Comp 324/424 - Client-side Web Design - Slides

Spring Semester 2018 - Week 3

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Semantic HTML - intro

- importance of web standards
  - *and their application to HTML markup and documents*
- standards help drive a consideration of markup, e.g. HTML
  - *usage for what they mean*
  - *not simply how they will look...*
- semantic instead of purely presentational perspective
  - *introduction of meaning and value to the document*
- when pages are processed
  - *impart structure and meaning beyond mere presentation*
- a core consideration for usage of markup languages
- issues persist with HTML element usage
  - *e.g. inline elements such as `<b>` and `<i>`*

Semantic HTML - a reason to care

- Semantic HTML - opportunity to convey meaning with your markup
  - *meaning may be explicit due to the containing element*
  - *implicit due to a structured grouping of elements*
- markup makes it explicit to the browser
  - *underlying meaning of a page and its content*
- notion of meaning and clarity also conveyed to search engines
  - *fidelity with query and result...*
- semantic elements provide information beyond page rendering and design
- use semantic markup correctly
  - *create more specific references for styling*
  - *greater chance of rendering information correctly*

Semantic HTML - example usage

```
<!-- incorrect element chosen -->
<div id="code">
document.addEventListener('click', function () {
  console.log('Click received...');
});
</div>
```

```
<!-- correct element chosen -->
<code>
document.addEventListener('click', function () {
  console.log('Click received...');
});
</code>
```

- semantic example usage

Semantic HTML - correct usage

- need to ensure elements convey their correct meaning
  - *i.e. the meaning expected for the contained content*
- e.g. often see the following elements mis-used and applied incorrectly for markup,
  - *<p> - paragraphs*
  - *<ul - unordered list*
  - *<h1> to <h6> - headings*
  - *<blockquote> - blockquote*
- using <blockquote> to simply help indent text
  - *instead of CSS margins...*
- or the perennial mis-use of a <p>
  - *simply add extra space between elements*

```
<p> <p>
```

Using lists correctly...

```
<li>nice</li>
<li>cannes</li>
<li>menton</li>
```

- list markup looks OK
  - *still fails validation for an obvious reason*
  - *missing structural grouping for list items*
  - *not valid markup...*
- semantics of the overall list are missing
- example - basic list items

HTML - a semantic point of view

```
<ul>
  <li>nice</li>
  <li>cannes</li>
  <li>menton</li>
</ul>
```

- from the perspective of semantics
  - *meant to act as a group of items that belong together*
- denote such groupings with correct semantic markup
- structuring items to clearly denote their meaning and purpose
- consider global attributes
  - *https://developer.mozilla.org/en-US/docs/Web/HTML/Global_attributes*
- example - basic group

HTML - benefits of structure & validation

- define and create a meaningful structure for required markup
  - *improves usage and flexibility as project develops*
  - *provides extensible structure for project*
- for example, benefits include
  - *helps increase ease of CSS styling*
  - *creates properly structured documents*
  - *improves general management of updates to markup*
  - *...*
- easier to understand and easier to maintain and update
- structured, valid markup aids in repurposing data
  - *into various representations of information*

HTML - benefits of structure & validation - example I

e.g. a standard list

```
<ul>
  <li>nice</li>
  <li>cannes</li>
  <li>menton</li>
  <li>antibes</li>
  <li>grasse</li>
</ul>
```

- example - basic group style

HTML - benefits of structure & validation - example 2

e.g. lists for navigation, menus, tabs...

```
<ul id="menutabs">
  <li><a href="nice">nice</a></li>
  <li><a href="cannes">cannes</a></li>
  <li><a href="menton">menton</a></li>
  <li><a href="antibes">antibes</a></li>
  <li><a href="grasse">grasse</a></li>
</ul>
```

- example - basic menu tabs

HTML - markup for headings - part 1

- HTML is flexible in markup usage
  - *due to presentational versus structural considerations*
- headings might be perceived as purely presentational, e.g.

```
<span class="heading">Chapter 1</span>
```

- issues with presentational markup, e.g.
  - *visual browsers with CSS will render as expected*
  - *no CSS, and browsers will render as normal text*
  - *non-visual browsers = normal text and no heading*
  - *accessibility issues...*
- search engines, ranking, spiders...
  - *will not process this markup as a heading*
  - *no semantic meaning...*
  - *recorded as normal text*
- CSS styles can be unique
  - *but restricted to `class` usage with `heading`*

HTML - markup for headings - part 2

- many different ways to markup content with HTML, e.g.

```
<p><b>Chapter 1</b></p>
```

- issues still exist with variant markup options, e.g.
  - *visual browsers will render text in bold & same size as default*
  - *unique styling is problematic...*
  - *search engines, ranking, spiders...*
    - will not process this markup as a heading
    - no semantic meaning...
    - recorded as normal text

HTML - markup for headings - part 3

- use markup correctly with structure and meaning, e.g.

```
<h3>Chapter 1</h3>
```

- benefits of this markup, e.g.
  - *conveys meaning to contained text*
  - *visual and non-visual browsers treat heading correctly*
    - regardless of any associated styles...
  - *easy to add unique styles with CSS*
  - *search engines &c. will interpret this markup correctly*
    - extract keywords, semantics, structure...

HTML - markup for tables

- great example of poor usage of HTML markup is `<table>` element
- main issue is use of nested tables and spacer elements, images...
- if used correctly in structured markup
  - *tables can be very useful structure*
  - *impart a sense of semantic organisation to data*
  - *creating various interpretive information*
- what is a table for?
  - *structuring data*
  - *data to impart curated information...*

HTML - markup for tables - example I

- simple table example - columns and rows for *presentation* purposes

```
<p>Travel Destinations</p>
<!-- basic table structure - minimal - rows and columns -->
<table>
  <tr>
    <td><b>Place</b></td>
    <td><b>Country</b></td>
    <td><b>Sights</b></td>
  </tr>
  <tr>
    <td>Nice</td>
    <td>France</td>
    <td>Cours Saleya</td>
  </tr>
  <tr>
    <td>Cannes</td>
    <td>France</td>
    <td>La Croisette</td>
  </tr>
  <tr>
    <td>Antibes</td>
    <td>France</td>
    <td>Picasso museum</td>
  </tr>
</table>
```

example

- example - basic table for presentation

HTML - markup for tables - example 2

- add semantic structure & elements to table caption - replace <p> with correct <caption> usage for a table...

```
<!-- basic table structure - minimal - add a caption -->
<table>
  <caption>Travel Destinations</caption>
  ...
```

- modern browsers style <caption> by default
  - *centred above the table*
- modify styling as required

example

- example - basic table caption

HTML - markup for tables - example 3

- add a summary attribute to the table

```
<!-- basic table structure - minimal - add summary attribute -->
<table summary="structured table data for travel destinations...">
  <caption>Travel Destinations</caption>
  ...
```

- add further meaning and structure to the table
  - *use of a summary attribute on the table element*
- processed by the browsers for semantics
- particularly useful for non-visual browsers

example

- example - basic table with summary

HTML - markup for tables - example 4

- add correct headers <th> to the table

```
<!-- basic table structure - minimal - add table headers -->
<table summary="structured table data for travel destinations...">
  <caption>Travel Destinations</caption>
  <tr>
    <th>Place</th>
    <th>Country</th>
    <th>Sights</th>
  </tr>
  ...
```

Benefits include:

- remove need for presentational markup, bold elements
- visual browsers process structural and presentation qualities of headings
- such heading elements can also be useful for non-visual browsers

example

- example - basic table with headers

HTML - markup for tables - example 5

- table markup and accessibility markup...

```
<!-- basic table structure - accessibility - add ids and headers -->
<table summary="structured table data for travel destinations...">
  <caption>Travel Destinations</caption>
  <tr>
    <th id="place">Place</th>
    <th id="country">Country</th>
    <th id="sights">Sights</th>
  </tr>
  <tr>
    <td headers="place">Nice</td>
    <td headers="country">France</td>
    <td headers="sights">Cours Saleya</td>
  </tr>
  ...
```

- creating a known relationship between the table's header, and its data
- a screen reader, for example, may read this table as follows,
  - *Place: Nice, Country: France, Sights: Cours Saleya*
- established a pattern to the output information for non-visual devices...

example

- example - basic table with accessibility

HTML - markup for tables - example 6

- add extra semantic markup for thead, tfoot, tbody...

```
<!-- basic table structure - add head, foot, body -->
<table summary="structured table data for travel destinations...">
  <caption>Travel Destinations</caption>
  <thead>
    <tr>
      ...
    </tr>
  </thead>
  <tfoot>
    <tr>
      ...
    </tr>
  </tfoot>
  <tbody>
    <tr>
      ...
    </tr>
  </tbody>
</table>
```

- head and foot elements customarily go above the table body
  - *allows modern browsers, readers, &c. to load that data first*
  - *then render the main table content*

Benefits include:

- better underlying structure to data
- greater ease for styling a table due to clear divisions in data and information
- structural and presentational markup now working together correctly...

example

- example - basic table with head, foot, body

HTML - presentational vs structural

- consider *presentational* vs *structural*
  - *e.g.usage of quotations in markup*
  - *similar consideration to headings...*
- need to convey meaning and structure
- rather than a mere presentational instruction
- consider HTML's phrase elements
  - *e.g.* `<cite>`, `<code>`, `<abbr>`
- each phrase element imparts a sense of underlying meaning
  - *structure & then presentation...*

HTML - minimising markup

- noticeable benefit to creating sites with valid markup
  - *separation of structural from presentational*
  - *general reduction in required markup*
- simply conforming to the W3C's specifications
  - *does not inherently guarantee less code for your project*
  - *possible to include many unnecessary elements & retain valid markup*
  - *markup may still be valid*
- project issues may include:
  - *lack of efficiency*
  - *extraneous markup and code*
- to help minimise markup
  - *consider classes added to markup*
    - are there too many? are they all necessary? &c.
    - avoid class usage for unique reference
  - *avoid `<div>` usage for explicit block-level elements*

HTML5 - intro

- finally became a standard in October 2014
- introduces many new features to HTML standard
- additional features include, e.g.
  - *new canvas element for drawing*
  - *video and audio support*
  - *support for local offline storage*
  - *content specific elements*
  - *including article, footer, header, nav, section*
  - *form controls such as*
  - *calendar, date, time, email, url, search*
- new input type attribute values
  - *assigned to provide better input control*
- Check browser compatibility using HTML5 Test

HTML5 - basic template

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <title></title>
  </head>
  <body>

  </body>
</html>
```

HTML5 - Elements - part I

- often known simply as **tags**
- elements allow us to add a form of metadata to our HTML page
- for example, we might add

```
<!-- a paragraph element -->
<p>add some paragraph content...</p>
<!-- a first heading element -->
<h1>our first heading</h1>
```

- this metadata used to apply structure to a page's content

HTML5 - Elements - part 2

- we can now add additional structure to our basic template

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <!-- title for the web page appears in the window, tab heading... -->
    <title>Demo 1</title>
  </head>
  <body>
    <h1>Our first web page</h1>
    <p>
      As we build our web apps, more elements and content will be added...
    </p>
  </body>
</html>
```

- Demo - Our first web page

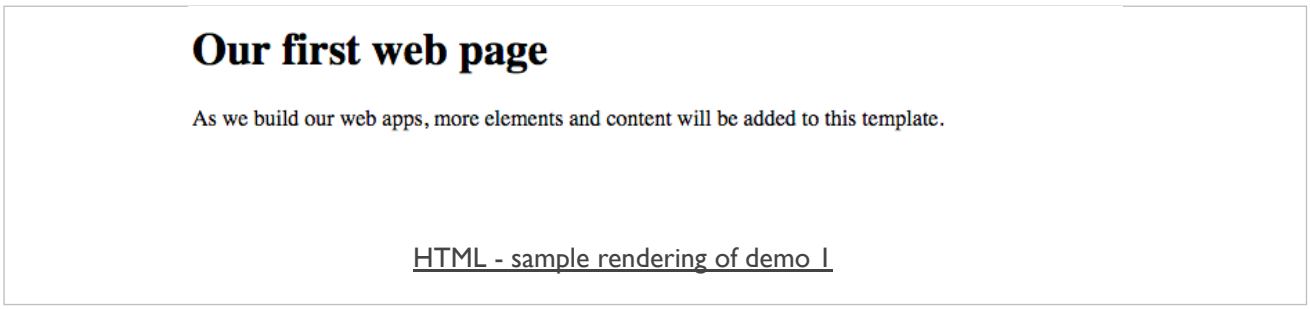
HTML5 - Comments

- comments are simple and easy to add to HTML
- add to HTML code as follows,

```
<!-- a comment in html -->
```

- comment not explicitly visible to the user in the rendered page
- comment appears in the code for reference...

Image - HTML5 sample rendering 1



Source - Demo 1

HTML5 - semantic elements - part 1

- new semantic elements added for HTML5
- known as **block-level** elements
  - *includes the following elements,*

```
<article>
<aside>
<details>
<figure>
<figcaption>
<footer>
<header>
<main>
<nav>
<section>
```

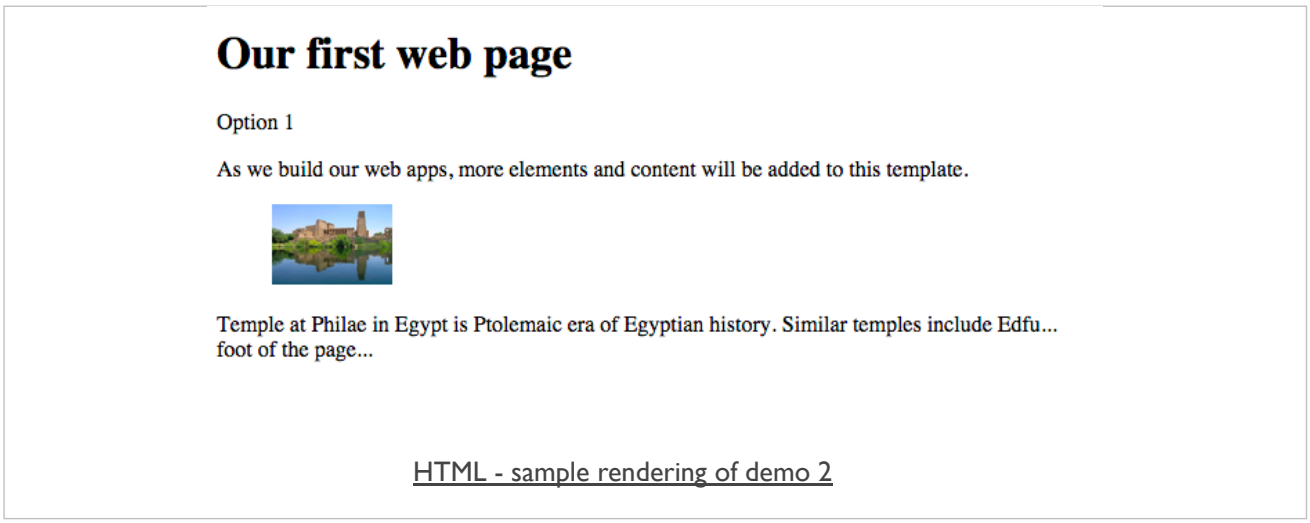
- better structure underlying documents
  - *add clear semantic divisions*

HTML5 - semantic elements - part 2

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <!-- our second demo with lots of new elements -->
    <title>Demo 2</title>
  </head>
  <body>
    <header>
      <h1>Our first web page</h1>
    </header>
    <!-- primary navigation elements, links... -->
    <nav>Option 1</nav>
    <!-- main content -->
    <main>
      <section>
        <p>
          As we build our web apps, more elements and content will be added...
        </p>
        <figure>
          <img src="media/images/philae-demo2.jpg" alt="temple of philae" width="333px" height="200px">
        </figure>
      </section>
      <aside>
        Temple at Philae in Egypt is Ptolemaic era of Egyptian history...
      </aside>
    </main>
    <footer>
      foot of the page...
    </footer>
  </body>
</html>
```

- Demo - New elements added

Image - html5 sample rendering 2



Source - Demo - New elements added

HTML5 - semantic elements - part 3

- element tag `article` not used in previous demo
- `article` and `section` tag can both cause some confusion
- not as widely used as expected
- `div` element still widely seen in development
- HTML5 is supposed to have relegated `div`
  - *sectioning element of last resort...*
- `article` and `section`
  - *good analogy with a standard newspaper*
  - *different sections such as headlines, politics, health...*
  - *each section will also contain articles*
- HTML specification also states that an `article` element

> *represents a self-contained composition in a document, page, application, or site and that is, in principle, independently distributable or reusable, e.g. in syndication.*

HTML5 - semantic elements and structure - intro

- perceived issue or concern with HTML5 semantic elements
  - *how and when to add them to our document*
  - *where and when do we add them to our page?*
- non-semantic elements often considered simpler to apply
  - *generalised application and context for usage*

HTML5 - semantic elements and structure - header and nav

- `<header>`
  - *used to collect and contain introductory content*
  - *semantically appropriate for the head or top of a page*
  - *technically feasible and acceptable to include multiple `<header>` elements*
  - *e.g. `<header>` within main content, sidebar content, an article, a section...*
- `<nav>`
  - *short for navigation*
  - *stores and defines a set of links for internal or external navigation*
  - *not meant to define all page navigation links*
  - *often considered suitable for primary site links*
  - *additional links can be placed in*
  - *sidebar, footer, main content...*
  - *no need to consider a `<nav>` element for these links...*

HTML5 - Semantic elements and structure - main

- this element tag defines our **main** content
- traditionally the central content area of our page or document
- HTML4 often used a `<div>` element
  - *plus a `class` or `id` to define central content*
  - *e.g.*

```
<!-- e.g. HTML4 main content -->
<div id="main">
  ...
</div>
```

- HTML5 semantically defines and marks content as `<main>`
- `<main>` should not include any page features such as
  - *nav links, headers etc, that are repeated across multiple pages*
- cannot add multiple `<main>` elements to a single page
- must not be structured as a child element to
  - *`<article>`, `<aside>`, `<footer>`, `<header>`, or `<nav>`*

HTML5 - Semantic elements and structure - section, article, aside

- `<section>`
  - *defines a section of a page or document*
  - *W3C Documentation defines as follows,*

> *a section is a thematic grouping of content. The theme of each section should be identified, typically by including a heading as a child of the section element.*

- a site can be sub-divided into multiple `<section>` groupings
  - *e.g. as we might consider a chapter or section break in a book...*
- `<article>`
  - *suitable for organising and containing independent content*
  - *include multiple `<article>` elements within a page*
  - *use to establish logical, individual groups of content*
  - *again, newspaper analogy is useful to remember*
  - *e.g. a blog post, story, news report...might be a useful article*
  - *key to using this element is often whether content can be used in isolation*
- `<aside>`
  - *used to define some content aside from containing parent content*
  - *normally used to help define or relate material to surrounding content*
  - *effectively acts as supporting, contextual material*

HTML5 - Semantic elements and structure - section, article, aside

- MDN Documentation suggests,

> *if it makes sense to separately syndicate the content of a `<section>` element, use an `<article>` element instead*

and

> *do not use the `<section>` element as a generic container; this is what `<div>` is for, especially when the sectioning is only for styling purposes. A rule of thumb is that a section should logically appear in the outline of a document.*

HTML5 - Semantic elements and structure - figure, figcaption

- `<figure>` & `<figcaption>`
  - *as with print media, we can logically group image and caption*
  - *`<figure>` acts as parent for image grouping*
  - *child elements include*
  - *`<img>` and `<figcaption>`*

```
<figure>
<img src="media/images/philae-demo2.jpg" alt="temple of philae"
width="333px" height="200px">
<figcaption>Ptolemaic temple at Philae, Egypt</figcaption>
</figure>
```

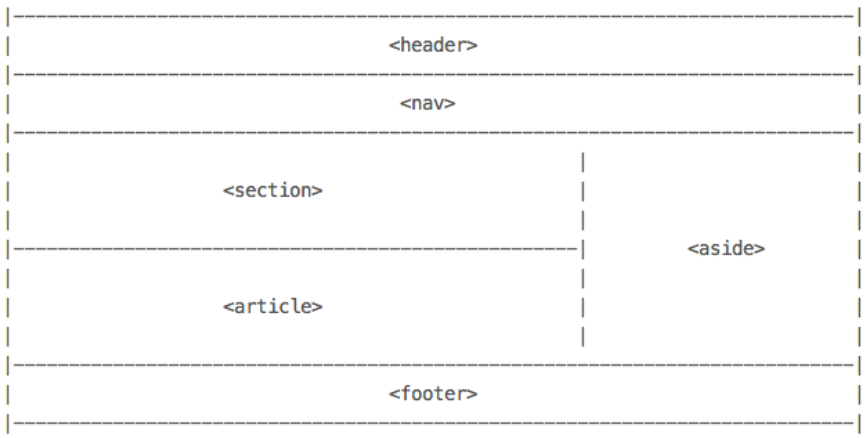
- updated demo with figure grouping - Demo - Semantic structuring

HTML5 - Semantic elements and structure - footer

- `<footer>`
  - *usually contains information about its containing element*
- example 1 - in a footer for an article
  - *might use this element to define and record*
  - *author of the article*
  - *publication date*
  - *suitable tags or metadata*
  - *associated documents...*
- example 2 - a footer simply placed at the **foot** of a page
  - *record copyright information*
  - *contextual links*
  - *contact information*
  - *small logos...*
- example 2 considered standard usage for `<footer>`
  - *continues from HTML4 and earlier generic usage...*

Image - HTML5 page structure - part 1

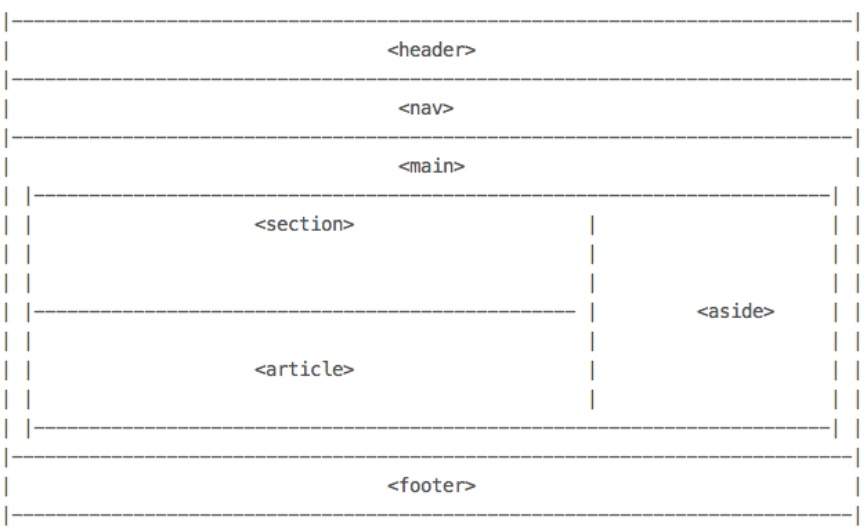
semantic elements



HTML5 - Structure

Image - HTML5 page structure - part 2

semantic elements



HTML5 - Structure

HTML5 page structure - part 3

- not included `<html>` and `<body>` tags in diagrams
  - *required for all HTML documents*
- divided the page into four logical, semantic divisions
  - *header*
  - *nav*
  - *main*
  - *footer*
- we could also add a sidebar etc for further division of content

HTML5 - extra elements - intro

- many other interesting and useful new HTML5 elements
  - *in addition to semantic elements*
- some struggle for browser compatibility
- useful new elements such as
  - *graphics and media*
- HTML5 APIs introduced as well, including
  - *App Cache*
  - *Drag/Drop*
  - *Geolocation*
  - *Local Storage*
  - *...*
- again, check browser support and compatibility

Browser check

- Can I Use_____?
  - *e.g. Can I Use Drag and Drop?*

<video> element

- until HTML5, video playback reliant on plugins
  - *e.g. Adobe Flash*
- embed video using element tag <video>
- add attributes for
  - *height, width, controls...*
- not all web browsers support all video codecs
- option to specify multiple video sources
- best supported codecs include
  - *MP4 (or H.264), WebM, OGG...*
- good general support for <video> element
- check browser support for <video> element
  - *Can I use_____video?*

HTML5 - Extra elements - media - video example

<video> - a quick example might be as follows,

```
<video width="300" height="240" controls>
  <source src="media/video/movie.mp4" type="video/mp4">
  <source src="media/video/movie.webm" type="video/webm">
  Your browser does not support the video tag.
</video>
```

- Demo - HTML5 Video playback

<audio> element

- HTML5 also supports standardised element for embedded audio
- supported codecs for <audio> playback include
  - *MP3 and mp4*
  - *WAV*
  - *OGG Vorbis*
  - *3GP*
  - *m4a*
- again, check browser support and compatibility
  - *Can I use_____audio?*
- fun test of codecs
  - *HTML5 Audio*

HTML5 - Extra elements - media - audio example

<audio> - a quick example might be as follows,

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

- Demo - HTML5 Audio playback

HTML5 - Extra elements - graphics - canvas

- graphics elements are particularly fun to use
- use them to create interesting, useful graphics renderings
- in effect, we can draw on the page
- `<canvas>` element acts as a placeholder for graphics
  - *allows us to draw with JavaScript*
- draw lines, circles, text, add gradients...
  - *e.g. draw a rectangle on the canvas*

HTML5 - Extra elements - graphics - canvas example

<canvas> will be created as follows,

```
<canvas id="canvas1" width="200" height="100">
  Your browser does not support the canvas element.
</canvas>
```

then use JavaScript to add a drawing to the canvas

```
<script type="text/javascript">
var can1 = document.getElementById("canvas1");
var context1 = can1.getContext("2d");
context1.fillStyle="#000000";
context1.fillRect(0,0,150,75);
</script>
```

Result is a rendered black rectangle on our web page.

- Demo - HTML5 Canvas - Rectangle

HTML5 - Extra elements - graphics - canvas example

A square can be created as follows,

```
<script type="text/javascript">
function draw() {
/*black square*/
var can1 = document.getElementById("canvas1");
var context1 = can1.getContext("2d");
context1.fillStyle="#000000";
context1.fillRect(0,0,50,50);
}
</script>
```

Again, we end up with the following rendered shape on our canvas.

- Demo - HTML5 Canvas - Square

HTML5 - Extra elements - graphics - canvas examples

- modify drawing for many different shapes and patterns
  - *simple lines, circles, gradients, images...*

1. shows different rendered shapes on a canvas.

- Demo - HTML5 Canvas - Assorted Shapes

2. little retro games

- Demo - HTML5 Canvas - Retro Breakout Game

CSS Basics - intro

- CSS allows us to define stylistic characteristics for our HTML
  - *helps us define how our HTML is displayed and rendered*
  - *colours used, font sizes, borders, padding, margins, links...*
- CSS can be stored
  - *in external files*
  - *added to a `<style>` element in the `<head>`*
  - *or embedded as inline styles per element*
- CSS not intended as a replacement for encoding semantic and stylistic characteristics with elements

CSS Basics - stylesheet

- add a link to our CSS stylesheet in the <head> element

```
<link rel="stylesheet" href="style.css" />
```

- change will replicate throughout our site wherever the stylesheet is referenced

CSS Basics - <style> element

- embed the CSS directly within the <head> section of our HTML page
- embed using the <style> element
- then simply add standard CSS within this element
- limitations include lack of abstraction for site usage and maintenance
  - *styles limited to a single page...*

```
<style type="text/css">
body {
  color: #000;
}
</style>
```

CSS Basics - inline

- embed styles per element using **inline** styles
  - *limitations and detractors for this style of CSS*
  - *helped by the growth and popularity of React...*

e.g.

```
<!-- with styles -->
<p style="color:#cd0603">a trip to Luxor</p>
<!-- without styles -->
<p>a trip to Karnak</p>
```

CSS Basics - pros

Pros

- inherent option and ability to abstract styles from content
- isolating design styles and aesthetics from semantic markup and content
- cross-platform support offered for many aspects of CSS
  - *CSS allows us to style once, and apply in different browsers*
  - *a few caveats remain...*
- various CSS frameworks available
- support many different categories of device
  - *mobile, screen readers, print, TVs...*
- accessibility features

CSS Basics - cons

Cons

- still experience issues as designers with rendering quirks for certain styles
  - *border styles, wrapping, padding, margins...*
- everything is global
  - *CSS matches required selectors against the whole DOM*
  - *naming strategies can be awkward and difficult to maintain*
- CSS can become a mess very quickly
  - *we tend to add to CSS instead of deleting*
  - *can grow very large, very quickly...*

Demos

week 3

- DOM & HTML
  - *Demo - Our first web page*
  - *Demo - New elements added*
  - *Demo - Semantic structuring*
- DOM & HTML5
  - *Demo - HTML5 Canvas - Rectangle*
  - *Demo - HTML5 Canvas - Square*
  - *Demo - HTML5 Canvas - Assorted Shapes*
  - *Demo - HTML5 Canvas - Retro Breakout Game*
  - *Demo - HTML5 Video playback*
  - *Demo - HTML5 Audio playback*

References

week 3

- HTML5 Test
- MDN
  - *HTML developer guide*
  - *Block-level elements*
  - *Content categories*
  - *Inline elements*
- Unicode
  - *The Unicode Consortium*
  - *Unicode Information*
  - *Unicode examples*
- W3C
  - *HTML Attribute Syntax*
  - *HTML5 Documentation*
- W3 Schools
  - *W3Schools - DOM Image*
  - *W3 Schools - HTML Block and Inline Elements*
  - *W3Schools - HTML5 Semantic Elements*