Web Programming
HTML

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What is it?

- **H**yper**T**ext **M**arkup **L**anguage
  - Language for creating web pages
  - Text surrounded by markings that specify the meaning of the content
  - Make the document displayable on different systems (different browsers)
- Division of responsibilities for a web document
  - HTML describes the content and structure
  - Style sheets (CSS) describe the appearance
  - Scripts (e.g., JavaScript) describe the behavior

HTML page rendered in the browser

HTML source

```
<!DOCTYPE html>
<html class=" js" dir="ltr" lang="en"> event scroll
  ▶ <head> ··· </head>
  ▼ <body class="node-type--landing-page eu-cookie-compliance-status-0" data-new-gr-c-s-check-loaded="8.867.0">
      event
      <a class="visually-hidden focusable" href="#main-content">Skip to main content</a>
    ▼ <div class="dialog-off-canvas-main-canvas" data-off-canvas-main-canvas="">
      ▼ <div class="layout-container">
          <div id="top"></div>
        ▼ <header id="header" class="header"> flex
          ▶ <div id="block-uis-branding" class="block">···</div>
          ▶ <div id="block-languageswitcher" class="block language-switcher-language-url" role="navigation">···</div>
          ▼ <div class="faccetted-nav-btn" tabindex="0"> event flex
              ::before
              <a href="/en/finn">Find</a>
            </div>
            ::after
          </header>
        ▶ <main class="main" role="main">···</main> flex
        ▶ <footer class="footer container-basic">···</footer>
        </div>
      </div>
    ▶ <script type="application/json" data-drupal-selector="drupal-settings-json">···</script>
      <script src="/sites/default/files/js/js_fxFgLdBZBsQ7ZPx9-0RYa_YfcGrlGqAxi-V-IMGAfuU.js"></script>
      <script src="/modules/contrib/eu_cookie_compliance/js/eu_cookie_compliance.js?v=1.9" defer=""></script>
      <script src="/sites/default/files/js/js__DhJiOTgfu_gBwf2oyzMjsZibeQs1_AfVqLLteCYKFc.js"></script>
    ▶ <script type="text/javascript">···</script>
    </body>
</html>
```

View HTML document in developer tools

Mac:

⌘+⌥+ i

Windows/Linux:

Ctrl + ⇧ + I

History

- 1991: HTML created by Tim Berners-Lee
- 1993: HTML standardized
- 1997: HTML 3.2
- 1999: HTML 4.01
- 2000-01: XHTML
  - Reformulation of HTML 4.01 using XML
  - No longer being developed
- 2014: HTML5

HTML "programming"

Programming environment
any text editor

Execution environment
any web browser

Syntax

- Fundamental syntactic units are **`<tags>`**
  - Specify type of content
  - Presentation is specific to the type of the tag
  - Most tags appear in pairs **`<tag>…</tag>`**
  - Tags without a closing pair
    `<tag>` or **`<tag />`** (preferred)
- Case insensitive but lowercase is recommended
- “Error handling” is left to the browser

Syntax (2)

- Comments are ignored by the browser
  ```
  <!-- comment text -->
  ```
- White spaces are collapsed
- Indentation makes the source more readable
  ```
  <tag1>
    <tag2>
      <tag3>...</tag3>
    </tag2>
  </tag1>
  ```

Terminology

Terminology

```
<img src="images/test.jpg" />
```

attribute name

attribute value

HTML Reference

www.w3schools.com/html

HTML <ol> Tag

« Previous Complete HTML Reference Next »

Definition and Usage

The <ol> tag defines an ordered list. An ordered list can be numerical or alphabetical.

Use the <li> tag to define list items.

Browser Support

Element						
<ol>	Yes	Yes	Yes	Yes	Yes	Yes

HTML Reference

www.w3schools.com/html

HTML <ol> Tag

« Previous Complete HTML Reference Next »

Attributes

= New in HTML5.

Do not use attributes that are no longer supported in HTML5!

Attribute	Value	Description
compact	compact	Not supported in HTML5. Specifies that the list should render smaller than normal
reversed	reversed	Specifies that the list order should be descending (9,8,7...)
start	*number*	Specifies the start value of an ordered list
type	1 A a I i	Specifies the kind of marker to use in the list

HTML Reference

www.w3schools.com/html

HTML <ol> Tag

« Previous Complete HTML Reference Next »

Example

2 different ordered lists:

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

<ol start="50">
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ol>
```

Try it Yourself »

Play with the examples!

Standard HTML document structure

```
<!DOCTYPE html>
<html>
  <head>
  ..
  </head>
  <body>
  ..
  </body>
</html>
```

document metadata

document content

Exercise #1

github.com/dat310-2023/info/tree/master/
exercises/html/basics

<head> elements

- **<title>** is required
- **<meta>** tags are optional
  - Keywords, description, author

```
<head>
    <title>My first HTML page</title>
    <meta name="keywords" content="example, html">
    <meta name="description" content="Just a simple example">
    <meta name="author" content="Krisztian Balog”>
</head>
```

Character encoding

- Indicate the character encoding used to write the page
- Use UTF-8 by default
- Best is to always include this line in the HTML head section

```
<head>
    <meta charset="UTF-8">
    <title>Title</title>
</head>
```

<body> elements

- Paragraphs
- Headings
- Text formatting
- Lists
- Tables
- Images
- Links

Paragraphs

<p>

- Documents are divided into paragraphs
  - Browsers automatically add an empty line before and after a paragraph
- Use **
** for a line break without starting a new paragraph

```
<p>This is a paragraph</p>
<p>Second paragraph. We force a linebreak here<br />then
continue.</p>
```

This is a paragraph

Second paragraph. We force a linebreak here
then continue.

Headings

<h1>,<h2>,...,<h6>

- Headings reflect document structure
  - **<h1>** is most important, **<h6>** is least important
  - Important for search engines

```
<h1>Heading 1</h1>
<h2>Heading 2</h2>
<h3>Heading 3</h3>
```

Heading 1

Heading 2

Heading 3

Exercise #2

github.com/dat310-2023/info/tree/master/
exercises/html/basics

Phrase elements

`<strong>,<em>`

- **`<strong>`** defines important text and is displayed in **bold** by default
- **`<em>`** defines emphasized text and is displayed in *italic* by default

```
<p>This is a paragraph. And we can make the text here
<strong>bold</strong> or <em>emphasized</em>.<br />
It is also possible to <strong><em>combine these</em>
</strong> by nesting tags.</p>
```

This is a paragraph. And we can make the text here **bold** or *emphasized*.
It is also possible to ***combine these*** by nesting the tags.

More text markup

`<s>`	Strikethrough
`<small>`	Smaller text
`<sub>`	Subscripted text
`<sup>`	Superscripted text
`<mark>`	Highlighted text

Character entities

` `	Non-breaking space
`<`	<
`>`	>
`€`	€
`©`	©
`®`	®

Lines

`<hr>`

- Draw a horizontal rule
- No closing tag **`<hr>`** and **`<hr />`** are both fine

```
<p>There is some text</p>
<hr />
<p>There is some more text</p>
```

There is some text

There is some more text

Exercise #3

github.com/dat310-2023/info/tree/master/
exercises/html/basics

Lists

`<ol>,<ul>,<li>`

Ordered list

```
<ol>
    <li>Item 1</li>
    <li>Item 2</li>
    <li>Item 3</li>
</ol>
```

1. Item 1
2. Item 2
3. Item 3

Unordered list

```
<ul>
    <li>Item 1</li>
    <li>Item 2</li>
    <li>Item 3</li>
</ul>
```

- Item 1
- Item 2
- Item 3

Lists

`<ol>,<ul>,<li>`

Nested list

```
<ol>
    <li>Item 1</li>
    <li>Item 2</li>
    <li>Item 3:
        <ul>
            <li>Item 1</li>
            <li>Item 2</li>
        </ul>
    </li>
</ol>
```

1. Item 1
2. Item 2
3. Item 3:
   - Item 1
   - Item 2

Any content inside a `<ol>` or `<ul>` element must be inside a `<li>`.

Exercise #4 (#4b)

github.com/dat310-2023/info/tree/master/
exercises/html/basics

Tables

<table>,<thead>,<tbody>,<tr>,<th>,<td>

```
<table border="1">
    <thead>
    <tr>
        <th>First name</th>
        <th>Last name</th>
        <th>Points</th>
    </tr>
    </thead>
    <tbody>
    <tr>
        <td>John</td>
        <td>Smith</td>
        <td>100</td>
    </tr>
    [...]
    </tbody>
</table>
```

First name	Last name	Points
John	Smith	100
Jack	Jackson	90
John	Doe	75

Merging cells

- Merging columns: **`colspan="x"`**

```
<td colspan="2">Content in the cell</td>
```

- Merging rows: **`rowspan="x"`**

```
<td rowspan="2">Content in the cell</td>
```

example

```html
<table border="1">
    <tr>
        <td>Row 1, Col 1</td>
        <td>Row 1, Col 2</td>
        <td>Row 1, Col 3</td>
    </tr>
    <tr>
        <td>Row 2, Col 1</td>
        <td>Row 2, Col 2</td>
        <td>Row 2, Col 3</td>
    </tr>
    <tr>
        <td>Row 3, Col 1</td>
        <td>Row 3, Col 2</td>
        <td>Row 3, Col 3</td>
    </tr>
</table>
```

Row 1, Col 1	Row 1, Col 2	Row 1, Col 3
Row 2, Col 1	Row 2, Col 2	Row 2, Col 3
Row 3, Col 1	Row 3, Col 2	Row 3, Col 3

example (colspan)

```
<table border="1">
    <tr>
        <td colspan="2">Row 1, Col 1-2</td>
        <td>Row 1, Col 2</td>
        <td>Row 1, Col 3</td>
    </tr>
    <tr>
        <td>Row 2, Col 1</td>
        <td>Row 2, Col 2</td>
        <td>Row 2, Col 3</td>
    </tr>
    <tr>
        <td colspan="3">Row 3, Col 1-3</td>
        <td>Row 3, Col 2</td>
        <td>Row 3, Col 3</td>
    </tr>
</table>
```

Row 1, Col 1-2		Row 1, Col 3
Row 2, Col 1	Row 2, Col 2	Row 2, Col 3
Row 3, Col 1-3		

example (rowspan)

```
<table border="1">
    <tr>
        <td rowspan="2">Row 1-2, Col 1</td>
        <td>Row 1, Col 2</td>
        <td rowspan="3">Row 1-3, Col 3</td>
    </tr>
    <tr>
        ~~<td>Row 2, Col 1</td>~~
        <td>Row 2, Col 2</td>
        ~~<td>Row 2, Col 3</td>~~
    </tr>
    <tr>
        <td>Row 3, Col 1</td>
        <td>Row 3, Col 2</td>
        ~~<td>Row 3, Col 3</td>~~
    </tr>
</table>
```

Row 1-2, Col 1	Row 1, Col 2	Row 1-3, Col 3
	Row 2, Col 2	
Row 3, Col 1	Row 3, Col 2	

Exercise #5

github.com/dat310-2023/info/tree/master/
exercises/html/basics

Links

<a>

- Clickable text to jump to another page
  - Absolute URL **`href="http://www.uis.no"`**
  - Relative to current page **`href="page2.html"`**

```
<p>There is some text with a <a href="http://www.uis.no">
clickable link</a> in it</p>
```

There is some text with a clickable link in it

Example

examples/html/relative_link1.html

```
<a href="relative_link/relative_link2.html">
   This ...
</a>
```

```
<a href="../relative_link1.html">
   This ...
</a>
```

Links (2)

<a>

- Link to email address

```
<a href="mailto:info@uis.no">email us</a>
```

- **target="_blank"** makes the browser open the link in a new window

```
<a href="http://www.uis.no" target="_blank">UiS</a>
```

Exercises #6 and #7

github.com/dat310-2023/info/tree/master/
exercises/html/basics

Links within a page
<a>

- **id** is a global attribute that can be defined for any HTML element
  - It needs to be unique, i.e., no two HTML elements can have the same id value
- Any element with an id can be linked within the page, e.g.,
  - Element to be linked

```
<h2 id="sec2">Section 2</h2>
```

  - Link to the element

```
<a href="#sec2">Section 2</a>
```

Example

examples/html/link_within_page.html

```
<a href="#sec2">Section 2</a>
```

```
<h2 id="sec2">Section 2</h2>
```

Exercise #8

github.com/dat310-2023/info/tree/master/
exercises/html/basics

Images
`<img>`

- Only attributes, no closing tag
- **`src`** can point to local or remote file (http://...)
- **`alt`** is alternative text if the image cannot be displayed
- **`width`** and **`height`** are optional
  - value in default is given in pixels
  - percentages can also be used (e.g., 50%)

```
<img src="images/pulpit_rock.jpg" alt="Pulpit rock" width="300"
height="200" />
```

Images - best practices

- Keep all images in a separate folder (e.g., images)
  - You can use further subfolders based on type or size
- Always use an alt tag
  - Screen readers read the alt tags for visually impaired
- Always specify width and height
  - To avoid the page flickering while the image loads

Images - best practices (2)

- Resize image files to the required size (e.g., for thumbnails and previews)
  - This makes your site load faster and reduces bandwidth

original jpg file (1000x1500px), **1MB**

```
<img src="img/pulpit_rock.jpg"
alt="Pulpit rock"
width="300" height="200" />
```

resized jpg file (300x200px), **55KB**

```
<img src="img/pulpit_rock_300x200.jpg"
alt="Pulpit rock"
width="300" height="200"/>
```

Exercises #9 and #10

github.com/dat310-2023/info/tree/master/
exercises/html/basics

Inline vs. block-level elements

- A **block-level element** always starts on a new line and takes up the full width available
  - Examples: <h1>,..<h6>, <p>, , <form>
- An **inline element** does not start on a new line and only takes up as much width as necessary
  - Examples: <a>, , <img>,

block level

inline

Container elements

- **`<div>`** defines a division or section in a page
  - Often used as a container for other HTML elements, to style blocks of content with CSS
- **`<span>`** groups inline elements in a document
  - Often used as a container for some text

div example

```
<div style="width:50px; height:50px; background-color:blue">
Div 1
</div>

<div style="width:100px; height:50px; background-color:yellow">
Div 2
</div>

<div style="width:150px; height:50px; background-color:red">
Div 3
</div>
```

Check CSS lecture for use of `style` attribute.

span example

```
<p style="font-family:Verdana;font-size:14px">
Lorem Ipsum is <span style="font-family:Impact;font-
size:18px">simply dummy text</span> of the printing and
typesetting industry.
</p>
```

Lorem Ipsum is **simply dummy text** of the printing and typesetting industry.

HTML5 elements for document structure/semantics

- <article>
- <aside>
- <details>
- <figure>
- <footer>
- <header>
- <main>
- <menuitem>
- <nav>
- <section>
- <summary>

Iframe

- **`<iframe>`** is used to display a webpage within a webpage

```
<iframe src="http://address.com"></iframe>
```

  - **`src`** attribute (mandatory) specifies the address of the document to embed
  - **`height`** and **`width`** attributes specify the size
- Recommended method for embedding YouTube videos

Example

examples/html/youtube_video.html

```
<iframe width="560" height="315"
src="https://www.youtube.com/embed/jofNR_WkoCE"
frameborder="0" allowfullscreen>
</iframe>
```

HTML5 audio and video

`<audio>, <video>`

- HTML5 provides standard ways to embed audio and video in web pages
  - Use .mp3 format for audios (supported by all browsers)

```
<audio controls>
    <source src="horse.mp3" type="audio/mpeg">
    Your browser does not support the audio element.
</audio>
```

Exercises #11 and #12

github.com/dat310-2023/info/tree/master/
exercises/html/basics

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