Front-End Web Development

Unit 2: Structuring the Web

UCD DUBLIN PROFESSIONAL ACADEMY

Course Outline

1. Getting Started
2. **HTML - Structuring the Web**
3. CSS - Styling the Web
4. JavaScript - Dynamic client-side scripting
5. CSS - Making Layouts
6. Introduction to Websites/Web Applications
7. CSS - Advanced
8. JavaScript - Modifying the Document Object Model (DOM)
9. Dynamic HTML
10. Web Forms - Working with user data
11. JavaScript - Advanced
12. Building a Web Application with JavaScript
13. Introduction to CSS Frameworks – Bootstrap
14. Building a Web Application with Svelte
15. SEO, Web security, Performance
16. Walkthrough project

Course Learning Outcomes

- Competently write HTML and CSS code
- Create web page layouts according to requirements using styles
- Add interactivity to a web page with JavaScript
- Access and display third-party data on the web page
- Leverage Bootstrap and Static Site Generator

Assessment

- Final Project - 100% of the grade

  - Design and Build functioning Website using HTML5, CSS (including Bootstrap), JavaScript (browser only)

✔ Code will be managed in GitHub
✔ Website will be deployed to GitHub Pages
✔ All code to follow best practice and be documented

- Details and How-To-Guide are available on the course page under the section called Assessments

1. Structuring the Web

In This Unit

Title
Understand the history of HTML
Learn the structure of a HTML document
Learn the major html tags, when they should be used

Overview of HTML5 and Document Structure

What is HTML

HyperText Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser

- Examples
- Simple website Paul Graham
- Complex website New York Times
- It defines the meaning and structure of web content
- It is often assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript

Markup Languages and HTML

- A markup language is a text-encoding system
- Consisting of a set of symbols inserted in a text document to control its structure, formatting
- Or the relationship between its parts
- Used to control the display of the document
- Enrich its content to facilitate automated processing
- Examples include SGML, XML and HTML
- Key features
  - Document Type
  - A set of elements or tags which add context to the text
- HTML is an application of SGML

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE recipe PUBLIC "-//Happy-Monkey//DTD RecipeBook//EN"
"http://www.happy-monkey.net/recipebook/recipebook.dtd">

<recipe>

    <title>Peanut-butter On A Spoon</title>

    <ingredientlist>
        <ingredient>Peanut-butter</ingredient>
    </ingredientlist>

    <preparation>
        Stick a spoon in a jar of peanut-butter,
        scoop and pull out a big glob of peanut-butter.
    </preparation>

</recipe>
```

History of HTML and Milestones

Year	Release	
1990	HTML 0.1	Initial release by Tim Berners-Lee in CERN
1993	HTML 1.0	Never adopted
1995	HTML 2.0	adopted in November 1995
1997	HTML 4.0	new features
1999	HTML 4.0.1	
2000	XHTML 1.0	reformulates HTML with XML
2001	XHTML 1.1	content presentation done with CSS
2008	HTML 5.0	replaces both HTML 4 and XHTML 1.x

Standards Bodies

World Wide Web Consortium (**W3C**) is the main international standards organization for the World Wide Web

- Founded in 1994 and led by Tim Berners-Lee
- Standards include HTML, CSS, SVG, XML, XSLT, SOAP

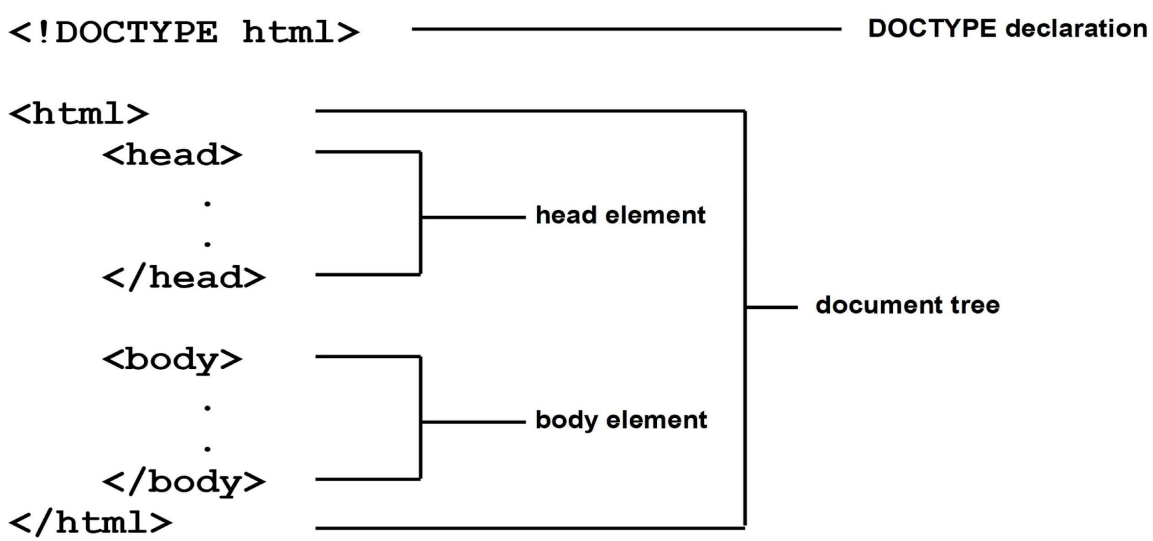
Web Hypertext Application Technology Working Group

- (**WHATWG**) Competing standards body to the W3C
- Sole responsibility for HTML5
- Other standards include DOM, Fetch, URL

Basic Structure of a HTML Document

HTML tags used to define the structure of the content - NOT the appearance

Best practice - keep all tags in lowercase as it's easier to read



HTML Elements

- Examples of elements in HTML are
  - Basic structure: <html>, <head>, <body>,
  - Headings: <h1> to <h6>
  - Paragraphs:
  - Lists: <ul>, <ol>,
  - Hypertext links: <a>
  - Tables: <table>
- Elements appear in a HTMl document as tags
  - <tagname>content</tagname>
  - e.g. Hello World
- Sometimes end tags can be omitted or where there is no content
- e.g. line break:

HTML5 Doctype

Identifying a HTML5 document is extremely easy and is less complex that for either HTML 4.x or XHTML 1.x

- HTML 4.01

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN"
        "http://www.w3.org/TR/html4/strict.dtd">
```

- XHTML 1.0

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
        "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
```

- HTML5

```
<!DOCTYPE html>
```

HTML Element Nesting

Be careful with nesting of tags!

note the and end tags are reversed

```
<p>This is <em>very <strong>wrong</em>!</strong></p>

<p>This is <em><strong>correct</strong>.</em></p>
```

HTM Attributes

- Elements have associated properties called attributes, which may have a value(s)
- Attribute name/value pairs appear before the ">" of the start tag
- Attribute name/value pairs are separated by spaces and can appear in any order
- Attribute values can be delimited using single or double quotes
- Attribute quotes are optional
- Example;

```
<body lang="en">, <body lang='en'>, <body lang=en>
```

HTML Attributes - Coding examples

- An opening tag with one attribute

```
<a href="contact.html">Contact Us</a>
```

- An opening tag with three attributes

```
<a href="contact.html" title="Click to Contact Us" class="nav_link">
```

- How to code an empty tag with attributes

```
<img id="image1" src="logo.gif" alt="Murach Logo">
```

- How to code a Boolean attribute

```
<input type="checkbox" name="mailList" checked>
```

Core HTML Attributes

These attributes can be applied to most elements

- id - unique identifier for a specific element or tag
- class - name of a CSS class(es)
- title - displayed when user hovers over image
- lang - language identifier for enclosing content
- style - inline CSS code

HTML Attributes

Coding rules

- An attribute consists of the attribute name, an equals sign (=), and the value for the attribute
- Attribute values don’t have to be enclosed in quotes if they don’t contain spaces
- Attribute values must be enclosed in single or double quotes if they contain one or more spaces, but you can’t mix the type of quotation mark used for a single value
- Boolean attributes can be coded as just the attribute name. To code multiple attributes, separate each attribute with a space.

Our coding recommendation

- For consistency, enclose all attribute values in double quotes

HTML Comments

- Comments start with special tags
- Everything between these tags is considered a comment even over multiple lines

```
<!-- this is a comment -->
<head>
    <title>Introduction to HTML</title>
</head>
<!-- this is also a comment
over multiple lines -->
<body bgcolor="#FFFFFF" text="#000000">
```

HTML Character Entities

- An HTML entity is a piece of text ("string") that begins with an ampersand (&) and ends with a semicolon (;) Entities are frequently used to display reserved characters (which would otherwise be interpreted as HTML code), and invisible characters (like non-breaking spaces)
- Use them in place of other characters that are difficult to type with a standard keyboard

Character	Entity	Character	Entity	Character	Entity	Character	Entity
&	&amp;	<	&lt;	>	&gt;	"	&quot;
		©	&copy;	™	&trade;	€	&euro;

Official list of character entities

HTML Head Section

- The <head> element is a container for metadata (data about data) and is placed between the <html> tag and the <body> tag
- HTML metadata is data about the HTML document Metadata is not displayed
- Metadata typically define the document title, character set, styles, scripts, and other meta information used by SEO/Search Engines
- The following tags describe metadata: <title>, <style>, <meta>, <link>, <script>, and <base>

```
<meta name="viewport" content="width=device-width, initial-scale=1" />
```

HTML Elements

- Every HTML element has a default display value depending on what type of element it is
- The two display values are: block and inline
- Block-level Elements
  - A block-level element always starts on a new line and takes up the full width available (stretches out to the left and right as far as it can go)

Block level elements in HTML:

<address>	<article>	<aside>	<blockquote>	<canvas>	<dd>
	<dl>	<dt>	<fieldset>	<figcaption>	<figure>
<footer>	<form>	<h1>-<h6>	<header>	<hr>	
<main>	<nav>	<noscript>		<p>	<pre>
<section>	<table>	<tfoot>		<video>	

HTML Elements

Inline Elements

- An inline element does not start on a new line and only takes up as much width as necessary.
- The element is an inline element.

Inline elements in HTML:

<a>	<abbr>	<acronym>	<b>	<bdo>
<big>	 	<button>	<cite>	<code>
<dfn>		<i>	<img>	<input>
<kbd>	<label>	<map>	<object>	<output>
<q>	<samp>	<script>	<select>	<small>
		<sub>	<sup>	<textarea>
<time>	<tt>	<var>		

Page Example - Code

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>San Joaquin Valley Town Hall</title>
    <link rel="shortcut icon" href="images/favicon.ico">
  </head>
  <body>
    <div id="header">
      <img src="images/logo.jpg" alt="Town Hall Logo" width="80">
      <h1>San Joaquin Valley Town Hall</h1>
      <ul id="nav">
        <li>October 19, 2022: <a class="date_passed" href="speakers/toobin.html" title="Link to Jeffrey Toobin">Jeffrey Toobin</a></li>
        <li>November 16, 2022: <a class="date_passed" href="#" title="Link to Andrew Ross Sorkin">Andrew Ross Sorkin</a></li>
        <li>January 18, 2023: <a href="#">Amy Chua</a></li>
      </ul>
    </div>
    <div id="main">
      <h2>Bringing cutting-edge speakers to the valley</h2>
      <h3>Looking for a unique gift?</h3>
      <p>Town Hall has the answer. For only $100, you can get a book of tickets for all of the remaining speakers.</p>
      <p class="indent">Or, for $50, <em>you can give yourself</em> the gift of our speakers, and still get an extra ticket for a companion,
      but for just one of the events.</p>
      <p id="contact_us"><em>Contact us by phone</em> at <a href="tel:+35312345678" title="Ring for ticket information">01 2345 678</a> for
      ticket information.</p>
      </div>
    <div id="footer">
      <p>&copy; Copyright 2023 San Joaquin Valley Town Hall.</p>
    </div>
  </body>
</html>
```

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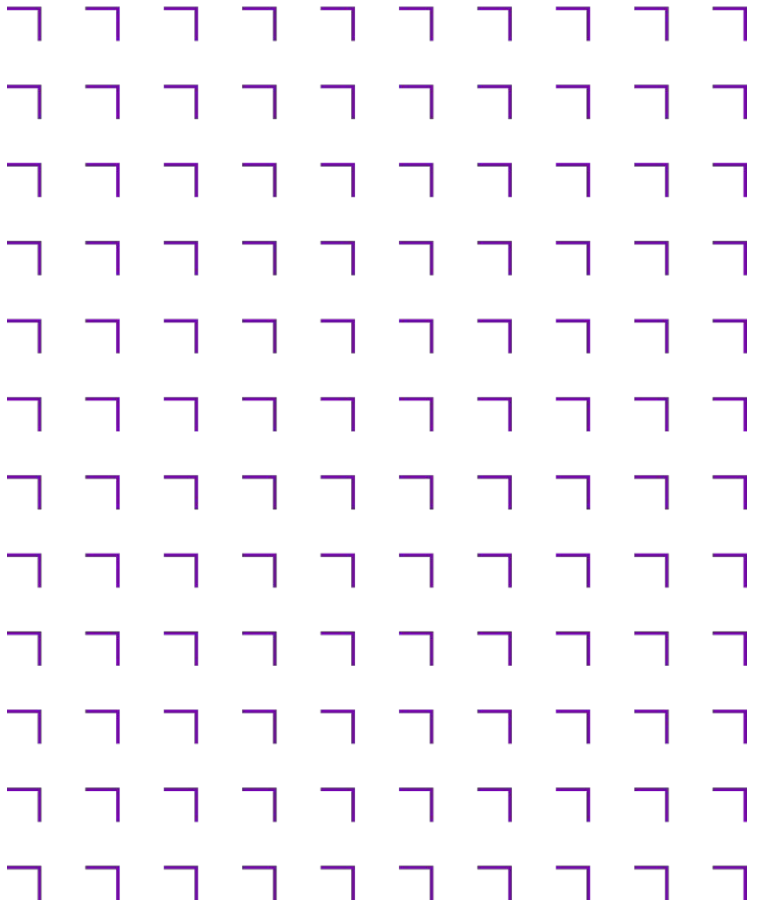
Activity

- Join a breakout room
- Download the previous example code from Moodle
- Modify the html and text as you like
- View the changes in the browser
- Suggested changes include
- Modify the title, h1 heading and paragraph text
- Add new paragraphs
- Remove elements to see the effect
- You have 35 minutes
- Lecturer will visit each room in turn, etc... Will start next topic on the hour

Walk through of main HTML5 elements/tags



Elements - HTML

- The <html> tag represents the root of an HTML document
- The <html> tag is the container for all other HTML elements (except for the <!DOCTYPE> tag)
- Note: You should always include the lang attribute inside the <html> tag, to declare the language of the Web page. This is meant to assist search engines and browsers
  - e.g. <html lang="en>

Elements - head

•The <head> element is a container for metadata (data about data) and is placed between the <html> tag and the <body> tag

•Metadata is data about the HTML document. Metadata is not displayed
•Metadata typically define the document title, character set, styles, scripts, and other meta information The following elements can go inside the <head> element:

- <title> (required in every HTML document)
- <style>, <base>, <link>, <meta>, <script>, <noscript>

Elements - body

- The <body> tag defines the document's body,
- i.e. the visible part of the web page/document
- The <body> element contains all the contents of an HTML document,

such as headings, paragraphs, images, hyperlinks, tables, lists, etc...

- Note: There can only be one <body> element in an HTML document

Headings

The <h1> to <h6> tags are used to define HTML headings

<h1> defines the most important heading. <h6> defines the least important heading
Note: Only use one <h1> per page - this should represent the main

heading/subject for the whole page Also, do not skip heading levels -

start with <h1>, then use <h2>, and so on

Correct ordering of headings is critical for Search Engine Optimisation (SEO)

Text Tag	
<p>	defines a paragraph
	is an inline container used to mark up a part of a text. Can be easily styled by CSS or manipluted with JavaScript
<b>	used to define text with strong importance. The content inside is typically displayed in bold
<i>	Italic text
	Emphasized text
	Important text
<sub>	Subscript text
<sup>	Superscript text

Containers - div & span

** **

- defines a division or a section in an HTML document
- is used as a container for HTML elements - which is then styled with CSS or manipulated with JavaScript
- is easily styled by using the class or id attribute
- Any sort of content can be put inside the tag!

****

- is an inline container used to mark up a part of a text or document
- is easily styled by CSS or manipulated with JavaScript using the class or id attribute
- is much like the element, but is a block-level element and is an inline element

Containers - Semantic elements

A semantic element clearly describes its meaning to both the browser and the developer

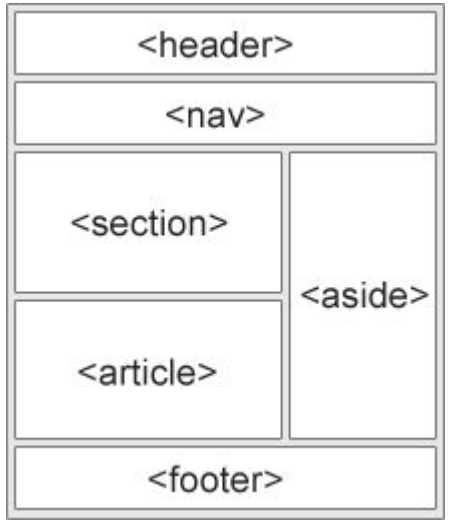
Examples of non-semantic elements: and - Tells nothing about its content

Examples of semantic elements: <form>, <table>, and <article> - Clearly defines its content

Other examples include <details>, <figcaption>, <figure>, <mark>, <summary>, <time>

Containers - Page Semantic elements

- Many web sites contain HTML code like: to indicate navigation, header, and footer
- In HTML5, new page semantic elements were introduced that can be used to define different parts of a web page
  - <header>, <nav>, <main>, <section>, <article>, <aside>, <footer>



Ordered List

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

Use the <li> tag to define list items

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

1. Coffee
2. Tea
3. Milk

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

50. Coffee
51. Tea
52. Milk

```
<ol type="I">
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ol>
```

I. Coffee
II. Tea
III. Milk

Unordered List

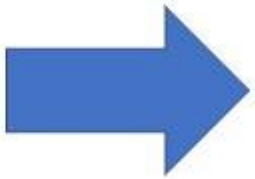
The <ul> tag defines an unordered (bulleted) list

Use the <li> tag to define list items

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

- Coffee
- Tea
- Milk

```
<ul type="square">
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ul>
```



- Coffee
- Tea
- Milk

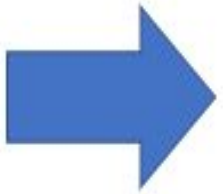
```
<ul type="circle">
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ul>
```

- Coffee
- Tea
- Milk

Description List

A description list is a list of terms, with a description of each term
The <dl> tag defines the description list, the <dt> tag defines the term (name), and the <dd> tag describes each term:

```
<dl>
  <dt>Coffee</dt>
  <dd>- black hot drink</dd>
  <dt>Milk</dt>
  <dd>- white cold drink</dd>
</dl>
```



Coffee
- black hot drink
Milk
- white cold drink

HTML Links

- HTML links are hyperlink

```
<a href="url">link text<a>
```

- You can click on a link and jump to another document or a different part of the same document
- When you move the mouse over a link, the mouse arrow will turn into a little hand
-
- Note: A link does not have to be text. Enclosing any tag in an <a> tag turns that tag into a link, e.g. image, , , etc...
- "url" can be absolute or relative;
  - absolute URL, link to a different website, e.g. https://www.google.com/
  - relative URl, link to a page on the same website, e.g. /aboutus/index.html

HTML Link Examples

```
<h2 id="top">Top of page!</h2>

<a href="anotherFile.html">Text for the link to file in same dir</a>

<a href="dir1/anotherFile.html">Text for the link to file in different dir</a>

<a href="http://java.sun.com/jdk/1.6/">JDK Download Page</a>

<a href="http://java.sun.com/jdk/1.6/"> <img src = "pic.gif"></a>

<a href="#top">Link to page element with id top</a>

<a href="https://www.w3schools.com" target="_blank">Visit W3Schools.com!</a>

<a href="mailto:someone@example.com?Subject=Hello" target="_top">Send Mail</a>

<a href="tel:+4733378901">+47 333 78 901</a>
```

HTML Images

- <img> tag is used to embed an image in a web page
- Images are not technically inserted into a web page; images are linked to web pages. The <img> tag creates a holding space for the referenced image
  The <img> tag is empty, it contains attributes only, and does not have a closing tag
- The <img> tag has two required attributes:
-
  - src - Specifies the path to the image
  - alt - Specifies an alternate text for the image which is displayed if the image fails to load
- Syntax is <img src="url" alt="alternatetext">

```
<img src="img_chania.jpg" alt="Flowers in Chania">
```

HTML Picture

- <picture> tag gives web developers more flexibility in specifying image resources
- most common usage is in responsive designs. Instead of having one image that is scaled up or down based on the device/viewport width, multiple images can be designed to more nicely fill the browser viewport

- The <picture> element contains two tags:
  - one or more <source> tags and one <img> tag
- The browser will look for the first <source> element where the media query matches the current viewport width, and then it will display the proper image (specified in the srcset attribute). The <img> element is required as the last child of the <picture> element, as a fallback option if none of the source tags matches

- Tip: The <picture> element works "similar" to <video> and <audio>. You set up different sources, and the first source that fits the preferences is the one being used

HTML Picture

Example

```
<picture>
  <source media="(min-width:650px)" srcset="img_pink_flowers.jpg">
  <source media="(min-width:465px)" srcset="img_white_flower.jpg">
  <img src="img_orange_flowers.jpg" alt="Flowers" style="width:auto;">
</picture>
```

HTML Common Image Formats

Abbreviation	File Format	File Extension
APNG	Animated Portable Network Graphics	.apng
GIF	Graphics Interchange Format	.gif
ICO	Microsoft Icon	.ico, .cur
JPEG	Joint Photographic Expert Group image	.jpg, .jpeg, .jfif, .pjpeg, .pjp
PNG	Portable Network Graphics	.png
SVG	Scalable Vector Graphics	.svg
WebP	Raster graphics file format from Google	.webp

HTML iframe

- The <iframe> tag specifies an inline frame
  An inline frame is used to embed another document within the current HTML document
- Tip: Use CSS to style the <iframe> (see example below)
- Tip: It is a good practice to always include a title attribute for the <iframe>. This is used by screen readers to read out what the content of the <iframe> is
- Example of code to embed a YouTube videoin a web page

```
<iframe width="560" height="315"
  src="https://www.youtube.com/embed/Wdwpwuuolog?si=WyMy8ZHxgYUtAQnQ"
  title="YouTube video player" frameborder="0"
  allow="accelerometer; autoplay; clipboard-write;
  encrypted-media; gyroscope; picture-in-picture; web-share"
  allowfullscreen>
</iframe>
```

HTML Table

•The <table> tag defines an HTML table

•An HTML table consists of one <table> element and one or more <tr>, <th>, and <td> elements

•The <tr> element defines a table row, the <th> element defines a table header, and the <td> element defines a table cell

•An HTML table may also include <caption>, <colgroup>, <thead>, <tfoot>, and <tbody>

elements. Note: Tables should not be used for page layout!

•Historically some Web authors misused tables in HTML as a way to control their page layout, the recommended approach is to use CSS

HTML Table Example

```
<table>
  <caption>Monthly savings</caption>
  <thead>
    <tr>
        <th>Month</th>
        <th>Savings</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td>January</td>
      <td>$100</td>
    </tr>
    <tr>
      <td>February</td>
      <td>$50</td>
    </tr>
  </tbody>
</table>
```

Monthly savings

Month	Savings
January	$100
February	$50

Activity

Breakout

- Join a breakout room
- Download the exercise-unit-2-topic-2 code from Moodle
- Modify the html and text as you like
- Use the indicated tags to
- You have 35 minutes
- Lecturer will visit each room in turn, etc...
- Will start next topic on the hour

Accessibility

When websites and web tools are properly designed and coded, people with disabilities can use them. However, currently many sites and tools are developed with accessibility barriers that make them difficult or impossible for some people to use.

Making the web accessible benefits individuals, businesses, and society. International web standards define what is needed for accessibility.

https://www.w3.org/WAI/fundamentals/accessibility-intro/

What is Web Accessibility

Web accessibility means that websites, tools, and technologies are designed and developed so that people with disabilities can use them. More specifically, people can: perceive, understand, navigate, and interact with the Web, contribute to the web.

Web accessibility encompasses all disabilities that affect access to the Web, including: auditory, cognitive, neurological, physical, speech, visual.

Always write HTML code with accessibility in mind!

Semantic HTML

- Semantic HTML means using correct HTML elements for their correct purpose as much as possible.
- Semantic elements are elements with a meaning; if you need a button, use the <button> element (and not a element)
- Semantic HTML gives context to screen readers, which read the contents of a page out loud.

With the button example in mind:

- Buttons have more suitable styling by default
- A screen reader identifies it as a button, focusable, clickable
- A button is also accessible for people relying on keyboard-only navigation; it can be clickable with both mouse and keys, and it can be tabbed between (using the tab key on the keyboard).

Headings are Important

- Headings are defined with the <h1> to <h6> tags
- Search engines use the headings to index the structure and content of your web pages
- Users skim your pages by its headings. It is important to use headings to show the document structure and the relationships between different sections
- Screen readers also use headings as a navigational tool. The different types of heading specify the outline of the page. <h1> headings should be used for main headings, followed by <h2> headings, then the less important <h3>, and so on.
- Note: Use HTML headings for headings only. Don't use headings to make text BIG or bold.

Alternative Text

- The alt attribute provides an alternate text for an image, if the user for some reason cannot view it (because of slow connection, an error in the src attribute, or if the user uses a screen reader)
- The value of the alt attribute should describe the image

```
<img src="img_chania.jpg" alt="A narrow city street with flowers in Chania">
```

Declare the Content Language

- You should always include the lang attribute inside the <html> tag, to declare the language of the Web page. This is meant to assist search engines and browsers

- The following example specifies English as the language:

```
<html lang="en">
```

Use Clear Language

Always use a clear language, that is easy to understand.

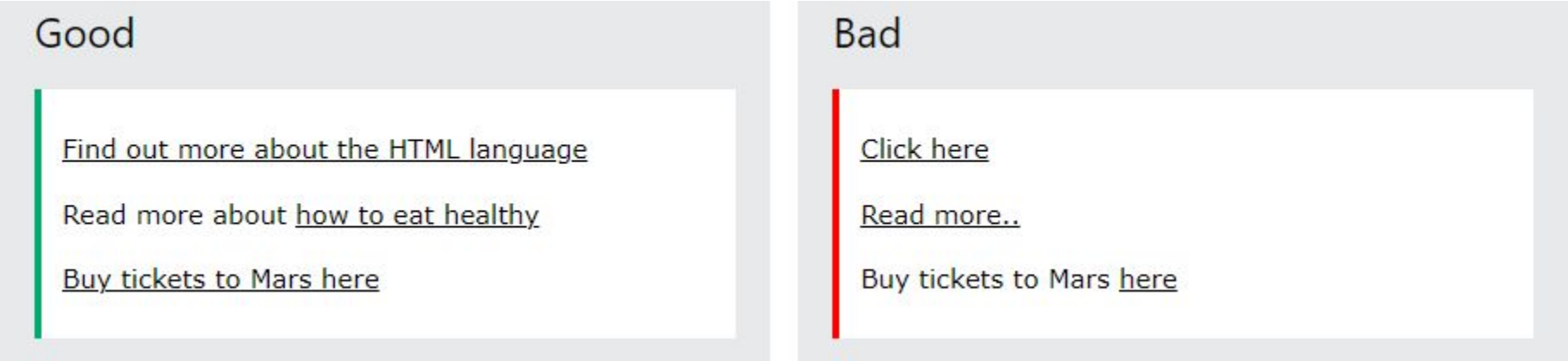
Also try to avoid characters that cannot be read clearly by a screen reader. For example:

- Keep sentences as short as possible
- Avoid dashes. Instead of writing 1-3, write 1 to 3
- Avoid abbreviations. Instead of writing Feb, write February
- Avoid slang words

Create Good Link Text

A link text should explain clearly what information the reader will get by clicking on that link.

Examples of good and bad links:



Accessibility Resources

https://www.w3schools.com/accessibility/

https://blog.hubspot.com/website/web-accessibility

Summary

- Overview of HTML5 & Document
- Structure Walk through of main HTML5 elements/tags
- Accessibility Overview
- Complete the remaining exercises before next class

Assessment

- Final Project - 100% of the grade

  - Design and Build functioning Website using HTML5, CSS (including Bootstrap), JavaScript (browser only)

✔ Code will be managed in GitHub
✔ Website will be deployed to GitHub Pages
✔ All code to follow best practice and be documented

- Details and How-To-Guide are available on the course page under the section called Assessments