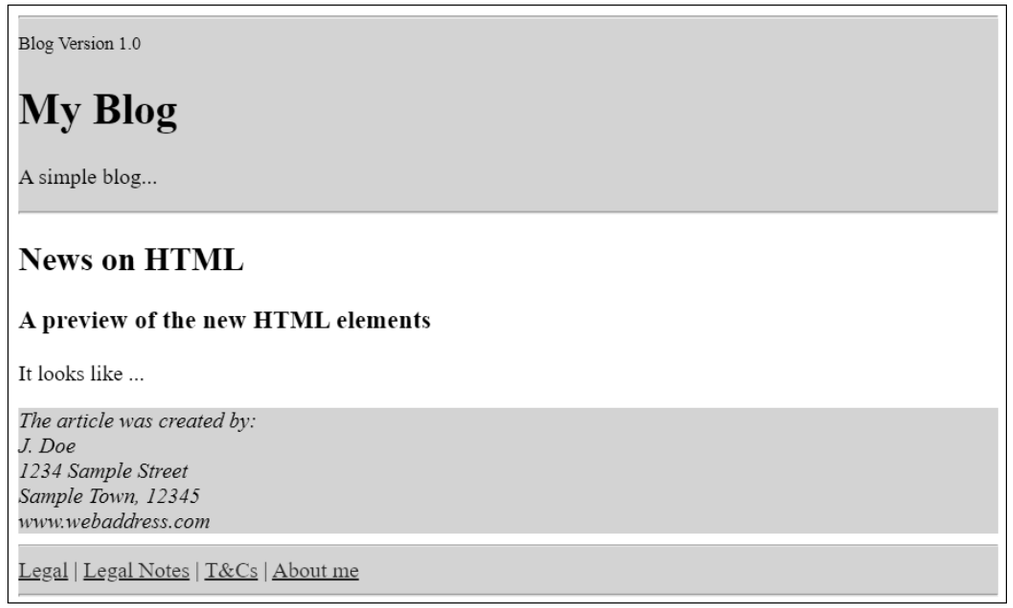


Figure 4.10 Contact Information for the Author of the Article Has Been Placed at the End of the Article between <footer> and </footer> Using the <address> Element


```
...
  <article>
    <h3>A preview of the new HTML elements</h3>
    <p>It looks like ...</p>
    <footer>
      <address>The article was created by:<br>
        J. Doe<br>
        1234 Sample Street<br>
        Sample Town, 12345<br>
        www.webaddress.com
      </address>
    </footer>
  </article>
...
```

Listing 4.8 /examples/chapter004/4_1_9/index.html

4.2 HTML Elements for Structuring Text

This section describes the HTML elements for grouping or structuring plain text content, such as paragraph text or a line break. This has nothing to do with dividing an HTML document into individual sections or areas. You've previously learned how to do that in Section 4.1.

HTML Element	Meaning
<p>	Text paragraph
 	Forcing a line break
<wbr>	Optional line break within a word
<hr>	Topic-based separation at the paragraph level
<blockquote>	Citation as a text paragraph
	Defining a general section
<main>	Used for the main content area of a web page
<figure>	Grouping or summarizing content for separate description
<figcaption>	Labeling content grouped via the figure element
	Unordered bulleted list
	Ordered list (mostly numbered)

Table 4.2 Brief Overview of the Elements Covered Here for Grouping and Dividing Content

HTML Element	Meaning
	List element in a ul or ol list
<dl>	Creating a description list using dt and dd
<dt>	Expression to be described before the dd element
<dd>	Description that follows the dt element

Table 4.2 Brief Overview of the Elements Covered Here for Grouping and Dividing Content (Cont.)

4.2.1 Adding Text Paragraphs Using

The p element (p = *paragraph*) is the classic element for text paragraphs in a longer continuous text. Anything you write here between the opening and the closing is treated as a text paragraph. Within such a text paragraph you can use images, videos, audio clips, or other text markup in addition to multiline body text. However, you can't use other group elements, headings (<h1> to <h6>), or section elements within and .

The following example demonstrates two slightly longer paragraph texts with the p element in use:

```
...
  <body>
  ...
  <h2>News on HTML</h2>
  <article>
    <h3>A preview of the new HTML elements</h3>.
    <p>Lorem ipsum dolor sit amet, consectetuer adipiscing
       elit. Aenean commodo ligula eget dolor. Aenean massa.
       Cum sociis natoque penatibus et magnis dis parturient
       montes, nascetur ridiculus mus. Donec quam felis,
       ultricies nec, pellentesque eu, pretium quis, sem.
       Nulla consequat massa quis enim. Donec pede justo,
       fringilla vel, aliquet nec, vulputate eget, arcu. In
       enim justo, rhoncus ut, imperdiet a, venenatis vitae,
       justo.
    </p>
    <p>Nullam dictum felis eu pede mollis pretium. Integer
       tincidunt. Cras dapibus. Vivamus elementum semper
       nisi. Aenean vulputate eleifend tellus. Aenean leo
       ligula, porttitor eu, consequat vitae, eleifend ac,
       enim. Aliquam lorem ante, dapibus in, viverra quis,
       feugiat a, tellus.
```



```
    </p>
  </article>
  ...
  </body>
...
```

Listing 4.9 /examples/chapter004/4_2_1/index.html

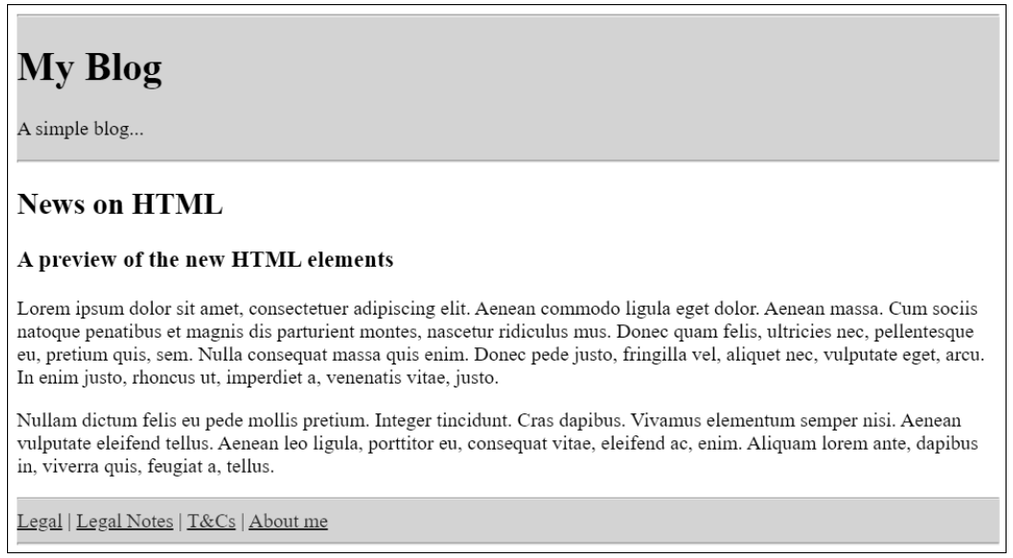


Figure 4.11 Two Paragraphs with Body Text between and Displayed in the Web Browser

Aligning and Formatting Paragraph Text Using CSS

Paragraph text with the p element can be formatted using CSS or CSS features.

4.2.2 Forcing Line Breaks Using

If you try to insert a line break or a space in the body text of the example just shown, */examples/chapter004/4_2_1/index.html*, you'll notice that it doesn't work. The point at which the line break is supposed to be inserted is decided by the web browser based on a space that separates words. Nevertheless, you can also force a line break at a certain point in the text using
 (br = *break*).
 is a standalone tag. Even though you can use multiple line breaks simultaneously via <br>, you shouldn't overuse it for separating paragraphs.

The following example is commonly used to represent an address neatly by means of forced line breaks (see Figure 4.12):

```
...
    Written by <a href="mailto:#">John</a><br>
    <address>
       John Doe<br>
       Sample Town<br>
       www.address.com
    </address>
...
```

Listing 4.10 /examples/chapter004/4_2_2/index.html

Figure 4.12 You Can Force Line Breaks via the
 Element

4.2.3 Adding Optional Line Breaks Using <wbr>

If, on the other hand, you need an optional line break that only occurs at a specific position when it's necessary for an optimal display in the web browser and to save the user from scrolling sideways, you can use the standalone `<wbr>` (or `<wbr />` in XHTML) tag for this (`wbr` = *word break*). `<wbr>` can be quite useful if you want to prevent the web browser from breaking a line in the wrong place. A simple example follows:

```
<p>Taumatawhakatangi<wbr>
hangakoauauotamatea<wbr>
turipukakapikimaungah<wbr>
oronukupokaiwhen<wbr>
uakitanatahu</p>
```

Depending on how wide the display section is in the web browser, the long word can be wrapped only at the places where `<wbr>` was inserted.

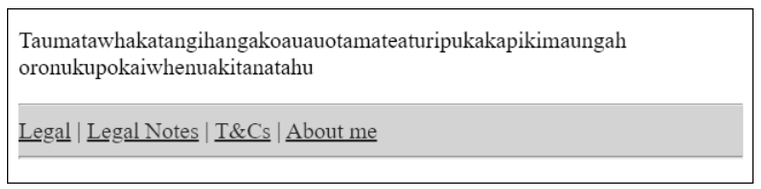


Figure 4.13 An Extremely Long Word Wrapped at a Position Suggested by <wbr>

Line Break via <wbr>

The optional line break via `<wbr>` was added to the standard HTML version at a later time, but it had been around since HTML 2.0. The Netscape web browser had introduced this element a long time ago, and other browser manufacturers had implemented it as well.

Nevertheless, this word separation is unattractive because the line gets broken without consideration of a grammatically correct separation. As an alternative, the *named entity* `&shy;` is suitable for a conditional hyphen. Similar to `<wbr>`, this allows the web browser to separate the word at this point if necessary. Unlike `<wbr>`, the web browser adds a hyphen at the end of the wrapped word. The alternative example looks as follows:

```
<p>Taumatawhakatangi&shy;
hangakoauauotamatea&shy;
turipukakapikimaungah&shy;
oronukupokaiwhen&shy;
uakitanatahu</p>
```

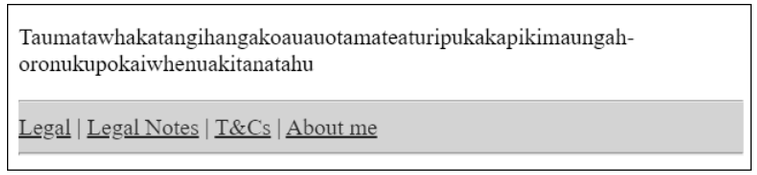


Figure 4.14 A Long Word Can Also Be Wrapped at the Position Suggested by "" but It Also Adds a Separator, Unlike <wbr>

4.2.4 Forcing Spaces and Preventing Wrapping Using " "

If you want to insert multiple spaces between two words, you can force this with the named character ` ` (` ` = *nonbreaking space*). Let's take a look at a simple example:

```
<p>word1    word2</p>
<p>word3     word4</p>
```

Between `word1` and `word2`, the named HTML entity character ` ` has been written four times, resulting in four spaces between these two words, which is also displayed by the web browser. In the example with `word3` and `word4` the same was tried by pressing the spacebar four times. Nevertheless, in this case, the web browser displays only one space between the words.

In addition to forcing a space, you can also use the named entity character ` ` to prevent a break between two words, which the web browser automatically performs when there is insufficient space at the end of a line. For example:

```
... word1 word2 ...
```

By placing this ` ` between `word1` and `word2`, you can prevent the two words from being split between two different lines by the web browser if there's a lack of space. `word1` and `word2` thus stick together in the same line forever.

4.2.5 Adding a Topic-Based Separation Using <hr>

You can use `<hr>` to create a topic-based separation in an HTML document, for example, to separate content more clearly. However, even though `<hr>` is visualized as a separator in HTML by web browsers, the element is also to be treated as a semantic element and not a presentation element. For example, it isn't valid HTML to use the `hr` element between `<p>` and `</p>` or within a heading (`<h1>` to `<h6>`), even though web browsers are quite fault-tolerant about this.

The example shown in Figure 4.15 with a horizontal line can be found under */examples/chapter004/4_2_5/index.html*. You'll see that a separator line also creates a paragraph.

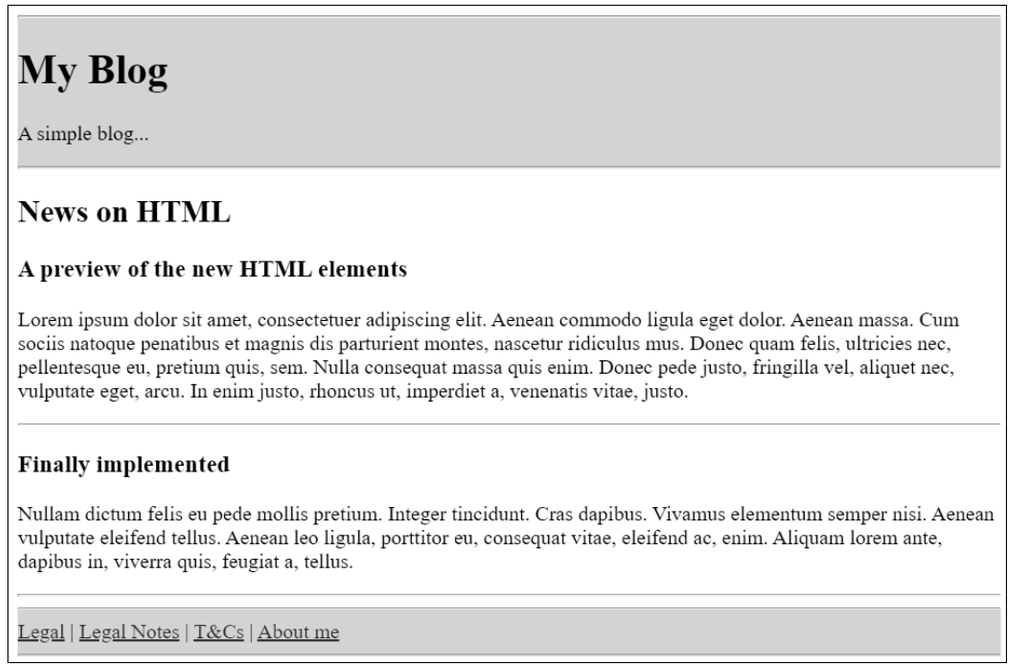


Figure 4.15 With <hr>, a Visual Topic-Based Separation Has Been Added as a Separator Line behind the Paragraph Text

4.2.6 Adding Paragraphs or Citations Using <blockquote>

Between `<blockquote>` and `</blockquote>`, you can quote a text from another source. Most web browsers indent the text in a new paragraph. Within such block quotes, you can use other HTML elements besides text.

The `blockquote` element contains `cite`, an HTML attribute that allows you to specify the source of the citation. With regard to books, this can also be a link to the corresponding book page or to a store where this book can be purchased. Unfortunately, no web browser provides the option to somehow make this source visible or to call the corresponding URL yet. So, to be on the safe side, you should add the source, as I did in the following example; in Figure 4.16, you can see the display in the web browser.

```
...
<blockquote cite="http://www.blindtextgenerator.com/">
   Nulla consequat massa quis enim. Donec pede justo,
   fringilla vel, aliquet nec, vulputate eget, arcu. In enim
   justo, rhoncus ut, imperdiet a, venenatis vitae, justo.
   <small> - http://www.blindtextgenerator.com/ - </small>
</blockquote>
...
```

Listing 4.11 /examples/chapter004/4_2_6/index.html

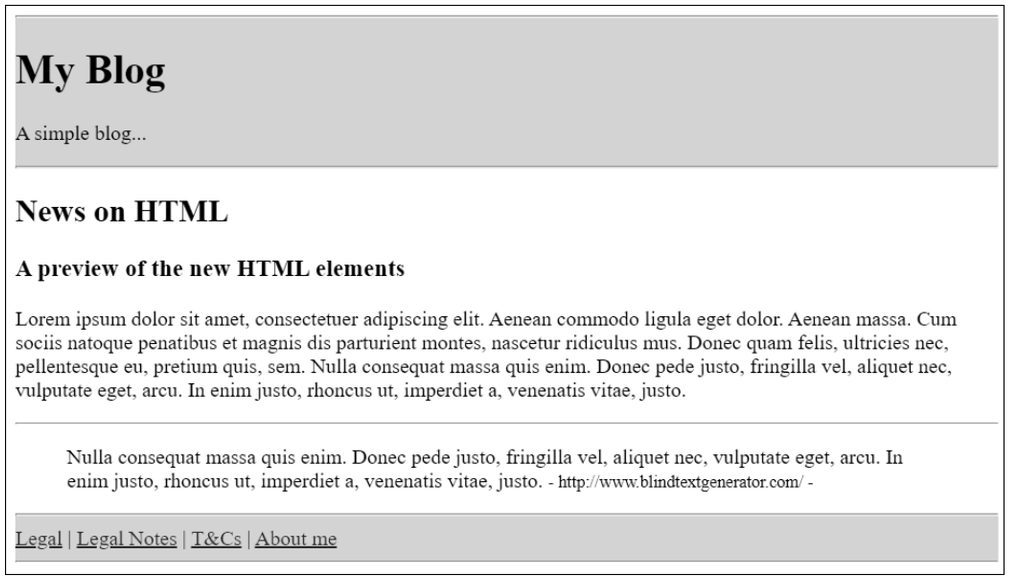


Figure 4.16 Text Quoted between <blockquote> and </blockquote> from the www.blindtextgenerator.com Website

4.2.7 Defining a General Section Using

Between `<div>` and `</div>` (`div` = *division*), you can define a general section, which at first usually does nothing but create a new line. This `div` element doesn't have any meaning until CSS comes into play, which is the main use of `<div>`: defining layout sections. In the following example, the HTML attribute `class` was used, which you can use to assign the `div` elements to a class that you can later select with CSS (using a selector) and visually customize or style. Here's a familiar example that demonstrates such an application in use:

```
...
  <body>
  <div class="header">
    <hr />
    <h1>My Blog</h1>
    <p>A simple blog ...</p>
    <hr />
  </div>
  <h2>News on HTML</h2>
  <div class="article">
    <h3>A preview of the new HTML elements</h3>
    <p>Lorem ipsum dolor ...</p>
  </div>
  <div class="footer">
    <hr />
    <a href="#">Legal</a> |
    <a href="#">Legal Notes</a> |
    <a href="#">T&Cs</a> |
    <a href="#">About me</a>
    <hr />
  </div>
  </body>
...
```

Listing 4.12 /examples/chapter004/4_2_7/index.html

For such examples, you should prefer semantic elements such as `<header>`, `<footer>`, `<article>`, `<nav>`, and so on instead of the `div` element.

Therefore, you should use the `div` element only if no other suitable HTML element is available. You can find more information about this in greater detail in Section 4.3. In regard to the */examples/chapter004/4_2_7/index.html* example, you should, as previously described in the book, use the HTML elements `<header>`, `<article>`, and `<footer>` that have been newly introduced in HTML instead of the `<div class="header">`, `<div class="article">`, and `<div class="footer">` sections used in the previous example. The corresponding example thus looks as follows (see Listing 4.13).

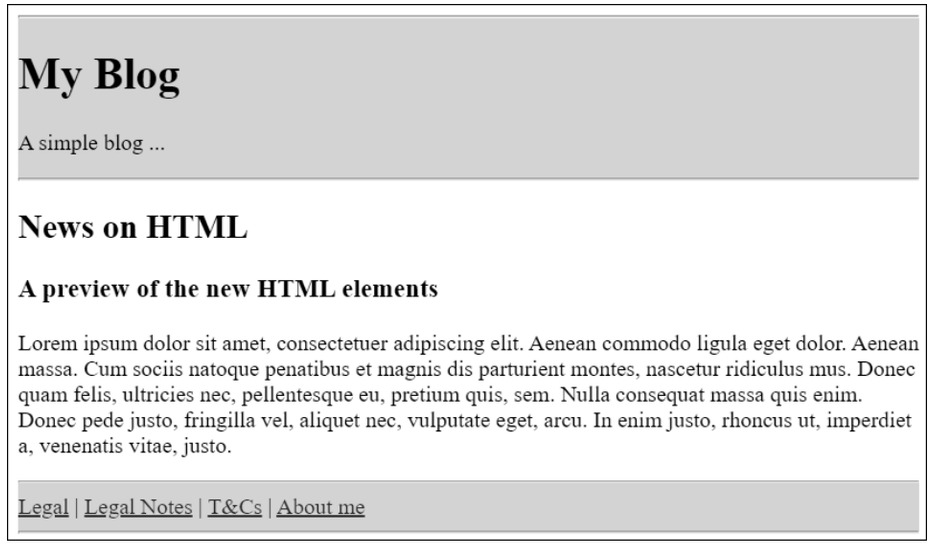


Figure 4.17 The Header and Footer of the HTML Document Appear in Gray

```
...
  <body>
  <header>
    <hr />
    <h1>My Blog</h1>
    <p>A simple blog ...</p>
    <hr />
  </header>
  <h2>News on HTML</h2>
  <article>
    <h3>A preview of the new HTML elements</h3>
    <p>Lorem ipsum dolor ... </p>
  </article>
  <footer>
    <hr />
    <a href="#">Legal</a> |
    <a href="#">Legal Notes</a> |
    <a href="#">T&Cs</a> |
    <a href="#">About me</a>
    <hr />
  </footer>
  </body>
...
```

Listing 4.13 /examples/chapter004/4_2_7/index2.html

4.2.8 Using <main>: An HTML Element for the Main Content

I described the `div` element in the previous section, so it makes sense to deal with the `main element` at this point. Where `<div id="main">...</div>` was used in the past, you can use `<main>...</main>` from now on. The `id` attribute identifies an element that occurs only once within a document.

Like all other new HTML elements, you should use the `main` element as sensibly as possible. In practice, you use it for the main content of a website, which means it's best not to place it inside `<article>`, `<aside>`, `<footer>`, `<nav>`, or `header` elements.

In the web browser, the `main element` is rendered like the `div` element with no special properties and only creates a line break. However, unlike the `div` element, you should use the `main` element only once (visibly) in an HTML document. In contrast to the `<section>` element, the `main` element isn't a section element, but a pure grouping element. Thus, the use of such a section doesn't affect the heading structure (the document outline) of the HTML document.

Here's an example of how you can group a section as the main section of a web page:

```
...
  <body>
  <header>
    <h1>My Blog</h1>
    <p>A simple blog ...</p>
  </header>
  <main>
    <h2>News on HTML</h2>
    <article>
      <h3>A preview of the new HTML elements</h3>
      <p>Lorem ipsum dolor...</p>
    </article>
  </main>
  <footer>
    <a href="#">Legal</a> |
    <a href="#">Legal Notes</a> |
    <a href="#">T&Cs</a> |
    <a href="#">About me</a>
  </footer>
  </body>
...
```

Listing 4.14 /examples/chapter004/4_2_8/index.html

Using <main> Multiple Times?

`<main>` is intended to present the main content of an HTML document and should therefore be included only once in a document. If it's used more than once, then this page won't pass the validation check. Nevertheless, there are *single-page* web applications, that is, applications that consist of a single HTML document and whose content is dynamically reloaded, where this rule can become an issue. For this reason, the use of the `main` element has been adjusted somewhat, and multiple `main` elements can now be used. However, only one `<main>` element of those can be visible at a time. All other `main` elements must be provided with the `hidden` attribute. For example:

```
<main>...</main>
<main hidden>...</main>
<main hidden>...</main>
```

Although there are other ways in CSS to hide individual elements, you can use only the `hidden` attribute with `<main>` for the HTML document to be valid. All other options are invalid.

4.2.9 Labeling Content Separately Using <figure> and <figcaption>

To set off or group certain content such as tables, images, listings, videos, or other HTML elements from the usual body text, you can use the `figure element`. If you want to link this section with an (optional) caption, you should use the `figcaption` element. Like the `figure` element, the `figcaption` element can contain other HTML elements besides ordinary body text. Thus, the `figure` element serves as the semantic parent for an element belonging to the page content, such as an image, table, listing, or other content, and the `figcaption` element encloses the subtitle to that element.

Here's a simple example, the result of which is shown in Figure 4.18:

```
...
  <h2>HTML</h2>
  <article>
    <h3>figure and figcaption in use</h3>
    <p>The text before figure ...</p>
    <figure>
      <img src="opera.jpg" alt="Chinese Opera" />
      <figcaption>Figure 1: Once upon a time ...</figcaption>
      </figure>
    <p>The text after figure</p>
  </article>
...
```

Listing 4.15 /examples/chapter004/4_2_9/index.html

If you want to place the (optional) caption with the `figcaption` element before the content (above the image in the example), you need to use the element right after the opening `<figure>`. However, it's only possible to use a `figcaption` element between `<figure>` and `</figure>`, and `<figcaption>` must be the first or last element of the `figure` element.

Figure 4.18 In the <article> Element between <figure> and </figure>, an Image Has Been Inserted with the <img> Element and a Caption with the <figcaption> Element

Between `<figure>` and `</figure>` you can also use more than one content type (e.g., an image in the example). In the web browser, a `figure` usually doesn't get displayed separately. In addition to a separate line, the content between `<figure>` and `</figure>` is often displayed slightly indented. However, CSS is used for the design of the `figure` element anyway.

4.2.10 Creating Unordered Lists Using <ul> and

An unordered list is basically nothing more than an unnumbered bulleted list in which all list entries are given a bullet character. The web browsers usually display this bullet with a *bullet point*.

You can introduce such a list with an opening `<ul>` (`ul` = *unordered list*), followed by the actual bullet points, which you write between `<li>` and `</li>`. Each `li` element (`li` = *list item*) is a bullet point. At the end, you must end the unordered bullet list with the closing

`</ul>`. Only `li` elements can be contained between `<ul>` and `</ul>`. In between the `li` elements, you can also use other HTML elements (except for section elements).

Here's a simple example of an unordered list, the execution of which you can see in Figure 4.19.

```
...
<article>
  <h2>Unordered bullet list with ul</h2>
  <ul>
     <li>Lorem ipsum dolor sit amet</li>
     <li>Donec quam felis ultricies</li>
     <li>Nulla consequat massa quis</li>
     <li>Etiam ultricies nisi vel</li>
     <li>Donec vitae sapien ut libero</li>
  </ul>
</article>
...
```

Listing 4.16 /examples/chapter004/4_2_10_15/index.html

Figure 4.19 Bulleted Lists with the <ul> Element Are Usually Displayed with a Bullet Point

4.2.11 Creating Ordered Lists Using <ol> and

What you've just read about the `ul` element also applies to the `ol` element (`ol` = *ordered list*). The only exception is that the `ol` element is an ordered list—more precisely, a numbered list in which the individual `li` elements are automatically numbered.

Here's an example of an ordered list, the execution of which you can see in Figure 4.20.

```
...
<article>
  <h2>Numbered bullet list with ol</h2>
  <ol>
     <li>Lorem ipsum dolor sit amet</li>
     <li>Donec quam felis ultricies</li>
     <li>Nulla consequat massa quis</li>
```

```
    <li>Etiam ultricies nisi vel</li>
    <li>Donec vitae sapien ut libero</li>
  </ol>
</article>
...
```

Listing 4.17 /examples/chapter004/4_2_10_15/index.html

Figure 4.20 The Numbered List with the <ol> Element Uses Arabic Numerals by Default

4.2.12 Reversing the Numbering of an Ordered List

With HTML, it's also possible to reverse the order of numbering via the HTML attribute `reversed` in the opening `<ol>` tag, so that the numbering gets displayed in descending order. Based on the preceding example, you only need to insert the following:

```
<ol reversed="reversed">
   ...
</ol>
```

Besides `<ol reversed="reversed">`, you can also just use `<ol reversed>` here because it's a standalone attribute. But if you want to be XHTML compliant, you must use the form `<ol reversed="reversed">`. In HTML, you can use both versions.

Figure 4.21 The Numbering Order Was Reversed via the "reversed" Attribute

4.2.13 Changing the Numbering of an Ordered List

You can use the HTML attribute `start` to specify the start value of the first `li` element in the opening `<ol>` tag. All values that follow the first `li` element are incremented by the

value `1`. Even within an opening `<li>` tag, you can use the HTML attribute `value` to change the numbering of the list entry. All subsequent entries are incremented by the value `1` using the value specified in `value`.

The execution of the following example is shown in Figure 4.22.

```
...
<ol start="20">
  <li>Lorem ipsum dolor sit amet</li>
  <li>Donec quam felis ultricies</li>
  <li>Nulla consequat massa quis</li>
  <li value="101">Etiam ultricies nisi vel</li>
  <li>Donec vitae sapien ut libero</li>
</ol>
...
```

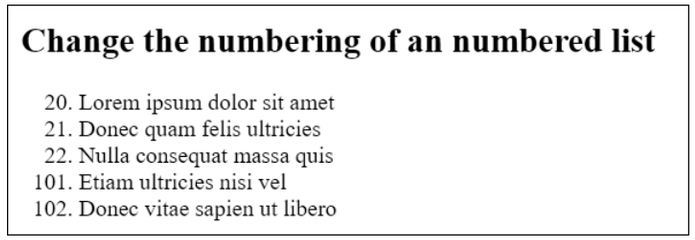


Figure 4.22 The Starting Numbering Was Set to 20 Right in the Opening <ol> Tag with the Attribute "start" and Then Again in an Opening <li> Tag with the Attribute "value" to 101

4.2.14 Nesting Lists within Each Other

You can nest both numbered lists and bulleted lists. Such nested lists are used when, for example, you need a finer structuring of the lists, such as a table of contents (e.g., at the beginning of this book). A navigation with submenus is also often formulated by means of a bulleted list.

Nesting lists can get a little messy, so if you have a deeper bulleted hierarchy, you should use indentations and/or add a comment. When nesting, the `li` elements aren't nested inside each other, as might be assumed, but a `ul` or `ol` element must be written again with the nested `li` elements inside an opening parent `<li>` tag. Only when you close the opening `<li>` tag with `</li>` will this list be marked and displayed as a child list.

The execution of the following code snippet is shown in Figure 4.23.

```
...
<h2>Nesting bullet lists ul</h2>
<ul>
  <li>Lorem ipsum dolor sit amet
```

```
  <ul><!-- Start: 1. Nesting -->
     <li>Donec quam felis ultricies</li>
     <li>Nulla consequat massa quis</li>
  </ul><!-- End: 1. Nesting -->
  </li>
  <li>Etiam ultricies nisi vel</li>
  <li>Donec vitae sapien ut libero</li>
</ul>
...
<h2>Nesting numbered lists ol</h2>
<ol>
  <li>Lorem ipsum dolor sit amet
  <ol><!-- Start: 1. Nesting -->
     <li>Donec quam felis ultricies</li>
     <li>Nulla consequat massa quis</li>
  </ol><!-- End: 1. Nesting -->
  </li>
  <li>Etiam ultricies nisi vel</li>
  <li>Donec vitae sapien ut libero</li>
</ol>
...
```

Listing 4.18 /examples/chapter004/4_2_10_15/index.html

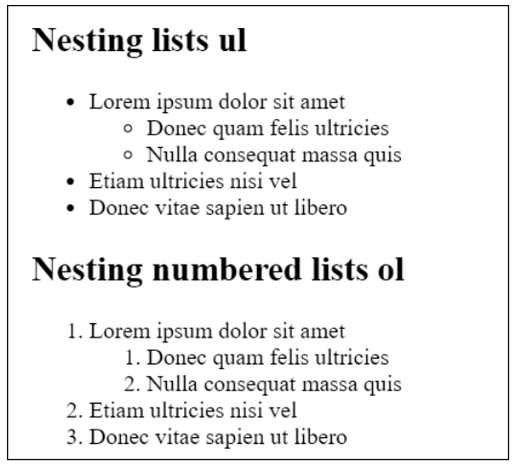


Figure 4.23 The Nesting of Unnumbered Lists and Numbered Lists during Execution

Of course, you can nest the lists even deeper. Mixing unordered and ordered lists is also possible without any problem. Unfortunately, it isn't possible to force automatic numbering such as 1.2, 1.3, 1.4, and so on for the numbered sublists.

To illustrate this, the following is an example of a deeper and mixed nesting, the result of which is shown in Figure 4.24.

```
...
<h2>Deeper nesting and mixing lists</h2>
<ol>
  <li>Lorem ipsum dolor sit amet
  <ol><!-- Start: 1. Nesting -->
      <li>Donec quam felis ultricies</li>
      <li>Nulla consequat massa quis
      <ol><!-- Start: 2. Nesting -->
          <li>Donec quam felis ultricies</li>
          <li>Nulla consequat massa quis</li>
      </ol><!-- End: 2. Nesting -->
      </li>
  </ol><!-- End: 1. Nesting -->
  </li>
  <li>Etiam ultricies nisi vel
  <ul><!-- Start: 1. Nesting (bullet point) -->
      <li>Donec quam felis ultricies</li>
      <li>Nulla consequat massa quis</li>
  </ul><!-- End: 1. Nesting (bullet point) -->
  </li>
  <li>Donec vitae sapien ut libero</li>
</ol>
...
```

Listing 4.19 /examples/chapter004/4_2_10_15/index.html

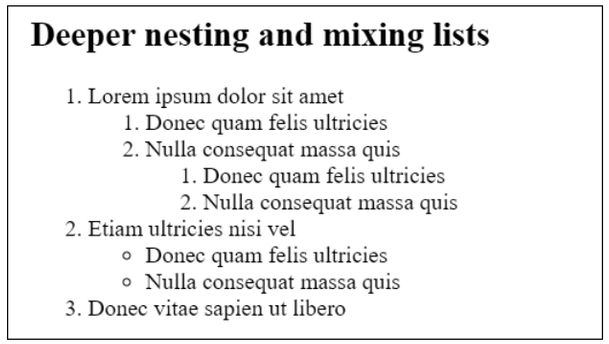


Figure 4.24 Further Nesting Depths and Mixing of Ordered and Unordered Lists

Omitting the Closing Tag from Lists

As you may remember from Chapter 2, Section 2.1.6, it's possible to omit the closing tags in some places. Especially if a list is deeply and extensively nested, this may even be clearer and easier than setting the closing tags. As mentioned earlier, this style isn't used in this book, and I've never used it in practice (yet). Nevertheless, it should be pointed out here because the lists are listed as a pro-argument, especially by the "omission faction."

4.2.15 Creating a Description List Using <dl>, <dt>, and <dd>

In HTML, there's another type of list you can use—the description list. This list is more of a name-value mapping list. Typical use cases for the description list are glossaries or the listing of special metadata and values; in other words, it's simply a special list with certain data in which a value or a description is assigned.

A description list gets summarized between `<dl>` and `</dl>` (`dl` = *description list*). The `dl` element may only contain the `dt` and `dd` elements described in the same way. The expression to be described, that is, the name of the name-value mapping list, is marked with `<dt>` and `</dt>` (`dt` = *description term*). The associated description is written after the `dt` element between `<dd>` and `</dd>` (`dd` = *definition description*). In turn, other HTML elements may be used in `dt` and `dd` elements—except for *grouping* elements and HTML elements for new sections (*sectioning*).

Here's a simple example of a description list, the result of which is shown in Figure 4.25. By default, web browsers display the descriptions (`<dd>` elements) slightly indented compared to the expression (`<dt>` elements). Here the description list was used for a list of abbreviations in the web jargon.

```
...
<h3>Web lingo</h3>
<dl>
  <dt>4U</dt>
  <dd>For you</dd>
  <dt>ACK</dt>
  <dd>Acknowledgment</dd>
  <dt>ASAP</dt>
  <dd>As soon as possible</dd>
  <dt>FYI</dt>
  <dd>For your information</dd>
</dl>
...
```

Listing 4.20 /examples/chapter004/4_2_10_15/index.html

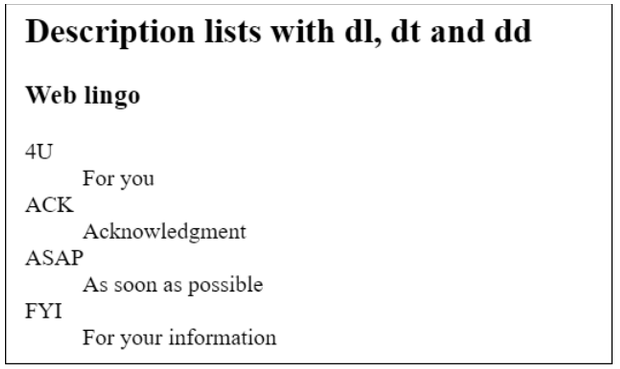


Figure 4.25 Descriptions (<dd> Elements) Slightly Indented Compared to the Expression (<dt> Elements)

Such a name-value pair list can also be used within other HTML elements such as between `<aside>` and `</aside>` or the new `details` element, as shown in the following example:

```
...
<h3>Book launch</h3>
<img src="Computer stories.png"
alt="Computer stories"><br>
<details>
  <summary>Book information:</summary>.
  <dl>
    <dt>Publisher</dt>
    <dd>Rheinwerk Verlag</dd>
    <dt>Author</dt>
    <dd>Juergen Wolf</dd>
    <dt>Scope</dt>
    <dd>400 pages</dd>
    <dt>Price</dt>
    <dd>$24.90</dd>
    <dt>ISBN</dt>
    <dd> ISBN 978-3-8362-7777-8 </dd>
  </dl>
</details>
...
```

Listing 4.21 /examples/chapter004/4_2_10_15/index.html

Figure 4.26 The Description List for an Image (a Book) Has Been Wrapped inside the <details> Element, Allowing the Description to be Expanded and Collapsed

4.3 Using Semantic HTML

Now that you know the HTML elements for page structuring and text structuring, you may be wondering how you can create a basic web page with these HTML elements so that it makes sense semantically. Specifically, this means that you can define the different logical parts of a web page with HTML tags. By the way, the semantic web isn't just a fad, but helps search engines, for example, better allocate the sheer flood of data on the internet. Search engines such as Google even prefer semantic web pages and searches HTML pages for semantic content.

Let's take as a simple example the term *goal*, whose meaning in hockey is different from that in business. The term gets its assignment and meaning only if you provide the relevant context. This is roughly how you can imagine the semantic web: you contextualize the content with code so that machines can also interpret and process it.

4.3.1 HTML without a Precise Structure

The first example is a classic HTML document that has no detailed structure:

```
...
  <h1>My Blog</h1>
  <p>A blog with yummy recipes ...</p>
```



```
  <p>Navigation:
    <a href="#">Blog</a> | <a href="#">Recipes</a> |
    <a href="#">About me</a> | <a href="#">Legal Notes</a>
  </p>
  <h2>Old Posts</h2>
  <ul>
    <li><a href="#">Last Week</a></li>
    <li><a href="#">Archive</a></li>
  </ul>
  <h2>Tasty homemade vanilla sauce</h2>
  <p>Today I want to show you how ...</p>
  <h3>Similar recipes</h3>
  <ul>
     <li><a href="#">Chocolate sauce made from cocoa</a></li>.
     <li><a href="#">Custard Made Easy</a></li>
  </ul>
  <p>
    <a href="#">Contact</a> | <a href="#">FAQs</a> |
    <a href="#">About me</a> | <a href="#">Legal Notes</a>
  </p>
...
```

Listing 4.22 /examples/chapter004/4_3_1/index.html

There isn't much to note about this example. The HTML code is valid and can be used like that. You can see some headings, unordered lists, navigation, and various paragraph texts. However, such code is rarely used because it's nearly unstructured and is relatively poorly suited for styling or laying out via CSS.

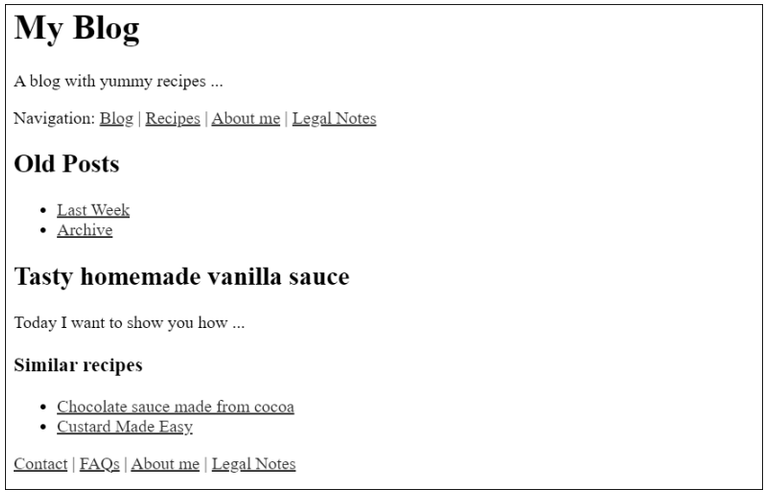


Figure 4.27 /examples/chapter004/4_3_1/index.html When Displayed in the Web Browser

4.3.2 Generic Structuring Using

The first example didn't contain any element to tell you where the different sections of content were located. For this reason, we'll now use the `div` element to divide the content into separate sections. Take a look at the same example again now, but this time it contains the `div` elements:

```
...
  <div>
  <h1>My Blog</h1>
  <p>A blog with yummy recipes ...</p>
  </div>
  <div>
  <p>Navigation:
    <a href="#">Blog</a> |
    <a href="#">Recipes</a> |
    <a href="#">About me</a> |
    <a href="#">Legal Notes</a>
  </p>
  </div>
  <div>
  <h2>Old Posts</h2>
  <ul>
    <li><a href="#">Last Week</a></li>
    <li><a href="#">Archive</a></li>
  </ul>
  </div>
  <div>
  <h2>Tasty homemade vanilla sauce</h2>
  <p>Today I want to show you ... </p>
  <h3>Similar recipes</h3>
  <ul>
     <li><a href="#">Chocolate sauce made from cocoa</a></li>.
     <li><a href="#">Custard Made Easy</a></li>
  </ul>
  </div>
  <div>
  <p>
    <a href="#">Contact</a> |
    <a href="#">FAQs</a> |
    <a href="#">About me</a> |
    <a href="#">Legal Notes</a>
  </p>
```



```
  </div>
...
```

Listing 4.23 /examples/chapter004/4_3_2/index.html

This time, the content was separated by means of `div` elements. Nevertheless, we still don't see any semantic elements. Visually, nothing changes here compared to the */examples/chapter004/4_3_1/index.html* example from the previous section.

All that can be achieved by using the `div` element is to group a piece of content together. Thus, it depends on the author of the web page to assign meaning to the individual `div` elements. Before semantic elements came into play, this was done via attributes in the opening `<div>` tag. So, let's now take a look at the next step and the next example, in which the individual `div` elements get their meaning:

```
...
  <div id="header">
  <h1>My Blog</h1>
  <p>A blog with yummy recipes ...</p>
  </div>
  <div id="navigation">
  <p>Navigation:
    <a href="#">Blog</a> |
    <a href="#">Recipes</a> |
    <a href="#">About me</a> |
    <a href="#">Legal Notes</a>
  </p>
  </div>
  <div id="sidebar">
  <h2>Old Posts</h2>
  <ul>
    <li><a href="#">Last Week</a></li>
    <li><a href="#">Archive</a></li>
  </ul>
  </div>
  <div id="content">
  <h2>Tasty homemade vanilla sauce</h2>
  <p>Today I want to show you ...</p>
  <h3>Similar recipes</h3>
  <ul>
     <li><a href="#">Chocolate sauce made from cocoa</a></li>.
     <li><a href="#">Custard Made Easy</a></li>
  </ul>
  </div>
  <div id="footer">
```

```
  <p>
    <a href="#">Contact</a> |
    <a href="#">FAQs</a> |
    <a href="#">About me</a> |
    <a href="#">Legal Notes</a>
  </p>
  </div>
...
```

Listing 4.24 /examples/chapter004/4_3_2/index2.html

While nothing has changed in a purely visual sense, the `div` elements have gained meaning thanks to the `id` attribute. We now have a header, navigation, sidebar, content, and footer as it's visually represented in Figure 4.28. Using CSS, you can design and lay out these areas individually. This way, you can virtually already achieve a semantically correct structuring of the website, but not yet a semantically unified structuring.

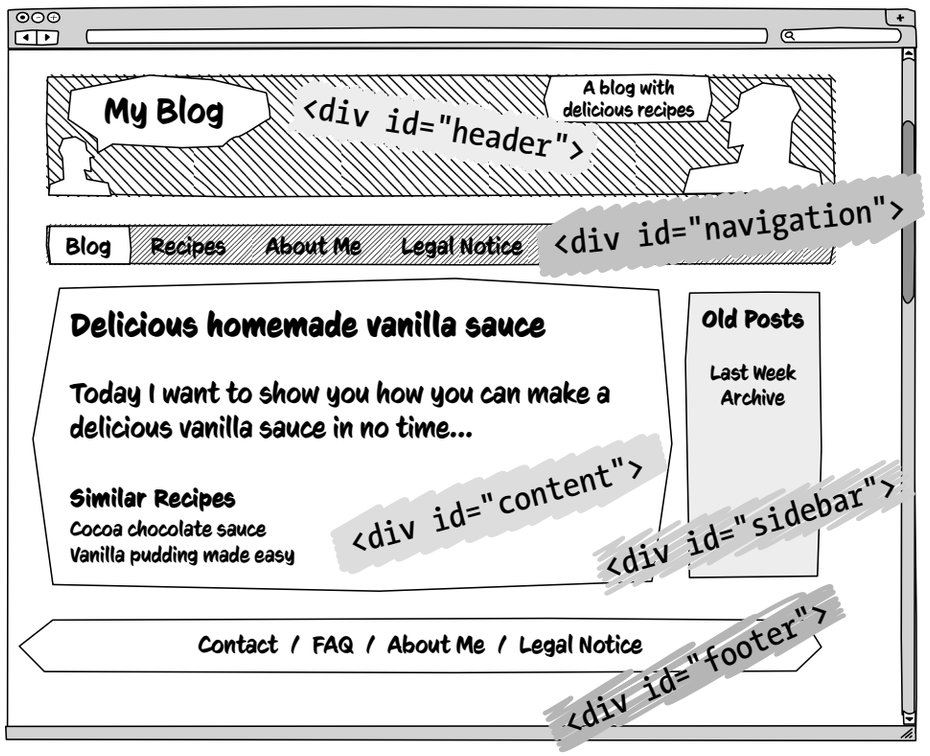


Figure 4.28 The Meaning for the Layout Areas Is Assigned via and the "id" Attribute

So why should you use semantic structuring at all when you can work with `div` elements without any problem? There are several reasons for this: Despite the use of IDs

in the `div` element, you have a semantically neutral element. It isn't a standardized structuring, but instead everyone can define what they want. For the machines, there's still no difference here. They can't know what you really mean by `id="header"` or `id="content"` and what's behind it. You might as well write `id="head"` or `id="synopsis"` or whatever in all the languages of the world.

For example, imagine a smart screen reader reading the main content of the web page to a visually impaired person. How would the screen reader know what the main content is? One web developer may write `id="content"`, another may write `id="main"`, and you may write `id="musings"`. In addition, some web developers don't mark up the main content at all.

The situation is the same with search engines. For search engines to return a better result, it's helpful if they know what belongs to the main content of the web page. Again, the search engine faces nonstandard class and ID names. Thus, it's an advantage here if you tell the web crawler on the next visit: this is the main content of my site.

> ** Can Still Be Used in HTML**
>
> Using `div` elements and labeling the layout sections with the ID and class names are by no means incorrect—they represent valid HTML. In addition, the `div` element often helps you solve a problem. Nevertheless, for future projects, you should use the new semantically meaningful elements that were introduced especially for this purpose.

4.3.3 Semantic Structuring Using the Elements Provided in HTML

To write a semantically meaningful structure as HTML code for machines, there are suitable elements in HTML that have already been described in the book and are listed once again in Table 4.3.

HTML Element	Meaning	Section in This Chapter
`header`	Header sections	Section 4.1.4
`nav`	Navigation blocks	Section 4.1.2 and "Declaring Content as a Page Navigation Bar Using <nav>" on Page 102
`section`	Division into content sections	"Dividing Content into Topic-Based Sections Using <section>" on Page 97
`article`	Division into self-contained blocks	"Dividing Content into a Self-Contained Block Using <article>" on Page 98
`aside`	Additional Information	Section 4.1.2
`footer`	Footer sections	Section 4.1.4

Table 4.3 Semantic HTML Elements

Returning to our example */examples/chapter004/4_3_2/index2.html*, this HTML code should do without `div` elements and instead rely on semantic HTML elements:

```
...
  <header>
  <h1>My Blog</h1>
  <p>A blog with yummy recipes ...</p>
  </header>
  <nav>
  <p>Navigation:
    <a href="#">Blog</a> |
    <a href="#">Recipes</a> |
    <a href="#">About me</a> |
    <a href="#">Legal Notes</a>
  </p>
  </nav>
  <aside>
  <h2>Old Posts</h2>
  <ul>
    <li><a href="#">Last Week</a></li>
    <li><a href="#">Archive</a></li>
  </ul>
  </aside>
  <article>
  <h2>Tasty homemade vanilla sauce</h2>
  <p>Today I want to show you ...</p>
  <h3>Similar recipes</h3>
  <ul>
     <li><a href="#">Chocolate sauce made from cocoa</a></li>.
     <li><a href="#">Custard Made Easy</a></li>
  </ul>
  </article>
  <footer>
  <p>
    <a href="#">Contact</a> |
    <a href="#">FAQs</a> |
    <a href="#">About me</a> |
    <a href="#">Legal Notes</a>
  </p>
  </footer>
...
```

Listing 4.25 /examples/chapter004/4_3_3/index.html

When you look at the HTML document with the semantic elements, it's probably already much easier to recognize at first glance what has which meaning here. This is just a simple example. Here you can immediately see the header, navigation, sidebar, main content, and footer (see Figure 4.29). This way, the content could perhaps also be placed inside the `main` element in which the individual articles are then summarized using the `article` element.

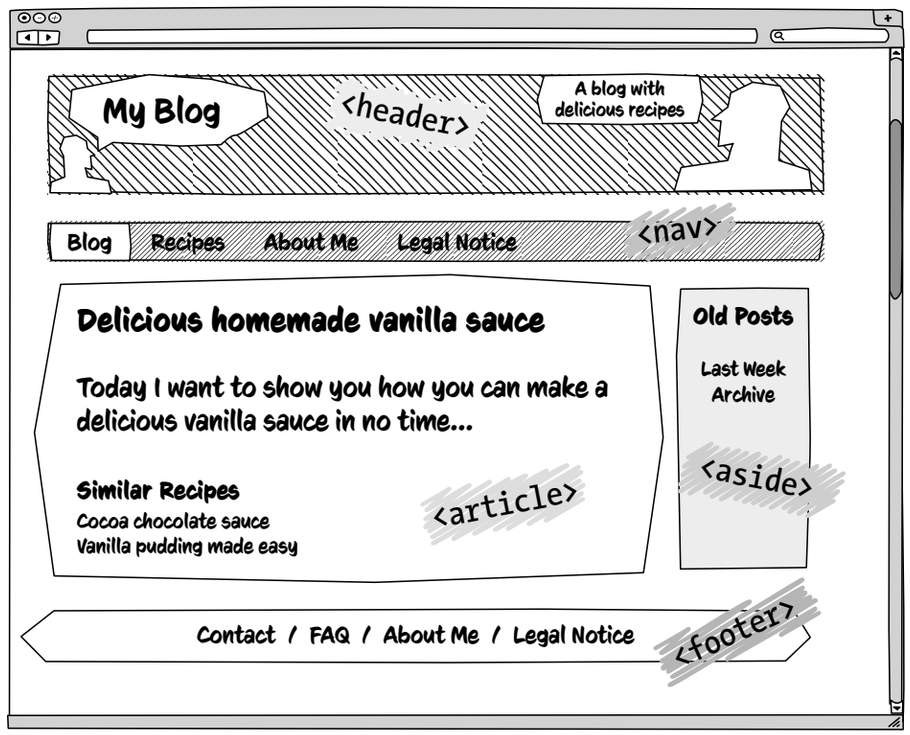


Figure 4.29 Layout Areas Marked with HTML Semantic Elements

The point here isn't at all where you can use exactly which HTML element in detail, but rather that this semantic structuring makes sense, even if you've never heard of new elements such as `nav`, `article`, `header`, `footer`, and so on. The logic here is almost self-evident. It's much easier to see where the navigation, header, or footer is written in this document.

> **The Main Content with <main>**
>
> If you still want to summarize the main content of the web page in `<main>` in the example */examples/chapter004/4_3_3/index.html*, then you should choose the `article` element.

4.3.4 What's the Use of Those Semantic HTML Elements?

If you've carefully followed this section, you've seen that the semantic HTML elements are very useful. Thus, probably one of their advantages is that they make life easier for you as the developer of the website.

For "normal" visitors, these semantic HTML elements don't have much value at first. On the contrary, those visitors won't even be able to distinguish in the web browser whether you've used `div` elements or the semantic HTML elements. However, if, for example, a new smart web browser provides special features that let you get to navigation by clicking a button, the new semantics take on meaning for normal visitors as well.

The situation is different, however, for visually impaired visitors who use a screen reader. A good screen reader could "recognize" the content of the web page based on the new semantic structure and thus jump directly to the content or navigation.

Of course, you shouldn't disregard the search engines at all. For example, you could let the search engine know in a consistent and standardized way where which content is located, so that it assigns a higher ranking to the relevant content of a web page.

4.4 HTML Elements for Text Markups

You apply HTML elements for text markup within plain text for individual letters, words, or parts of sentences. Thus, the described elements don't create a new paragraph or line break, but mark out specific passages in a continuous text according to the semantics defined for the element. You can find all text markups used here in the HTML document */examples/chapter004/4_4/index.html*.

Text Formatting via CSS

Even though many of the elements presented here cause a slight visual change of the text in the web browser, you shouldn't use these HTML elements for text formatting. CSS is responsible for text formatting. These HTML elements rather serve a clean semantic text markup. Thanks to semantic text markup, you can lay the foundation for later text formatting with CSS. If you use sensible text markup in body text, you can later format your text more easily and logically with CSS.

HTML Element	Meaning
`<abbr>`	Marking abbreviations or acronyms.
`<cite>`	Marking text as source text of a working title.

Table 4.4 Brief Overview of the Elements Covered for Text Markups

HTML Element	Meaning
`<code>`	Marking up computer code within a paragraph of text.
`<pre>`	Marking up preformatted text. All spaces and line breaks get displayed as specified in the text.
`<kbd>`	Marking up text as keyboard input.
`<samp>`	Marking up text as screen output of a program.
`<dfn>`	Defining a term.
`<var>`	Marking up text as a variable.
`<bdo>`	Changing the text direction for bidirectional text.
`<bdi>`	Defining a section for bidirectional text.
`<em>`	Highlighting text you would emphasize in spoken language.
`<strong>`	Highlighting words or passages that are particularly important in terms of content.
`<i>`	Marking up words or passages with technical terms, thoughts, and foreign words.
`<b>`	Marking up meaningful names or keywords.
`<mark>`	Highlighting text with a marker.
`<q>`	Marking up words or passages as cited or spoken text.
`<u>`	Marking up text underlined as proper name or incorrect words or passages.
`<s>`	Marking up text as no longer valid or obsolete.
`<ins>`	Marking up text as newly added in the revised sense.
`<del>`	Marking up text as deleted in the revised sense.
`<sub>`	Marking text as subscript.
`<sup>`	Marking text as superscript.
`<time>`	Marking up dates and times
`<small>`	Marking up text as small print, such as for copyright information, licensing information, or legal notes.
`<ruby>`, `<rp>`, and `<rt>`	Specifying Ruby annotations.
`<span>`	Marking up a general section within a paragraph of text.

Table 4.4 Brief Overview of the Elements Covered for Text Markups (Cont.)

4.4.1 Marking Up Abbreviations or Acronyms Using <abbr>

The `abbr` element (`abbr` = *abbreviation*) can be used for abbreviations or acronyms. It's also helpful to use the global HTML attribute `title` in which you write out the abbreviation or acronym so that a web browser can display the full meaning when hovering over it, as you can see in Figure 4.30. This reproduces the code snippet of the following example:

```
...
<p>The <abbr title="world wide web">WWW</abbr> is teeming with
   abbreviations.
</p>
...
```

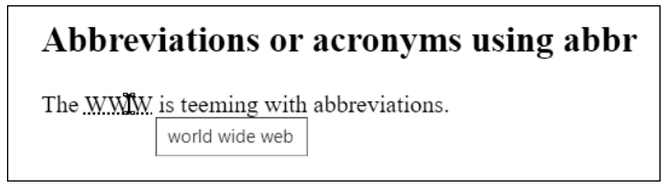


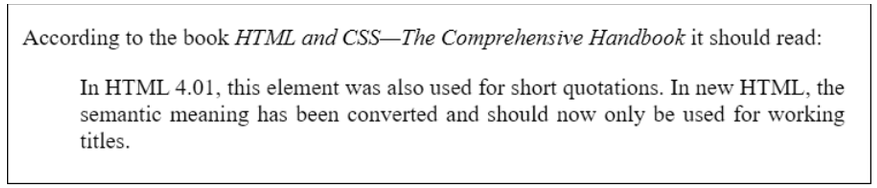
Figure 4.30 The Global "title" Attribute Displays the Meaning of the Abbreviation "WWW" When You Hover the Mouse Cursor over the Word

Anyone who writes abbreviations between `<abbr>` and `</abbr>` is passing useful information to the web browser, language-checking software, translation systems, screen readers, or even the search engines for indexing. The extent to which this information is useful and actually used can't always be predicted. Nevertheless, the `abbr` element is very useful for logical text markup.

4.4.2 Marking Up Text as the Source of a Working Title Using <cite>

You can use the `cite` element when you include the title of a book, movie, painting, piece of music, exhibition, and so on in the body text. However, you should only mark up the working title and not the name or main character of the title. Again, you can usually still use the global HTML attribute `title` to specify more information about the working title when the user hovers over it with the mouse pointer. Most web browsers display everything between `<cite>` and `</cite>` in italics.

```
...
<p>According to the book <cite>HTML and CSS—The Comprehensive
   Handbook</cite> it should read:
</p>
...
```



According to the book *HTML and CSS—The Comprehensive Handbook* it should read:

> In HTML 4.01, this element was also used for short quotations. In new HTML, the semantic meaning has been converted and should now only be used for working titles.

Figure 4.31 In This Example, We Wrote the Working Title of a Book between <cite> and </cite>

4.4.3 Marking Up Computer Code Representation Using <code> and <pre>

You should use the `code` element to indicate computer code within body text. Most web browsers often display this area using a monospace font such as Courier, as shown in Figure 4.32, which renders the following code snippet in the web browser:

```
...
<h2>Computer code with <code>code</code></h2>
<p>The <code>code</code> element does not contain any attributes.</p>
...
```

Figure 4.32 The <code> Element Is Suitable for Marking Up Language Elements or Parts of a Source Code of a Particular Language

If you want to format multiple lines of computer code, you should note the `code` elements in between `<pre>` and `</pre>`. The `pre` element (`pre` = *preformatted*) represents preformatted text. In the section between `<pre>` and `</pre>`, several whitespace characters won't get combined to one space, but everything is output as it was entered in the editor. Because that section is output in a monospace font, the `pre` element is very suitable for outputting source text across multiple lines. This isn't to say that `<pre>` is only suitable for marking up source code. It's therefore recommended that you specify the content between `<pre>` and `</pre>` more precisely with appropriate text markup. So, for source `code`, you should use `<code>`; for keyboard input, `<kbd>`; and for displaying a program output, `<samp>`.

In the following example, the text preformatted between `<pre>` and `</pre>` is output as it was written. Specifying `<code>` and `</code>` between `<pre>` and `</pre>` isn't mandatory, but it makes the text markup even more precise. You can see the following example at execution in Figure 4.33:

```
...
<p>Here is a source code snippet of a C program:</p>
<pre><code>#include &lt;stdio.h&gt;

int main(void)
{
    puts("Hello World!");
    return 0;
}</code></pre>
...
```

Here is a source code snippet of a C program:

```
#include <stdio.h>

int main(void)
{
    puts("Hello World!");
    return 0;
}
```

Listing 1: Hello World in C

Figure 4.33 The Text Preformatted between <pre> and </pre> Gets Output Exactly as It Was Entered

The Masking Characters "<" and ">"

To display < or > characters in HTML that aren't to be used as HTML, the character entities `<` for < and `>` for > were used here.

4.4.4 Keyboard Input Using <kbd> and Program Output Using <samp>

The `kbd` element (`kbd` = *keyboard*) should be used to mark up continuous text as keyboard input. The `samp` element, on the other hand, should be used for the screen output of programs. Most often, these two elements are also rendered in a monospace font (usually Courier) in the web browser, as you can see in Figure 4.34, which shows the following example running in the web browser:

```
...
<p>You can use <kbd>Strg</kbd> + <kbd>A</kbd> to mark up the entire text.</p>
<pre>term#1&gt; <kbd>gcc -o Wall hello hello.c</kbd>
term#1&gt; <kbd>./hello</kbd>
<samp>Hello World!</samp>
term#1&gt;</pre>
...
```


You can use **Strg** + **A** to mark up the entire text.

```
term#1> gcc -o Wall hello hello.c
term#1> ./hello
Hello World!
term#1>
```

Figure 4.34 The Web Browsers Themselves Decide How to Display the Text Between <kbd> and <kbd> for Input or <samp> and </samp>

In Figure 4.34, the `kbd` elements have been made bold, and the `samp` elements have been made gray by using CSS to help you see what has been used where.

4.4.5 Marking Up Text as a Definition Using <dfn>

Text that you write between `<dfn>` and `</dfn>` is supposed to represent a definition. Usually, you mark up a word or a text passage, which you then explain in the text that follows. However, the `dfn` element shouldn't mark up the definition itself, but the defined term. Let's take a look at a simple example:

```
...
<p>A <dfn>smartphone</dfn>—as opposed to a
   cell phone—provides more
   computer functionality and better connectivity.
</p>
...
```

A *smartphone*—as opposed to a cell phone—provides more computer functionality and better connectivity.

Figure 4.35 In this Paragraph Text, the Term "Smartphone" Was Described, Which Is Why It Was Placed between <dfn> and </dfn>

In common practice, you can also use another element such as `<abbr>` inside `<dfn>` and `</dfn>`, as shown in the following example:

```
...
<p>A <dfn><abbr>smartphone<abbr></dfn>—as opposed to
   a cell phone—provides more
   computer functionality and better connectivity.
</p>
...
```

You can also use the global attribute `title` inside the opening `<dfn>` tag. The value of `title` should be the same as the content of the `dfn` element.

4.4.6 Marking Up Text as a Variable Using <var>

You can use the `var` element to mark up the text in between as a variable. Such a variable can be, for example, part of an application, a mathematical expression, or an identifier of a variable in a programming language:

```
...
<p>The radius <var>r</var> is equal to
   half the diameter <var>d</var>.
</p>
...
```

4.4.7 Changing the Text Direction Using <bdo> and <bdi>

The `bdo` element (`bdo` = *bidirectional override*) allows you to change the text direction. This is useful, for example, when you want to display text that is written from right to left (e.g., Hebrew or Arabic). By default, the text is displayed from left to right. To change the text direction, you must use the global HTML attribute `dir`. The attribute value `rtl` makes the text run from right to left, whereas `ltr` makes it run from left to right.

You don't need to put every Hebrew or Arabic word between `<bdo dir="rtl">` and `</bdo>`. When you use Unicode in HTML, the text direction is usually automatically taken into account according to the language, provided you use a Unicode-capable web browser. You should only use the `bdo` element if the correct text direction doesn't work.

To illustrate this, here's a code snippet in which in the first paragraph text—a palindrome for fun—was put between `<bdo>` and `</bdo>`, and the text alignment was changed via the attribute `dir` into the value `rtl` (*right to left*). The second paragraph, on the other hand, displays the Hebrew word "shalom", which usually doesn't require changing the text direction. You can see the result of these lines in Figure 4.36:

```
<p><bdo dir="rtl">Never odd or even</bdo></p>
<p>שלום</p>
```

neve ro ddo reveN

שלום

Figure 4.36 Example Executed with <bdo>

The situation is different in the following HTML lines:

```
<p>1: السلام عليكم(as-salaam alaykum)</p>
<p>2: שלום(shalom)</p>
<p>Howdy: 3</p>
```


The first two examples would probably not lead to the desired result here. Although `as-salaam alaykum` in Arabic and `shalom` in Hebrew are correctly written from right to left, the following colon and number have been given a different writing direction. Originally, this was supposed to look like the third paragraph with `Howdy`.

Here, the writing behind the Arabic characters continued from right to left, so that the colon and the number behind it also retained the writing direction. Only the translation of the Arabic or Hebrew meaning was reproduced in the correct place.

To be on the safe side, the `bdi` element (`bdi` = *bidirectional isolation*) was introduced for this purpose. Using the `bdi` element, you can mark up the boundaries of text direction changes in a Unicode-enabled web browser more accurately. Thus, in the preceding example, you only need to put the Arabic or Hebrew characters between `<bdi>` and `</bdi>`.

After that, it looks as shown in Figure 4.37:

```
<p><bdi>السلام عليكم</bdi>: 1 (as-salaam alaykum)</p>
<p><bdi>שלום</bdi>: 2 (shalom)</p>
<p>Howdy: 3</p>
```

السلام عليكم: 1 (as-salaam alaykum)

שלום: 2 (shalom)

Howdy: 3 (greetings in the rural Southern United States)

Figure 4.37 Thanks to the Containment of the Arabic and Hebrew Script between <bdi> and </bdi>, the Colon and the Decimal Number Now Display after the Script

4.4.8 Emphasizing Text Using , , <i>, and <b>

To emphasize text, you can use either the `em` element (`em` = *emphasis*) or the `strong` element. The `em` element should be used for words or passages that you would emphasize when speaking.

If you want to bring a word or passage more into focus, you should use the `strong` element. In contrast to the `em` element, the `strong` element is used to mark certain places in the text with a special signal or warning effect. The `strong` element should definitely be used for words or passages that are particularly important in terms of content.

Let's take a look at the following example:

```
...
<p><em>Bear</em>! Who the hell is this <em>Bear</em>!</p>
<p><strong>Caution!</strong> <em>Bear</em> could be standing behind you!</p>
<p><strong>Delivery date in <strong><em>summer 2022</em></strong></strong></p>
...
```

In this example, it's semantically clear from the emphasis on `bear` in the first paragraph in Figure 4.38 that it isn't the animal that is referred to here, but a person with the surname "Bear". In the second paragraph, the word `Caution!` was marked with a special importance. In the last paragraph, an `em` element was nested within a `strong` element to emphasize `summer 2022` more strongly in terms of content in addition to its particular importance.

Bear! Who the hell is this *Bear*!

Caution! *Bear* could be standing behind you!

Delivery date in *summer 2022*

Figure 4.38 Different Ways to Emphasize or Highlight a Text Using and

Here, you could also still nest the same HTML elements to increase the emphasis or importance of `em` or `strong` elements, at least semantically.

Because web browsers usually render `<em>` with italic and `<strong>` with bold font, you shouldn't make the mistake of replacing these elements with `<i>` and `<b>`, respectively, because these elements (i.e., `<em>` and `<i>` or `<strong>` and `<b>`) are rendered quite similarly in the web browser. As mentioned at the beginning, HTML isn't used to format the text, but these HTML elements are about giving the text a meaningful significance.

The `i` element is recommended to mark special technical terms, a thought, scientific names, or foreign language words. The `b` element, on the other hand, should be used for meaningful names or keywords to draw attention to something.

Using <i> and <b>

Standard HTML recommends using the `b` or `i` elements only if no other HTML tag fits to mark up the text or passage. The days when these elements were used purely for formatting are over because CSS is used for that purpose.

4.4.9 Highlighting Text Using <mark>

You should use the `mark` element to mark up words or passages in a continuous text. The easiest way to compare such a markup is with a highlighter. In practice, this HTML element should be suitable for visually highlighting the search term found during a search. This works only if the content is generated dynamically. The element is also very suitable for highlighting code fragments of a source code.

The following code snippet demonstrates the `mark` element whose execution is shown in Figure 4.39:


```
...
<p>In 2021, profits have increased by
   <mark>100 percent</mark>.
</p>
<p>Here is a source code snippet of a C program:</p>
<pre><code>#include &lt;stdio.h&gt;

int main(void)
{
    <mark>puts("Hello world!");</mark>
    return 0;
}</code></pre>
...
```

In 2021, profits have increased by 100 percent.

Here is a source code snippet of a C program:

```
#include <stdio.h>

int main(void)
{
    puts("Hello world!");
    return 0;
}
```

Figure 4.39 Web Browsers That Recognize the New Element Usually Mark the Text Placed between <mark> and </mark> with Yellow Background Color

Even though the `mark` element predominantly applies yellow background color to the text, you shouldn't use it to apply a background color to a text. You should rather use `<mark>` only if it makes sense in terms of content and no other semantic HTML element is suitable. If you want to format the text background, you should use the `span` element (Section 4.4.17) with CSS instead.

4.4.10 Placing Text between Quotes Using <q>

While you can use the `blockquote` element to quote an entire paragraph text, the `q` element allows you to quote something in the middle of the text or mark it as spoken text. Text or passages you insert between `<q>` and `</q>` should be placed between quotes by the web browser. You shouldn't use the `q` element if you simply want to enclose a word or passage in quotation marks. That wouldn't be the semantic sense of the `q` element.

If you use a quote or spoken text from another source, you can use the `cite` attribute with a URL to the source. Because the implementation of the `cite` attribute is still poor in web browsers, you may want to consider using a hypertext link.

You can also nest the q element. Such nested q elements usually get another matching quotation mark. In this country, for example, the outer quotation marks are double and the inner ones are single. This is demonstrated in the following example, the execution of which you can see in Figure 4.40:

```
...
<p>Wolf asked: <q cite="http://tom-bear.com/">
   <em>Bear</em>! Who the hell is this <em>Bear</em>!</q>
</p>
<p>Fox replied: <q>Caution! <q><em>Bear</em></q> could be
   standing behind you!</q>
</p>
...
```

As you can see in Figure 4.40, this example quoted spoken text in the first paragraph. The second paragraph demonstrates the nesting of q elements. The inner q element was placed between single quotes and the outer one between double quotes.

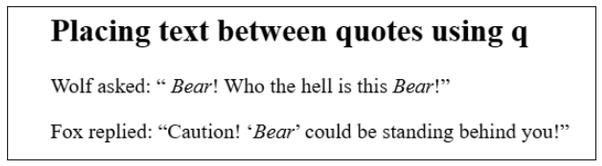


Figure 4.40 Placing Text between Quotes Using the <q> Element

For Advanced Users: Setting Custom Quotation Marks

The problem with the q element is that the quotes set by the web browser may not always be the ones you want. In this case, an intervention with CSS is a good idea. Thus, the following CSS line could be used to change the first and second nested characters of the q element:

```
q {quotes: '»' '«' '›' '‹';}
```

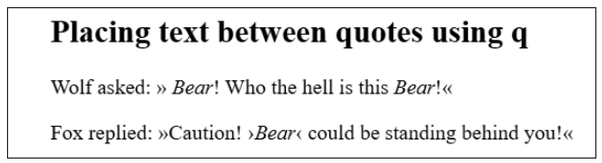


Figure 4.41 The Quotes of the <q> Element Have Been Changed with CSS

4.4.11 Underlining or Crossing Out Text Using <u> and <s>

Both the u element (u = *underline*) and the s element (s = *strikethrough*) were marked as deprecated with HTML 4.01 and were supposed to be removed from the standard. With

the new HTML standard, they have acquired a new semantic meaning and are thus again an official part of HTML.

You should use the s element to mark content as obsolete or no longer correct. The web browsers display the text between <s> and </s> as strikethrough. If you want to display a document edit where you want to mark a word or passage from the not yet finished document as deleted, you should use the del element instead.

According to its new meaning, the u element is to be used for underlining proper names, as is common, for example, in Chinese writing (see *http://en.wikipedia.org/wiki/Proper_name_mark*). Most readers are unlikely to use Chinese proper names, so another recommended example of the u element is to knowingly indicate misspelled words or passages containing errors. Web browsers usually display the u element with an underscore. In addition to the u element, there's the ins element, which is also rendered as underlined but is intended to indicate newly inserted content (Section 4.4.12).

Here's a short example, the execution of which you can see in Figure 4.42:

```
...
<p>You can place a text in the middle with
   <s><code>&lt;center&gt;</code> or</s> the
   CSS feature <code>text-align</code> and the value
   <var>center</var>.
</p>
<p>我来自
<u>德国
</u>。= I am from Germany.</p>
<p>Also, <u  class="spell-checker">spellig errors</u>
   can be marked with it.
</p>
...>
```

As you can see in Figure 4.42, in the first paragraph text, the content or was crossed out. In the second paragraph text, a Chinese proper name (Germany = 德国) is underlined. Finally, in the final paragraph, a spelling error was underlined with a red dashed line. The color changes and the style of the underline were adjusted with CSS in the example.

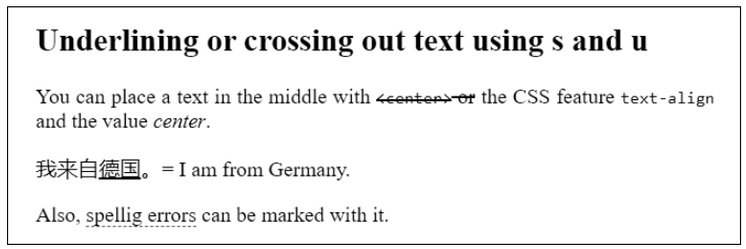


Figure 4.42 Underlining or Crossing Out Text Using <u> and <s>

In any case, it's important that you use both elements for their intended content and not for text decoration. If you want to underline or strike through text for purely decorative reasons, you should use CSS to do so.

4.4.12 Marking Changes of Text Using <ins> and <del>

The `ins` element is rendered by web browsers similar to the `u` element, while the `del` element is rendered similar to the `s` element. Nevertheless, the semantic meaning of the two elements is different and therefore not interchangeable.

The `del` element (`del` = *delete*) allows you to mark a content-related (active) editing of a text as deleted in the revised sense. It's used to inform readers that this part has been revised or further developed. Instead of removing the text completely, you want to make sure that the previous versions of the text remain visible. The web browser usually crosses out this text.

The `ins` element (`ins` = *insert*) is the counterpart of the `del` element and should be used when something new gets inserted into the document. Here again, you mark a further development of the previous version of the text. The web browsers usually display this text with an underscore.

You can see the execution of the following example with the elements `del` and `ins` in Figure 4.43.

```
...
<del>
  <p>The singer performs on 1/1/2024 in the concert hall!</p>
</del>
<ins>
  <p>The concert was canceled,
     because the singer is sick!</p>
</ins>
...
```

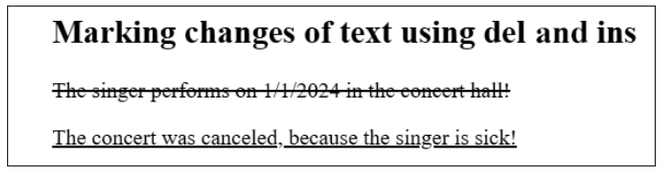


Figure 4.43 The <del> Element Used to Delete a Paragraph Text and Insert a New Paragraph with a New Message between <ins> and </ins>

Again, you should use the `del` and `ins` elements only if they fit the semantics. If you want to cross out or underline the text in a purely decorative way, CSS should be the first choice.

Text Underline Can Be Confusing!

The frequent use of underscores with `<ins>` or `<u>` may confuse the user because hypertext links with `<a>` are usually also represented with an underscore. It's therefore also recommended to change the formatting with CSS, so that the individual elements are displayed in a clearly distinguishable manner.

4.4.13 Displaying Text as Superscript or Subscript Using <sup> and <sub>

These two markups are mainly used for simple mathematical and chemical formulas to lower text with the `sub` element (`sub` = *subscript*) and to raise it with the `sup` element (`sup` = *superscript*).

Here's a code snippet as an example, the execution of which you can see in Figure 4.44:

```
...
<p><sup>[1]</sup> Reaction scheme: 2 H<sub>2</sub>O
   &RightArrow; 2 H<sub>2</sub> + O<sub>2</sub></p>
<p><sup>[2]</sup> Calculate circular area: A = &pi; * r
   <sup>2</sup></p>
...
```

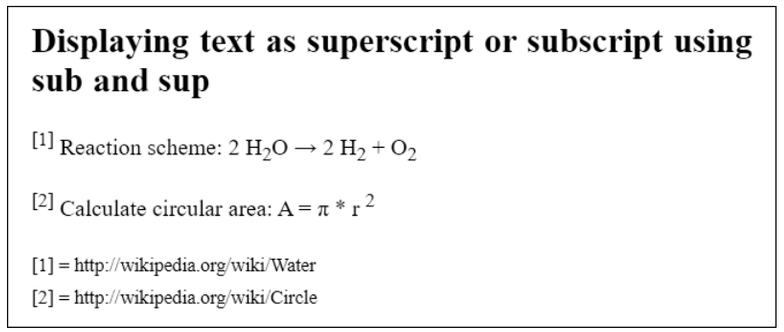


Figure 4.44 The <sub> and <sup> Elements Were Used Several Times for Superscript and Subscript Numbers and Footnotes, Respectively

4.4.14 Marking Dates and Times Using <time>

The `time` element was introduced to mark up dates and times. When displayed in a web browser, text placed between `<time>` and `</time>` is usually not visually noticeable at all. The goal and purpose of the `time` element is rather that date and time are uniquely coded for machines and can also be displayed in a readable way for humans. You can specify the machine-readable form in the HTML attribute `datetime`, while the human-readable form is usually written between `<time>` and `</time>`. Here's a brief example:

```
...
<p>We met on my <time datetime="2023-11-12">
   44th birthday</time> at <em>Bear's place</em>.
   <time datetime="20:00">at 8 pm.</time>
</p>
...
```

The specification `44th birthday` can be any other text such as *Wednesday* or *November 12* as long as the value of `datetime` is a precise date of the Gregorian calendar. The same applies to the time `at 8 pm`.

Valid Machine-Readable Date and Time Information

A date readable by machines is specified as YYYY-MM-DD. YYYY is the year (e.g., 2023), MM is the month (e.g., 11 for November), and DD is the day in the month (e.g., 12). If you also want to note the time, you must place a capital `T` between the date and the time and then enter the time behind it in the form HH:MM where HH stands for hours and MM for minutes. In a newer version of `time`, this `T` can be omitted and a space can be used instead. Optionally, you can specify the time zone offset from UTC (*Coordinated Universal Time*). UTC is a designation for Universal Time. Here, you must specify a + followed by HH:MM, for example:

```
2023-10-10T21:00+01:00
```

For this example, you enter October 10, 2023, as the date. The time is exactly 9 pm, and the +01:00 at the end means UTC + 1 hour. Many other different forms of presentation are possible in this context. For more information, you should visit *www.w3.org/TR/2011/WD-html5-20110525/text-level-semantics.html#the-time-element*. For further and future developments of the `time` element, you may find the following website useful: *http://wiki.whatwg.org/wiki/Time_element*.

Alternatively, you can specify the date, time, and time zone (if needed) in `datetime` at once:

```
...
<p>We met on my
   <time datetime="2023-11-12T20:00+00:00">44th birthday
   </time> at <em>Bear's place</em> at 8pm.
</p>
...
```

So, if you use a valid `datetime` attribute with the `time` element, you can write whatever you want between `<time>` and `</time>`. *Without* specifying the `datetime` attribute, you *must* specify a valid date format and/or a valid time format—that is, the machine-readable version—between `<time>` and `</time>`, such as the following:


```
...
<p>We met on <time>2023-11-12</time> at <em>Bear's place</em>
   at <time>20:00</time>
</p>
...
```

The `time` element has been improved and made much more flexible over time after its first release. For example, the following specifications are also possible:

```
...
<p>On every <time datetime="11-12">birthday</time>
   I got flowers.
</p>
...
```

This refers to November 12. Another option would be to specify the following for `datetime` if you don't remember the exact day of the date:

```
<p>The concert in the photo was recorded sometime in
   <time datetime="2023-08">August</time>
   this year.
</p>
```

Here, a date in August 2023 is meant. It's possible to use only the year (e.g., `datetime="2023"`).

Another improvement is that you can use a time duration. Here's an example of how such a duration is represented:

```
<p>the rock festival lasted <time datetime="P3D">3
   days</time>.
</p>
```

The letter `P` stands for *period*, the `D` for *day*, and the `3` for three days. You can still specify a time period from a combination with `H` for *hours*, `M` for *minutes*, and `S` for *seconds* (e.g., `datetime="P1D5H10M"` = 1 day, 5 hours, and 10 minutes).

Here's What Doesn't Work (Yet)!

It isn't yet possible to specify a time before Christ (BC), neither can you specify a time period based on two date ranges. For this purpose, you still need to use two `time` elements.

What Should I Use <time> for in Practice?

If you use the `time` element, it will be easier for other programs to index this data. For example, it's easier for a script in blog articles to extract the date using the `time` element, rather than using any other techniques to look for and read this data. By having the date and/or time information in a machine-readable form, there's the advantage for search engines to make use of it when searching for items of a certain period or date.

If you then also use the `datetime` attribute, you can provide readers with a reader-friendly alternate display between `<time>` and `</time>`. Basically, you should put a (readable) date and/or time between `<time>` and `</time>` because the web browser won't display an automatic value in between if you don't put anything there.

Another possibility is that future web browsers provide the option to enter a date into the calendar at the request of the visitor. In addition, the web browser could convert the time used into the visitor's time zone if the appropriate value was specified with `datetime`. And he could convert the season according to the Buddhist time calculation, which is valid, for example, in Thailand or Laos.

In Figure 4.45, you can see again all `time` elements described and used here. I underlined the places where `<time>` was used with a dotted line using CSS for better visibility. Here, the date on which the article was written was additionally indicated behind the article title. To use the `time` element in a semantically correct way, the specification of an exact time must be used and observed. For example, you should avoid the following incorrect usage:

These are the results from `<time>last week</time>`.

Figure 4.45 To Clarify What Is between <time> and </time>, a Dotted Underline Has Been Added

4.4.15 Marking the Small Print Using <small>

You should use the `small` element for words or text passages in which you want to display some small print. This can be copyright information, license information, legal notes, and so on.

Here's a short code snippet with the `small` element; its execution is shown in Figure 4.46.

```
...
<article>
  <header>
    <h2>Small print with small</h2>
    <small>&copy; John Doe;
    <time datetime="2024-01-01">January 1, 2024</time></small>
  </header>
  <p>The shipment can be delivered in <time datetime="P2D">2 days</time>.
     <small>(Due to high demand
     it can also take longer (+1 day)).</small>
  </p>
</article>
...
```

Again, you should use this element only if it semantically fits the content and not to make text look smaller. For visual adjustments, you should use CSS.

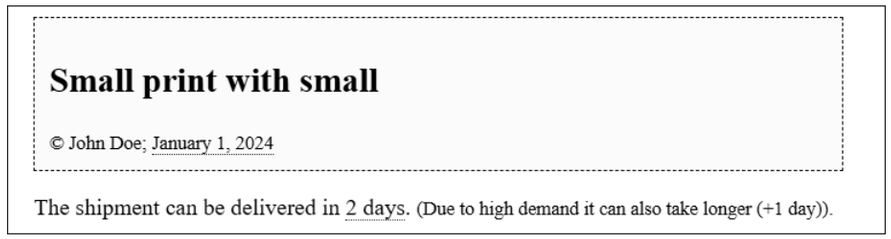


Figure 4.46 A Copyright Was Placed in the Head of an Article as well as Small Printed Information between <small> and </small>

4.4.16 Using <ruby>, <rp>, and <rt> for Annotations about Pronunciation

The Ruby annotation is probably of little interest to most readers. This is an annotation system in which the text appears with the annotation in one line, as used in Japanese and Chinese texts. If you want to know more about this notation, see *https://en.wikipedia.org/wiki/Ruby_character*.

Here, we'll only briefly describe the use of the Ruby annotation with the existing HTML elements. For this purpose, here's a simple example in which Asian characters have been omitted:

```
...
<p>
  <ruby>
    LOL<rp> (</rp><rt>Laugh Out Loud</rt><rp>)</rp>
  </ruby>
</p>
...
```

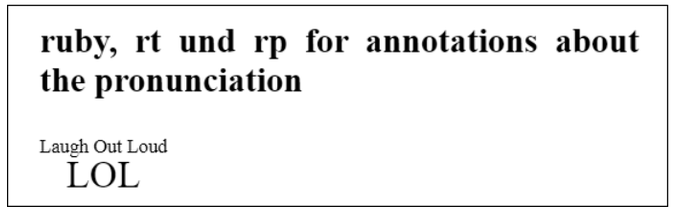


Figure 4.47 The Text between a Ruby Annotation Is Displayed as Text with Annotation in One Line

The example features `LOL` with annotations (which is nonsense here, of course). All characters, including annotations, are written between `<ruby>` and `</ruby>`. Then the character is noted as element content (here: LOL). The parentheses of the annotations are created with the (optional) `rp` element (`rp` = *Ruby parenthesis*). The text is then marked with the `rt` element (`rt` = *Ruby text*). Thus, the annotation is written between `<rt>` and `</rt>`.

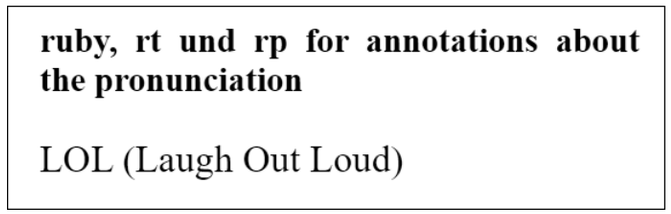


Figure 4.48 The Optional <rp> Element Is Used to Put Parentheses around the Ruby Text (with the <rt> Element) for Web Browsers That Don't Understand <ruby>

Web Browser Support for <ruby>

Web browser support in current web browsers is now quite good. In some web browsers, however, an add-on may need to be installed.

4.4.17 Grouping Ranges of Individual Text Passages Using

While you can use the `div` element (Section 4.2.7) to group entire groups into one block, you can use the `span` element to mark up individual passages of text inside the body

text with CSS. Visually, text placed between `<span>` and `</span>` doesn't change at all. In addition, the `span` element in conjunction with a JavaScript is quite useful when searching for global attributes used within it to directly update the element content. Here's a rather theoretical example:

```
<p>Current temperature <span id="temp">64</span> F</p>
```

Here, you could use a JavaScript to read the global `id` with the value `temp` and further process or update the element content. Let me also show you this CSS example:

```
<p>Formatting with <span style="text-decoration:overline;">
   CSS</span> and the span element.</p>
```

Here, the text is preceded by a stroke that has been implemented via style statements directly in the HTML tag `span` with the HTML attribute `style`.

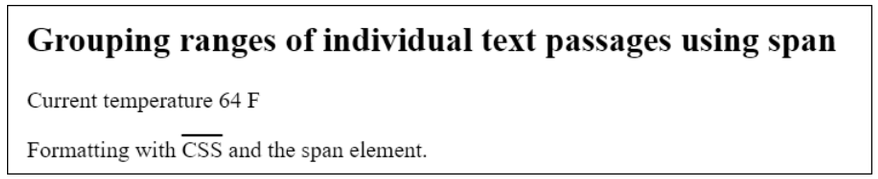


Figure 4.49 The Element Has No Default Formatting; Besides Designing with CSS, It Can Also Be Used to Identify Unique Elements.

However, as with the `div` element, you should only use this element if there's no semantically more suitable HTML element available.

Example of All Text Markup Elements

Once again, note that you can find an example with all the text markup elements demonstrated here on the web page for the book (*www.rheinwerk-computing.com/5695/*) and at *https://html-examples.pronix.de/examples/chapter004/4_4/index.html*.

4.5 Related Topic: Character Encoding

What follows here isn't a treatise on character encoding in general, but rather in the context of HTML documents—especially on how you can avoid special characters, such as German umlauts, from getting displayed as cryptic characters. If you consider the following two points, there shouldn't be any problem:

- In the HTML document, you need to specify the character encoding of the document in the head data between `<head>` and `</head>`, as we've been doing in the book so far with `<meta charset="UTF-8">`. Unless you have a specific reason, you should always use the `UTF-8` value for the `charset` attribute.

- However, it doesn't suffice to specify the character encoding in the HTML document as it must also be saved in this encoding using the editor of your choice. Consequently, if you've specified UTF-8 as the character encoding in the HTML document, you must also save the document with the UTF-8 encoding. With most editors, you no longer have to bother about this. Nevertheless, it should be briefly mentioned here.

4.5.1 From Bytes to Character Encoding

The smallest unit, the bit, will be skipped here because you don't need to go so deep into detail at this point. The byte unit is quite sufficient for this purpose. When the computer reads a file or data into the main memory, it's basically just bytes that have a certain value. The value of a single byte results from the states of the individual bits. Let's use a byte with the value 68 (incidentally, with the bit value 1.000.100) as an example.

To create a human-readable character from this byte with the value 68, a convention is needed that describes which byte value corresponds to which representable character. For this purpose, a translation table (also referred to as encoding table) is used for encoding bytes.

4.5.2 From ASCII to ISO-8859

You know that an encoding table is responsible for turning a byte into a readable character. The first type of such a character set was introduced with the ASCII encoding and the EBCDIC encoding, with which 128 different states can be represented on 7 bits. ASCII encoding has become established in common practice. In the ASCII encoding table, the first 32 characters are pure control characters, and the actual characters are stored in the character set between 32 and 127. A look at the ASCII encoding table shows that the value 68 corresponds to the capital letter D.

The 8th bit was initially used only for error-correction purposes (parity bit) for communication lines or other control tasks. Because there was no space left in the ASCII character set between the values 32 and 127 for language-specific characters (e.g., umlauts), the 8th bit was used to extend the character set. At this point, the Babylonian character confusion also arose because different developers wrote their own "8th-bit-codes." IBM PCs and English MS-DOS systems used codepage 435, for example. In Germany, codepage 850 was used for Western European characters.

Newer standards such as ISO-8859 also use 8 bits. Here, several character set tables were developed at once. For example, ISO-8859-1 (or Latin-1) represents the Western European languages. The first 127 characters were taken over from the ASCII encoding. In the

values between 128 and 255, many special characters and important characters from different European languages were implemented (with the German umlauts, the Spanish tilde character, or the French accent characters).

So, theoretically, you can use the ISO-8859-1 character set for the HTML document:

```
<meta charset="iso-8859-1">
```

While in theory, you can use any character set for `charset`, you should keep in mind that not every web browser understands all character sets. If you use a more widely used character set, you have a better chance that a web browser in distant countries will be able to do something with it.

Microsoft had also added its own variation to the ISO-8859-1 encoding with codepage 1252. After all, code page 1252 already contained the euro sign. ISO-8859-1, on the other hand, doesn't recognize the euro sign because at the time this table was created, the euro didn't even exist. The euro sign was added by the ISO only later with ISO-8859-15. Now the situation here is that ISO-8859-1 doesn't recognize the euro sign, while ISO-8859-15 and codepage 1252 do know it, but the value in the encoding table is again different. Fortunately, today you don't need to deal with the different character sets of a language. The description of the ISO 8859 standards here serves only as background information on the subject.

The current HTML specification uses the Unicode UTF-8 character set with `charset="UTF-8"`.

4.5.3 Beyond the Byte Boundary with Unicode

The preceding provided a good impression of the confusion regarding the different character encodings. Note, however, that this was only about the Western European character set, and I haven't really gone into detail yet. The fact is that character encoding can be relatively complex if you pack everything into a byte and then want to use different characters from different cultures. To bring all characters under one hood, the Unicode system was introduced.

The Unicode character set can be used to represent all human-made characters. In purely theoretical terms, more than four billion characters could be used with 32 bits per character—in practice, Unicode is limited to about one million code points. UTF-8 is the 8-bit encoding of Unicode, which is also backward compatible with ASCII encoding. A character can contain between one and four 8-bit words. UTF-8 is now a uniform standard. For example, many operating systems use UTF-8 by default, and UTF-8 is also being used increasingly in web development with HTML to represent language-specific characters, where it more and more replaces the use of HTML entities (Section 4.6).

More Information Online

I could write much more on this topic, especially Unicode, but this would go beyond the scope of this book. For more information, visit *http://r12a.github.io/scripts/tutorial/* and *https://home.unicode.org/*. You can also find the characters of the Unicode encoding at *www.unicode.org/charts/*.

4.6 Character Entities in HTML

While the importance of character entities in HTML has diminished considerably with the gradual spread of Unicode (especially UTF-8), I should still touch on them briefly here because there are always reasons to use them. In Section 4.5, you learned about different character sets, and, by now, you know how to specify the character set used as a `<meta>` tag in the HTML document head with `charset`. For example, if you've specified ISO-8859-1 or ISO-8859-15 as the character set and want to use the word shalom (=שלום) in Hebrew characters, you're likely to be unsuccessful:

```
<meta charset="iso-8859-1">
  ...
<p>Shalom: שלום</p>
```

The output is likely to be a cluster of cryptic characters instead of שלום. The simplest solution would be to change the character set to UTF-8 via

```
<meta charset="UTF-8">
```

There might also be a different problem with this example: How do you type the word שלום in your editor? If you don't happen to have a Hebrew keyboard in front of you or a virtual keyboard with Hebrew characters, the simple and quick solution might be to use the character entities of HTML. This is how you write the word "Shalom" in Hebrew using character entities:

```
<p>Shalom: <bdo>&#1501;&#1503;&#1500;&#1513;</bdo></p>
```

4.6.1 Structure of a Character Entity in HTML

As you've seen before from the four Hebrew characters, an HTML entity starts with the `&` character and ends with the semicolon. Now you have two options to arrange the sign:

- **Numeric entities**
  You specify the form with `&#`**nnn**`;`. Here, **nnn** stands for the encoding of the character. This form is used when it isn't possible to enter the character via the keyboard. The notation can also be in the form of `&#`**xhhh**`;`, where **xhhh** is the hexadecimal value for the character. The notation without **x** is the decimal notation.
- **Named entities**
  This is an easier-to-remember name that has been agreed on for the character. You may have already seen examples with `<` (`lt` = *less than*) or `>` (`gt` = *greater than*) where people prefer to use these named entities. Alternatively, you can use the numeric entity instead of the named entities. For example, with `<`, `&#60;`, and `&#x003C;`, you would use the < sign (less-than sign) three times.

Masking HTML-Specific Characters

Especially if you use special characters in your body text that are part of the HTML syntax, you should mask these characters by using the appropriate entity. For example, the following line is likely to cause display problems in a web browser:

```
<p>Mexico City<Tokyo and Mumbai>London</p>
```

The web browsers would only output `Mexico City-London` here, because the area between < and > is considered an HTML element (even if it's wrong). Although you could solve this problem with a blank line in between, you should use the appropriate entity for this, to be on the safe side. This is where the named entity comes in handy:

```
<p>Mexico City&lt;Tokyo and Mumbai&gt;London</p>
```

The ampersand character & belongs to it as well and should be used via the string `&` in the continuous text.

In addition, if you want to use the double quote within HTML attributes, you should replace " with `&quot;`, such as the following:

```
<img src="#" alt="Cover of book &quot;CSS from A to Z&quot;">
```

In the `alt` attribute, `&quot;` was used as a masking character for ". If you used " instead of the named entity `&quot;` here, the area in between would probably be "swallowed" by the web browser.

More Unicode Numbers

You can find even more Unicode numbers for a desired character at *www.unicode.org/charts*.

4.7 Summary

In this chapter, you learned a lot about the semantic use of various HTML elements. Roughly summarized, you've learned the following in this chapter:

- How to use the `<section>`, `<article>`, `<aside>`, and `<nav>` elements to divide an HTML document into meaningful parts (or sections)
- How to use headings with the elements `<h1>` to `<h6>` and the new section elements `<section>`, `<article>`, `<aside>`, and `<nav>` to affect the content structure of headings
- How to use a header with `<header>` and a footer with `<footer>` in an HTML document
- How to use the `<main>` element to set the main content of a web page
- Which HTML elements are available to divide or group plain text content into paragraphs
- What semantic HTML is and how you can structure a semantic web page
- How to logically mark up text, individual letters, words, or parts of sentences to give them semantic meaning
- That the HTML elements for text markup aren't used for formatting web pages, but that this is done via CSS

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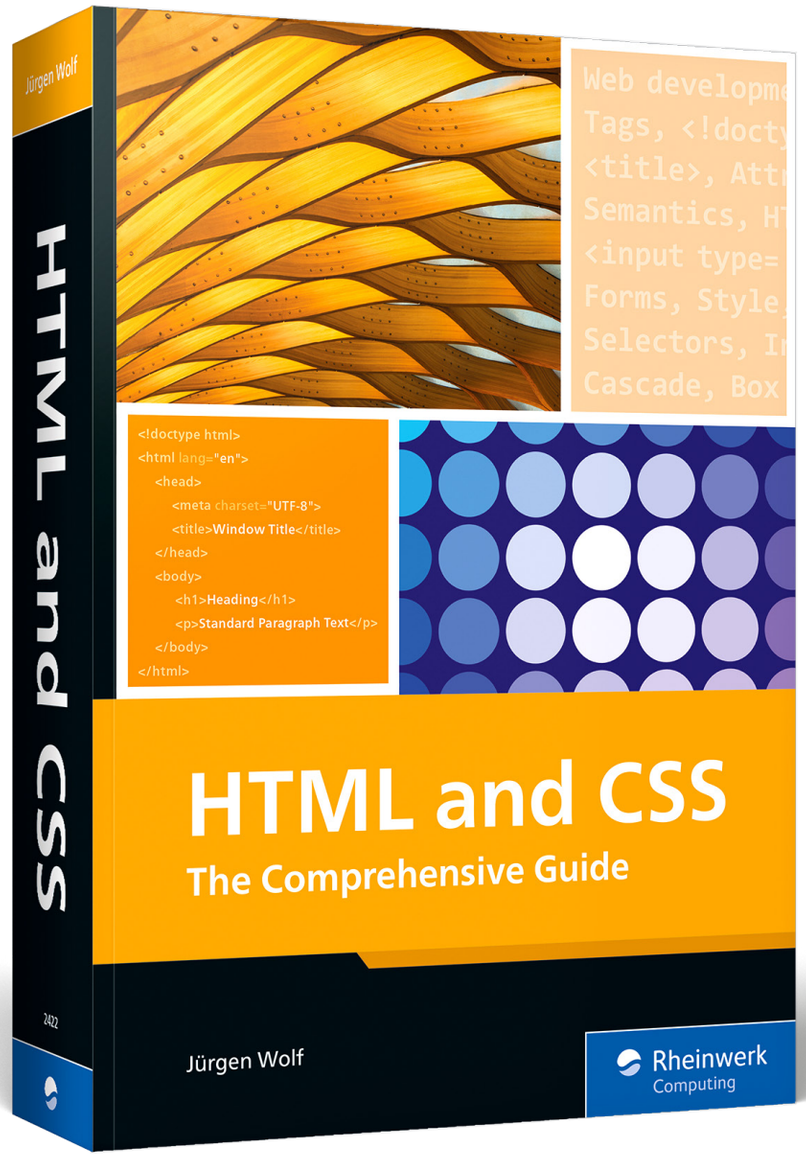

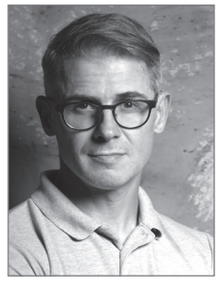

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