

1 HTML introduction

1.1 What is HTML?

HTML is the standard markup language for creating Web pages.

- HTML stands for **H**yper **T**ext **M**arkup **L**anguage.
- HTML describes the structure of Web pages using markup.
- HTML elements are the building blocks of HTML pages.
- HTML elements are represented by tags.
- HTML tags label pieces of content such as “heading”, “paragraph”, “table”, and so on.
- Browsers do not display the HTML tags, but use them to render the content of the page.

Example 1.1. A simple HTML *code* (structure) is given below:

```
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
</head>
<body>

<h1>My First Heading</h1>
<p>My first paragraph.</p>

</body>
</html>
```

Each command is explained below:

- The `<!DOCTYPE html>` declaration defines this document to be HTML5.
- The `<html>` element is the root element of an HTML page.
- The `<head>` element contains meta information about the document.
- The `<title>` element specifies a title for the document.
- The `<body>` element contains the visible page content.
- The `<h1>` element defines a large heading.
- The `<p>` element defines a paragraph.

1.2 HTML tags

HTML *tags* are element names surrounded by angle brackets `< >`:

```
<tagname>content goes here...</tagname>
```

Here are a few things about tags:

- HTML tags normally come in pairs like `<p>` and `</p>`.
- The first tag in a pair is the start tag, the second tag is the end tag.
- The end tag is written like the start tag, but with a forward slash inserted before the tag name.

The start tag is also called the *opening tag*, and the end tag the *closing tag*.

1.3 Web browsers

The purpose of a *web browser* (Chrome, IE, Firefox, Safari) is to read HTML documents and display them. Hence you expect that different browsers have different functionalities and peculiarities.

The browser does not display the HTML tags, but uses them to determine how to display the document:

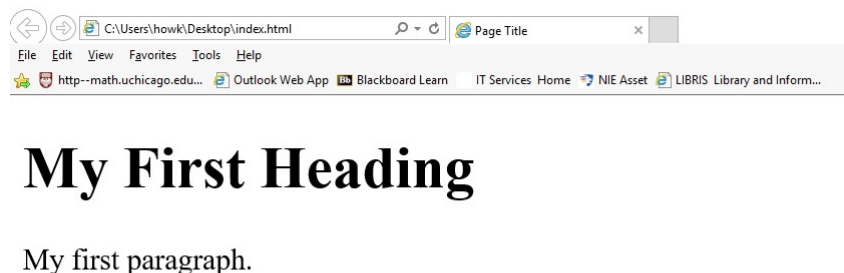


Figure 1: Simple web page

1.4 HTML page structure

Below is a visualization of an HTML page structure:

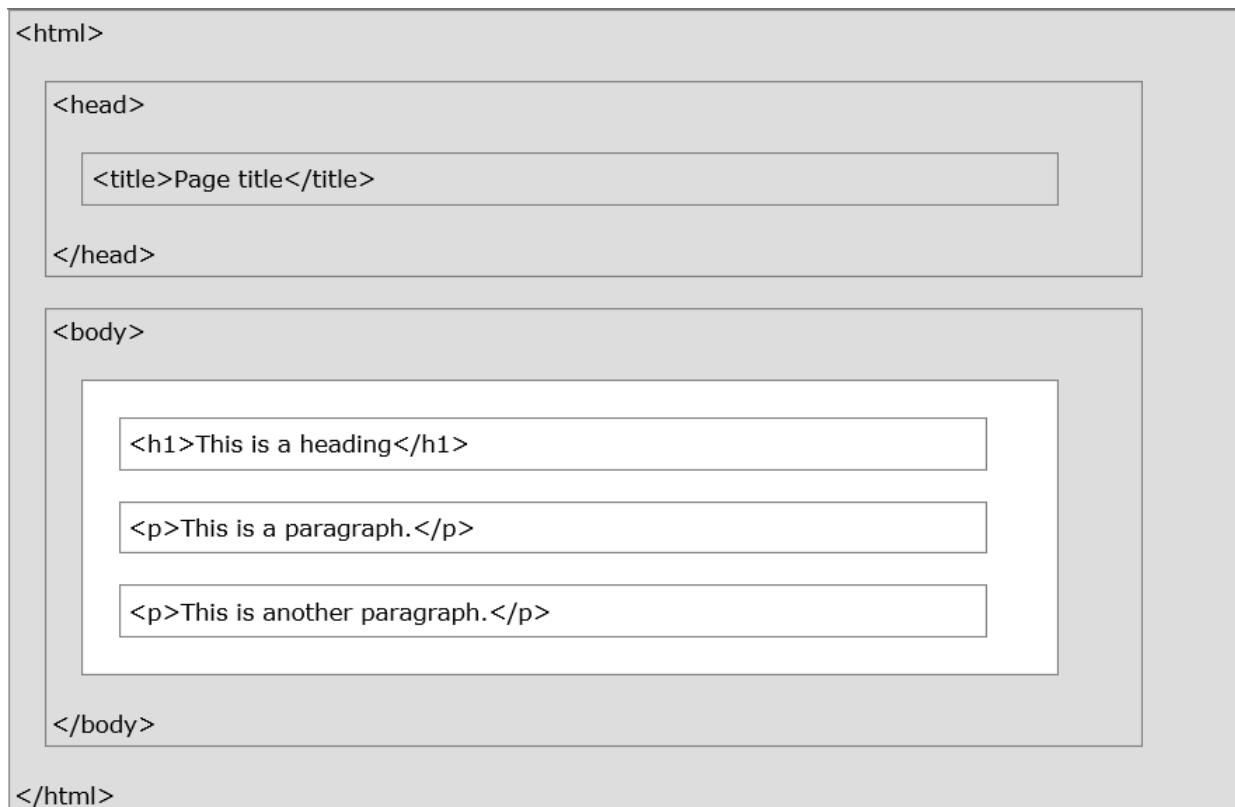


Figure 2: HTML page structure

Remark 1.2. Only the content inside the `<body>` section (the white area above) is displayed in a browser.

1.5 The `<!DOCTYPE>` declaration

The `<!DOCTYPE>` declaration represents the document type, and helps browsers to display web pages correctly.

It must only appear once, at the top of the page (before any HTML tags).

The `<!DOCTYPE>` declaration is not case sensitive.

The `<!DOCTYPE>` declaration for HTML5 is:

```
<!DOCTYPE html>
```

1.6 HTML versions

Since the inception of the web and internet, many versions of HTML have since evolved:

Version	Year
HTML	1991
HTML 2.0	1995
HTML 3.2	1997
HTML 4.01	1999
XHTML	2000
HTML5	2014

Table 1: Evolution of HTML

2 HTML editors

2.1 Write HTML using Notepad or TextEdit

Web pages can be created and modified by using professional HTML editors.

However, for learning HTML we recommend a simple text editor like Notepad (PC) or TextEdit (Mac).

We believe using a simple text editor is a good way to learn HTML.

Follow the four steps below to create your first web page with Notepad or TextEdit.

We proceed step-by-step for both Notepad and TextEdit.

2.1.1 Step 1: Open your editor

Step 1: Open Notepad (PC). Windows 8 or later:

Open the Start Screen (the window symbol at the bottom left on your screen), and look under Microsoft Accessories to select **Notepad**.

Alternatively, go to Search (Magnifying glass), and type **Notepad**.



Step 1: Open TextEdit (Mac). Open Finder > Applications > TextEdit

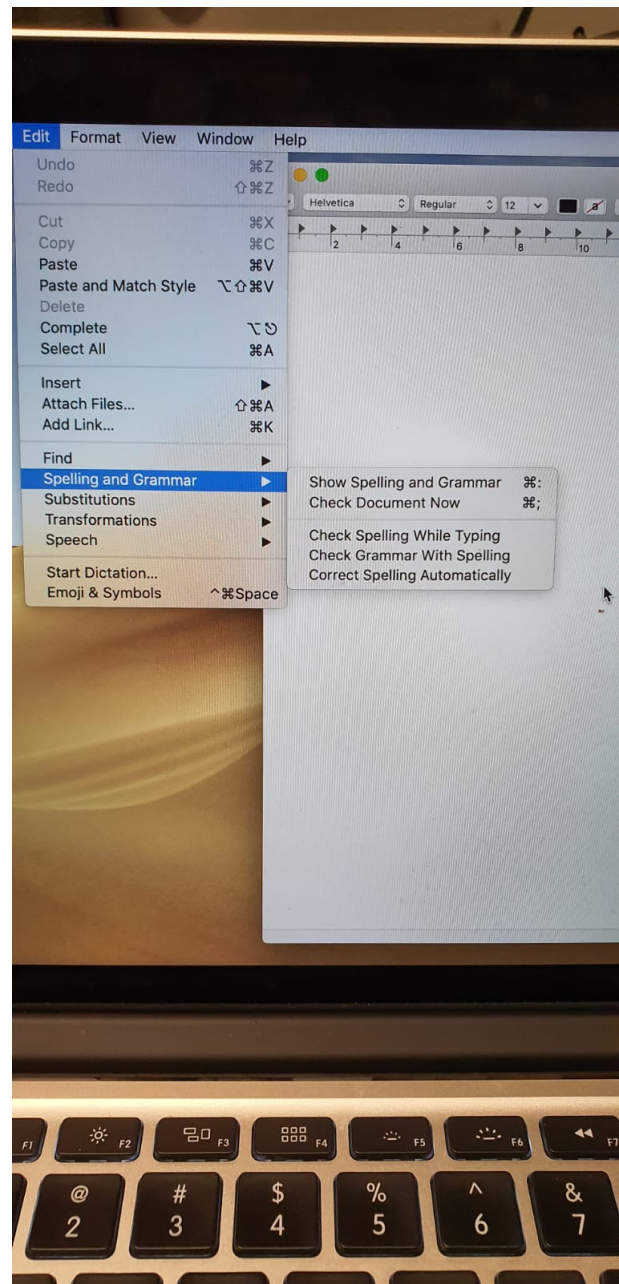
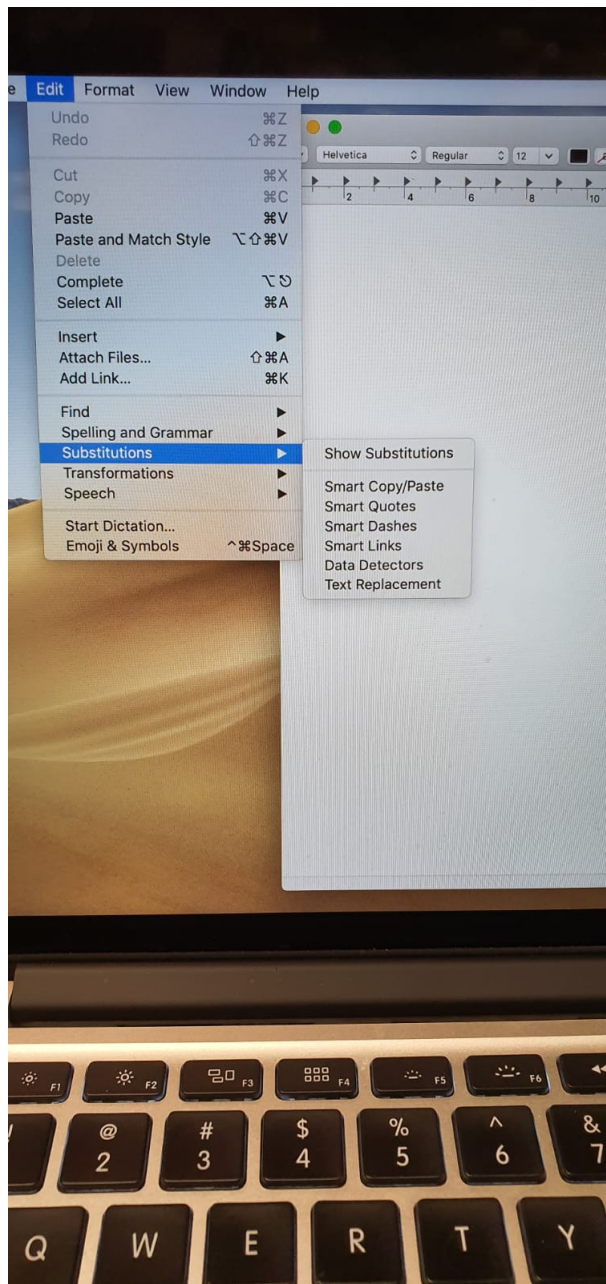


Also change some preferences to get the application to save files correctly. In **Preferences** > **Format** > choose “**Plain Text**”.

Then under “**Open and Save**”, check the box that says “**Display HTML files as HTML code instead of formatted text**”.

Then open a new document to place the code.

Additionally, you would need to perform the following two more steps, illustrated by the following screen-captures:



2.1.2 Step 2: Write some HTML

Write or copy some HTML into Notepad.

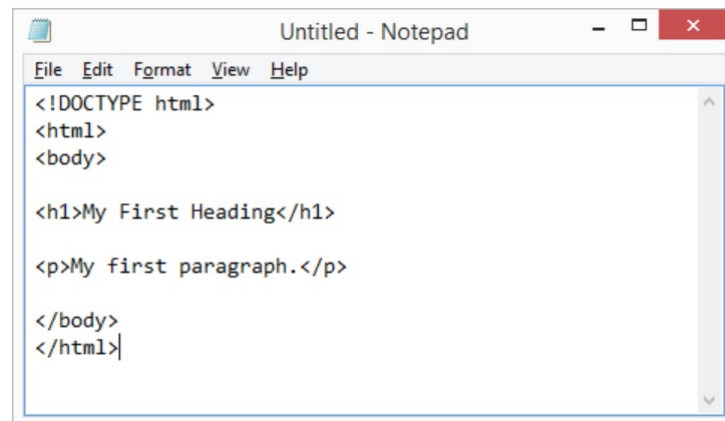
```
<!DOCTYPE html>
<html>
<body>

<h1>My First Heading</h1>

  <p>My first paragraph.</p>

</body>
</html>
```

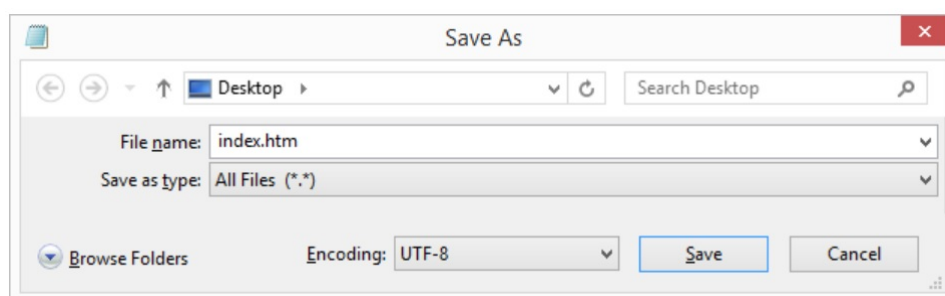
This is what you should see in the editor:



2.1.3 Step 3: Save the HTML page

Save the file on your computer. Select **File > Save as** in the Notepad menu.

Name the file `index.htm` and set the encoding to **UTF-8** (which is the preferred encoding for HTML files).



Remark 2.1. You can use either `.htm` or `.html` as file extension. There is no difference, it is up to you.

2.1.4 Step 4: View the HTML page in your browser

Open the saved HTML file in your favorite browser (double click on the file, or right-click – and choose **“Open with”**).

The result will look much like this:



2.2 W3Schools online editor

We shall work during the tutorials with the free W3Schools online editor, where you can edit HTML code and view the result directly in your browser. This saves a lot of time because you want to test code fast. It also has color coding and the ability to save and share code with others:

Example

```
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
</head>
<body>

<h1>This is a Heading</h1>
<p>This is a paragraph.</p>

</body>
</html>
```

Try it Yourself »

Click on the “Try it Yourself” button to see how it works.

Remark 2.2. Sometimes, we practise our HTML skills outside the W3Schools editor.

3 HTML basic

In this segment, you will see some examples which use tags that you have not encountered before. Just don’t panic! You will learn about them in the next chapters.

Remark 3.1. In this course, we learn coding by using a *Whole Code Approach*. This means that we make use of a complete code – even before we understand each and every command –

and make changes to observe the effects. Not only will this quicken our pace of learning, but also enhance our understanding of the relation between *syntax* (codes in the language) and *semantics* (meaning of the codes).

3.1 HTML documents

All HTML documents must start with a *document type declaration*:

```
<!DOCTYPE html>.
```

The HTML document itself begins with `<html>` and ends with `</html>`.

The visible part of the HTML document is between `<body>` and `</body>`.

Example 3.2. Here is the structure described above:

```
<!DOCTYPE html>
<html>
<body>

<h1>My First Heading</h1>
<p>My first paragraph.</p>

</body>
</html>
```

3.2 HTML headings

HTML *headings* are defined with the `<h1>` to `<h6>` tags.

`<h1>` defines the most important heading, while `<h6>` defines the least important heading:

Example 3.3. Headings that are defined by tags in decreasing order of importance:

```
<h1>This is heading 1</h1>
<h2>This is heading 2</h2>
<h3>This is heading 3</h3>
```

Task 3.4. Type three headings that are different from the given ones. Add in a fourth and a fifth heading. Do you observe any difference(s)? Record your observations here.

I observe that:

3.3 HTML paragraphs

HTML *paragraphs* are defined with the `<p>` tag:

Example 3.5. Look for the paragraph tag `<p>`.

```
<p>This is a paragraph.</p>
<p>This is another paragraph.</p>
```


3.4 HTML links

HTML *links* are defined with the `<a>` tag.

Example 3.6. Links defined with `<a>` tags look like this.

```
<a href="https://www.w3schools.com">This is a link</a>
```

The link's destination is specified in the `href` attribute. Attributes are used to provide additional information about HTML elements. More will be talked about concerning attributes in a later chapter.

3.5 HTML images

HTML *images* are defined with the `` tag.

Example 3.7. The source file (`src`), alternative text (`alt`), width, and height are provided as attributes:

```

```

Note that the image `w3schools.jpg` is already stored in the root directory of the W3Schools editor. If you work on our laptop or work station, you need to store the image file in the same directory where your `index.html` file resides.

Task 3.8. Surf the web for an image of a **wombat** and replace the `w3schools.jpg` image file by this one: `wombat.jpg`. Next, manually change the width and height of the picture to reduce the distortion of the wombat image.

3.6 HTML buttons

HTML *buttons* are defined with the `<button>` tag:

Example 3.9. Look for the `<button>` tag below.

```
<button>Click me</button>
```

Task 3.10. What happens when you click the button? Record your findings here:

```
When I click the button,
```

3.7 HTML lists

HTML *lists* are defined with the `` (*unordered*/bullet list) or the `` (*ordered*/numbered list) tag, followed by `` tags (list items):

Example 3.11. Look out for the differences of the tags between unordered list and ordered list.

```
<ul>
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ul>
```

4 HTML elements

An HTML *element* usually consists of a *start* tag and *end* tag, with the content inserted in between:

```
<tagname>Content goes here...</tagname>
```

The HTML element is everything from the start tag to the end tag:

```
<p>My first paragraph.</p>
```

The table below displays some of these elements and their accompanying opening and closing tags:

Start tag	Element content	End tag
<h1>	My First Heading	</h1>
<p>	My first paragraph.	</p>

Table 2: Elements of HTML and their accompanying tags

Remark 4.1. HTML elements with no content are called *empty elements*. Empty elements do not have an end tag, such as the
 element (which indicates a line break).

4.1 Nested HTML elements

HTML elements can be *nested* (elements can contain elements). All HTML documents consist of nested HTML elements.

Example 4.2. This example contains four HTML elements:

```
<!DOCTYPE html>
<html>
<body>

  <h1>My First Heading</h1>
  <p>My first paragraph.</p>

</body>
</html>
```

Task 4.3. By drawing an explicit link-pair, locate all the four HTML elements in the above example.

We now explain Example 4.2 in detail.

The <html> element.

- The <html> element defines the whole document.
- It has a start tag <html> and an end tag </html>.
- The element content is another HTML element (the <body> element).

```
<html>
  <body>

    <h1>My First Heading</h1>
    <p>My first paragraph.</p>

  </body>
</html>
```

The <body> element.

- The <body> element defines the *document body*.
- It has a start tag <body> and an end tag </body>.
- The element content is two other HTML elements (<h1> and <p>).

```
<body>

  <h1>My First Heading</h1>
  <p>My first paragraph.</p>

</body>
```

The <h1> element.

- The <h1> element defines a heading.
- It has a start tag <h1> and an end tag </h1>.
- The element content is: **My First Heading**.

```
<h1>My First Heading</h1>
```

The <p> element.

- The <p> element defines a paragraph.
- It has a start tag <p> and an end tag </p>.
- The element content is: **My first paragraph**.

```
<p>My first paragraph.</p>
```

4.2 Do not forget the end tag

Some HTML elements will display correctly, even if you forget the end tag:

Example 4.4. Locate the missing tags. Compile the codes in the browser.

```
<html>
<body>

  <p>This is a paragraph
  <p>This is a paragraph

</body>
</html>
```

The example above works in all browsers, because the closing tag is considered optional.

Remark 4.5. Never rely on this! It might produce unexpected results and/or errors if you forget the end tag.

4.3 Empty HTML elements

HTML elements with no content are called *empty elements*.

 is an empty element without a closing tag (the
 tag defines a line break).

Empty elements can be “closed” in the opening tag like this:
.

HTML5 does not require empty elements to be closed. But if you want stricter validation, or if you need to make your document readable by XML parsers, you must close all HTML elements properly.

4.4 Use lowercase tags

HTML tags are not case sensitive: `<P>` means the same as `<p>`.

The HTML5 standard does not require lowercase tags, but in this course we recommend lowercase in HTML, and demands lowercase for stricter document types like XHTML.

Remark 4.6. For consistency and readability of codes, we recommend the use of lowercase for tags in this course.

5 HTML attributes

Attributes provide additional information about HTML elements. Here are some properties concerning HTML attributes:

- All HTML elements can have attributes.
- Attributes provide additional information about an element.
- Attributes are always specified in the start tag.
- Attributes usually come in name-value pairs like: `name="value"`.

5.0.1 The href attribute

HTML links are defined with the `<a>` tag.

Example 5.1. The link address is specified in the `href` attribute:

```
<a href="https://www.w3schools.com">This is a link</a>
```

You will learn more about links and the `<a>` tag subsequently in this tutorial.

5.1 The src attribute

HTML images are defined with the `` tag.

Example 5.2. The filename of the image source is specified in the `src` attribute:

```

```

5.2 The width and height attributes

Images in HTML have a set of size attributes, which specifies the width and height of the image:

Example 5.3. In this case, the image size is specified in pixels¹: `width="500"` means 500 pixels wide.

```

```

¹There are 96 pixels per inch.

You will learn more about images in our HTML Images chapter.

5.3 The alt attribute

The **alt** attribute specifies an *alternative text* to be used, when an image cannot be displayed.

The value of the attribute can be read by screen readers². This way, someone “listening” to the webpage; for instance, a visually impaired person, can “hear” the element.

Example 5.4. Here is how you put in the alternative text:

```

```

Remark 5.5. The **alt** attribute is also useful if the image does not exist.

5.4 The style attribute

The **style** attribute is used to specify the *styling* of an element, like color, font, size etc.

Example 5.6. Here we can specify the color of the words appearing in a paragraph:

```
<p style="color:red">I am a paragraph</p>
```

Remark 5.7. You will learn more about styling later in this tutorial, and in the CSS Tutorial. More generally, CSS (another distinct language for HTML) allows the webpage designer to better style his/her webpage.

²You can turn on **START**, followed by **Ease of Access > Narrator**

5.5 The lang attribute

The *language* of the document can be declared in the `<html>` tag. The language is declared with the `lang` attribute.

Example 5.8. Declaring a language is important for accessibility applications (screen readers) and search engines:

```
<!DOCTYPE html>
<html lang="en-US">
<body>

    ...

</body>
</html>
```

The first two letters specify the language (en). If there is a dialect, use two more letters (US).

5.6 The title attribute

Here, a `title` attribute is added to the `<p>` element.

Example 5.9. The value of the `title` attribute will be displayed as a tool-tip when you mouse over the paragraph:

```
<p title="I'm a tooltip">
This is a paragraph.
</p>
```

The first two letters specify the language (en). If there is a dialect, use two more letters (US).

5.7 Some suggestions

5.7.1 Use lowercase attributes

The HTML5 standard does not require lowercase attribute names.

The `title` attribute can be written with uppercase or lowercase like `title` or `TITLE`.

In this course, we recommend lowercase in HTML, and demands lowercase for stricter document types like XHTML.

5.8 Quote attribute values

The HTML5 standard does not require quotes around attribute values.

Example 5.10. The `href` attribute, demonstrated above, can be written without quotes:

```
This is of bad standard:  
<a href=http://math.nie.edu.sg/>  
  
This is of good standard:  
<a href="http://math.nie.edu.sg/">
```

This course recommends quotes in HTML, and demands quotes for stricter document types like XHTML.

Example 5.11. Sometimes it is necessary to use quotes. This example will not display the `title` attribute correctly, because it contains a space:

```
<p title=About W3Schools>
```

Remark 5.12. Using quotes are the most common. Omitting quotes *can* produce errors. In this course, we always use quotes around attribute values.

5.8.1 Single or double quotes?

Double quotes around attribute values are the most common in HTML, but single quotes can also be used.

In some situations, when the attribute value itself contains double quotes, it is necessary to use single quotes:

```
<p title='John "ShotGun" Nelson'>
```

or vice-versa:

```
<p title="John 'ShotGun' Nelson">
```

6 Chapter summary

6.1 Basic HTML and HTML elements

- All tags are lowercase. Although HTML does allow uppercase tags, modern developers have agreed on lowercase tags in most cases. (`<!DOCTYPE>` is one notable exception to this rule.)
- Tag pairs are containers, with a beginning and an end. Tags contain other tags or text.
- Some elements can be repeated. There's only one `<html>`, `<title>`, and `<body>` tag per page, but a lot of the other elements (`<h1>` and `<p>`) can be repeated as many times as you like.

- Carriage returns are ignored. In the Notepad document, there are a number of carriage returns. The formatting of the original document has no effect on the HTML output. The markup tags indicate how the output looks.

6.2 HTML attributes

- All HTML elements can have attributes.
- The `title` attribute provides additional “tool-tip” information.
- The `href` attribute provides address information for links.
- The `width` and `height` attributes provide size information for images.
- The `alt` attribute provides text for screen readers.
- In this course, we always use lowercase attribute names.
- In this course, we always quote attribute values with double quotes.

7 List of HTML attributes

Below is an alphabetical list of some attributes often used in HTML, which you will learn more about in this tutorial:

Attribute	Description
<code>alt</code>	Specifies an alternative text for an image, when the image cannot be displayed
<code>disabled</code>	Specifies that an input element should be disabled
<code>href</code>	Specifies the URL (web address) for a link
<code>id</code>	Specifies a unique <code>id</code> for an element
<code>src</code>	Specifies the URL (web address) for an image
<code>style</code>	Specifies an inline CSS style for an element
<code>title</code>	Specifies extra information about an element (displayed as a tool tip)

Table 3: List of HTML attributes

Remark 7.1. A complete list of all attributes for each HTML element, is listed in the HTML attribute reference at https://www.w3schools.com/tags/ref_attributes.asp.

8 Tutorial exercises

8.1 Quickies

Go to <https://www.w3schools.com/html/exercise.asp> and attempt the five exercises on HTML attributes.

8.2 Assignment 1 (2 weeks: due on 28 Jan 2021)

Design a web page to introduce **one** place to people where they can spend time outdoors in Singapore.

Your web page should be kept *simple* in layout:

- One single page
- No more than four headings
- Include images of the place
- Demonstrate the use of the knowledge acquired in Chapters 1 and 2.

On this webpage, your content may include:

- Map location of the place.
- Photograph(s) of the place.
- Textual introduction and description of the place, e.g., some history, special features, etc.
- Suggestions of things to do there, with more pictures.

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