Comp 324/424 - Client-side Web Design

Spring Semester 2020 - Week 3

Dr Nick Hayward

HTML Basics - <body> - part 6

lists

- unordered list `<ul>`, ordered list `<ol>`, definition list `<dl>`
- `<ul>` and `<ol>` contains list items `<li>`

```
<ul>
  <li>...</li>
</ul>
```

```
<ol>
  <li></li>
</ol>
```

- definition list uses `<dt>` for the item, and `<dd>` for the definition

```
<dl>
  <dt>Game 1</dt>
  <dd>our definition</dd>
</dl>
```

HTML & JS Example - add basic toggle to lists - HTML

```html
<!doctype html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <title>DOM Manipulation - Node Toggle</title>
  </head>
  <body>
    <header>
      <h3>DOM manipulation - Node Toggle</h3>
    </header>
    <section id="quote">
      <p>
        <blockquote id="berryhead" data-visible="true">
          Shine through the gloom, and point me to the skies...
        </blockquote>
      </p>
    </section>
    <section id="content">
      <h4>Planets...</h4>
      <div id="list-output">
        <span id="toggle">toggle...</span>
        <ul id="planets" data-visible="true">
          <li>Mercury</li>
          <li>Venus</li>
          <li>Earth</li>
          <li>Mars</li>
          <li>Jupiter</li>
          <li>Saturn</li>
          <li>Uranus</li>
          <li>Neptune</li>
          <li>Pluto</li>
        </ul>
      </div>
    </section>
    <!-- load JS files - pre module design example -->
    <script type="module" src="./toggle.js"></script>
  </body>
</html>
```

HTML & JS Example - add basic toggle to lists - JS Option 1

- various options for toggling visibility of DOM nodes
- option 1 relies on inefficient iterator of child nodes
- nodes may include elements, text, attributes…

```
// toggle switch
let toggle = document.getElementById('toggle');

// get node in DOM
let domNode = document.getElementById('planets');

toggle.addEventListener('click', () => {
  // get child nodes
  let nodeChildren = domNode.children;
  console.log(nodeChildren);
  if (domNode.getAttribute('data-visible') === 'true') {
      domNode.setAttribute('data-visible', 'false');
      // modify display property for each child
      for (let child of nodeChildren) {
        child.style.color = '#779eab';
        child.style.display = 'none';
       }
    } else {
      domNode.setAttribute('data-visible', 'true');
      // modify display property for each child
      for (let child of nodeChildren) {
        child.style.color = '#000';
        child.style.display = 'list-item';
       }
    }
});
```

- Demo - List Toggle Children

HTML & JS Example - add basic toggle to lists - JS Option 2

- option 2 uses more efficient DOM properties to access required nodes
- access element nodes & ignores text &c. nodes in DOM…

```
// toggle switch
let toggle = document.getElementById('toggle');

toggle.addEventListener('click', () => {
  // get sibling element to toggle...
  let siblingNode = toggle.nextElementSibling;

  // check child node element visibiity
  if (siblingNode.getAttribute('data-visible') === 'true') {
    // update visibility
    siblingNode.setAttribute('data-visible', 'false');
    // hide sibling node
    siblingNode.style.display = 'none';
  } else {
    // update visibility
    siblingNode.setAttribute('data-visible', 'true');
    // show sibling node
    siblingNode.style.display = 'block';
  }
});
```

- Demo - List Toggle Sibling
- JS Info - DOM Nodes

HTML & JS Example - add basic toggle to lists - JS Option 3

- add some initial animation

```
...
function slideUp() {
  if (slideHeight < 1) {
    console.log('slide up - height less than 1...');
    return;
  }
  slideHeight -= 2;
  siblingNode.style.height =  slideHeight + 'px';
  requestAnimationFrame(slideUp);
}

requestAnimationFrame(slideUp);
...
```

- Demo - Toggle vertical with animation
- Demo - Toggle horizontal with animation
- MDN - requestAnimationFrame

HTML Basics - <body> - part 7

forms

- used to capture data input by a user, which can then be processed by the server
- `<form>` element acts as the parent wrapper for a form
- `<input>` element for user input includes options using the *type* attribute
  - *text, password, radio, checkbox, submit*

```
<form>
  Text field: <input type="text" name="textfield" />
</form>
```

- process forms using
  - *e.g. JavaScript...*
- MDN - HTML Forms

HTML - better markup

- web standards are crucial for understanding markup
  - *markup that goes beyond mere presentation*
- improved usage and structure, accessibility, integration…
- with standards, maintenance and extensibility becomes easier
- improved page structure and styling
  - *helps web designers and developers update and augment our code*
- poor markup usage
  - *to achieve a consideration and rendering of pure design*
  - *e.g. nesting tables many levels deep*
  - *adding images and padding blocks for positioning…*
- support for web standards continues to grow in popular browsers
- gives developers option to combine markup and styling
  - *HTML with CSS to achieve greater standards-compliant design*

HTML - markup and standards

- many benefits of understanding and using web standards, e.g.
- *reduced markup*
  - *less code, faster page loading*
  - *less code, greater server capacity, less bandwidth requirements…*
- *separation of concerns*
  - *content, structure, and presentation separated as needed*
  - *CSS used to manage site's design and rendering*
  - *quick and easy to update efficiently*
- *accessibility improvements*
  - *web standards increase no. of supported browsers & technologies…*
- *ongoing compatibility*
  - *web standards help improve chances of compatibility in the future…*

HTML - better structure

- consider *semantic* or *structured* markup
  - *within the context of app usage and domain requirements*
- trying to impart a sense of underlying meaning with markup
  - *correct elements for document markup*
- for a list
  - *use correct list group with list items - e.g.* `ul`, `li`…
- for a table
  - *consider table for data purposes*
  - *structure table & then consider presentation…*
- *semantic* markup helps create *separation of concerns*
  - *separate content and presentation*
  - *improves comprehension and usage*

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>
```

- Demo - 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>
```

HTML - structure & validation - example

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
- Demo - 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*
- Demo - 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 1

e.g. a standard list

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

- Demo - 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>
```

- Demo - 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 1

- 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

- Demo - 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

- Demo - 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

- Demo - 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

- Demo - 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

- Demo - 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

- Demo - 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 1

- 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

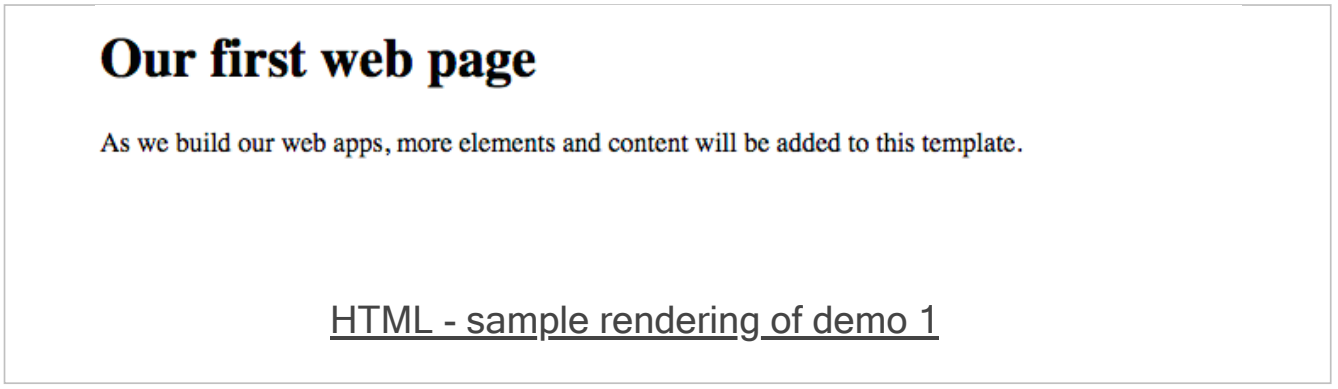
HTML5 - Comments

- 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>
```

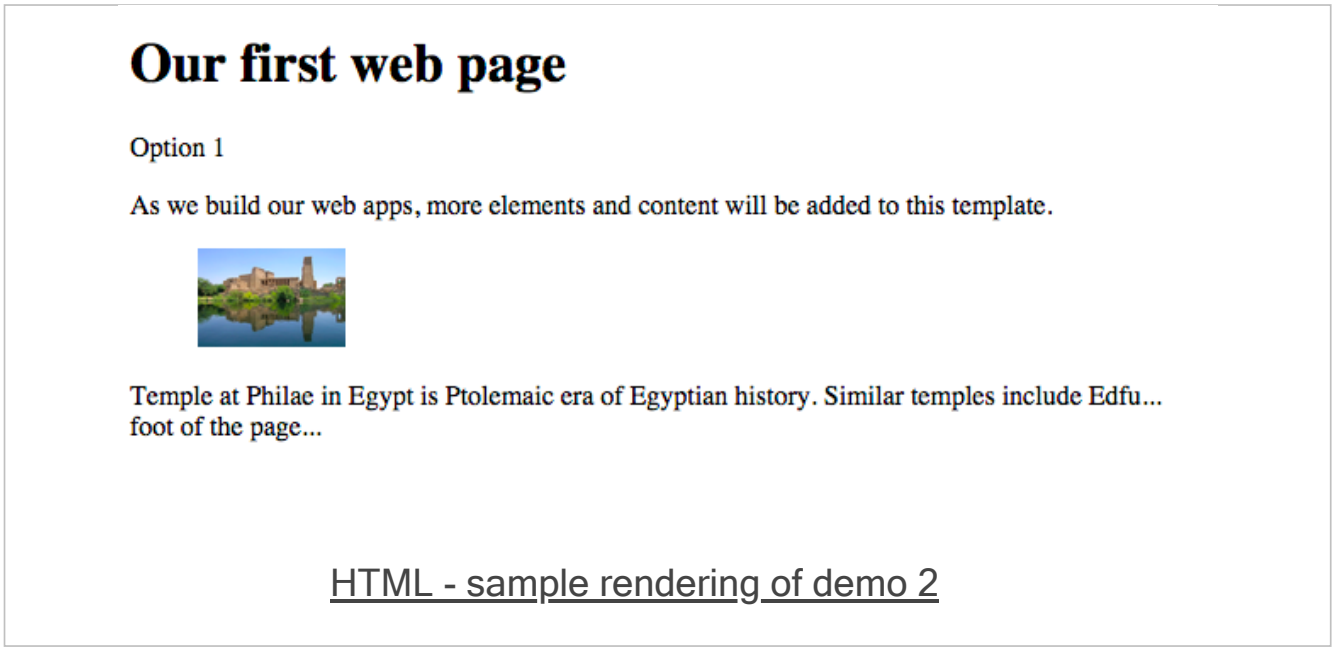
- better structure underlying documents
  - *add clear semantic divisions*

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 - part 1

- `<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 - part 2

- 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*

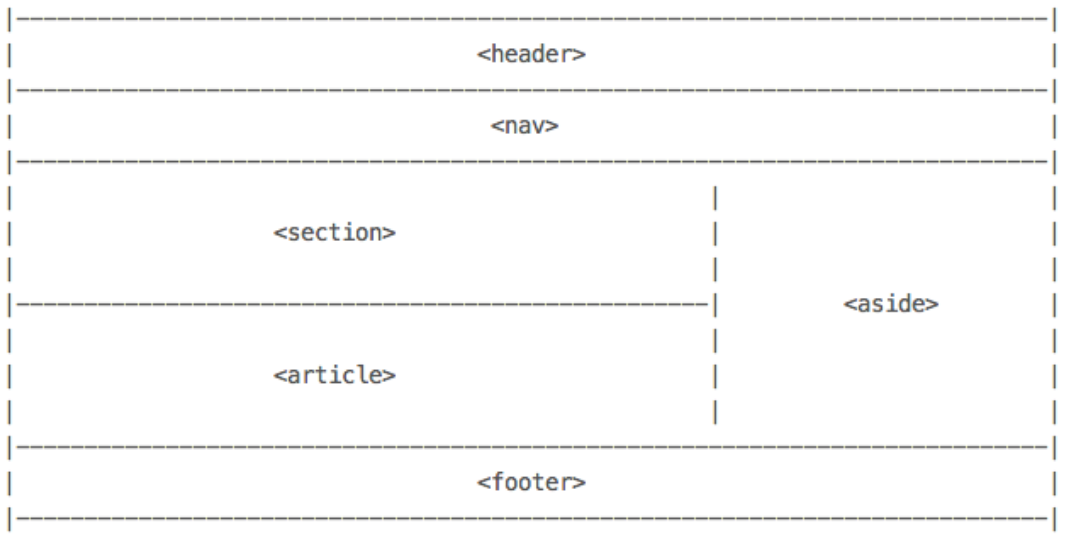
HTML5 - Semantic elements and structure

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

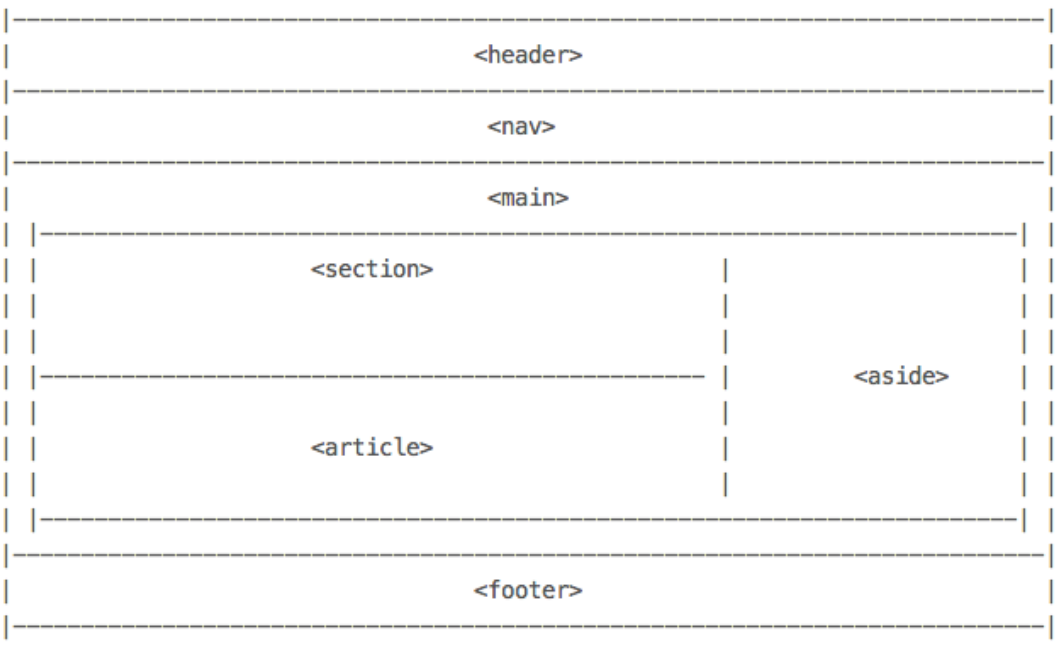
semantic elements



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?*

HTML5 - Extra elements - media - part 1

video

`<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 - part 2

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

HTML5 - Extra elements - media - part 3

audio

`<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 - part 4

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 - part 1

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 - part 2

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 - part 3

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 - part 4

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

HTML5 - Extra elements - graphics - part 5

canvas examples - basics

- basic drawing - rectangle & staircase
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic/*
- Example - basic drawing - stepped pyramid
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic2/*
- Example - various colours
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic3/*
- Example - basic drawing - rectangle outlines
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic4/*
- Example - draw lines - line & pyramid
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic5/*
- Example - draw a stickman
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic6/*
- Example - fill paths
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic7/*

HTML5 - Extra elements - graphics - part 6

canvas examples - curves & circles

- Example - arcs and circles
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic8/*
- Example - Bézier curves - quadratic
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic9-quadratic/*
- Example - Bézier curves - cubic
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic9-cubic/*
- Example - arcs and circles - combine shapes to create an *ankh*
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic10-ankh/*
- Example - circle function
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic11-function-circles/*

HTML5 - Extra elements - graphics - part 7

canvas examples - animation & fun

- Example - horizontal animation
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation1/*
- Example - animate size
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation2/*
- Example - variant mouse colours
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation3.1/*
- Example - variant mouse colours
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation3.2/*
- Example - random movement and animation
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation3.3/*

HTML5 - Extra elements - graphics - part 8

canvas examples - images & files

- Example - draw image to canvas from local file
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-image/basic1/*
- Example - draw image to canvas from local file - `dw` & `dh`
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-image/basic2/*
- Example - draw image to canvas from local file - `dw` & `dh` plus source crop
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-image/basic3/*

HTML5 - Extra elements - graphics - part 9

canvas examples - move & control

- Example - move ball with keyboard control
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move1/*
- Example - update `move()` to check canvas boundaries
  - *ttp://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move2/*
- Example - move ball on 4-point axis
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move3/*
- Example - move sprite image
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-sprite-move1/*
- Example - move sprite image
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move4/*
- Example - check basic collision against blocks
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move5/*
- Example - check basic collision against blocks - horizontal
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move6/*

HTML5 - Extra elements - graphics - part 10

more fun canvas examples

Some fun examples of animations with HTML5 Canvas API.

- Destroy things in a video - http://www.craftymind.com/factory/html5video/CanvasVideo.html
- Particles - https://codepen.io/eltonkamami/pen/ECrKd
- Curtain - https://codepen.io/dissimulate/pen/KrAwx
- Jelly - https://codepen.io/dissimulate/pen/dJgMaO
- Canvas cycle - http://www.effectgames.com/demos/canvascycle/

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…*

CSS Basics - intro to syntax

- simple, initial concepts for CSS syntax
- follows a defined syntax pattern, e.g.
- selector
  - *e.g. `body` or `p`*
- declaration
  - *property and value pairing*

```
body {
  color: black;
  font-family: "Times New Roman", Georgia, Serif;
  }
```

- `body` is the selector, `color` is the property, and `black` is the value.

CSS Basics - rulesets

- a CSS file is a group of rules for styling our HTML documents
- rules form **rulesets**, which can be applied to elements within the DOM
- rulesets consist of the following,
  - *a selector - `p`*
  - *an opening brace - `{`*
  - *a set of rules - `color: blue`*
  - *a closing brace - `}`*
- for example,

```
body {
  width: 900px;
  color: #444;
  font-family: "Times New Roman", Georgia, Serif;
  }
```

- HTML Colour Picker

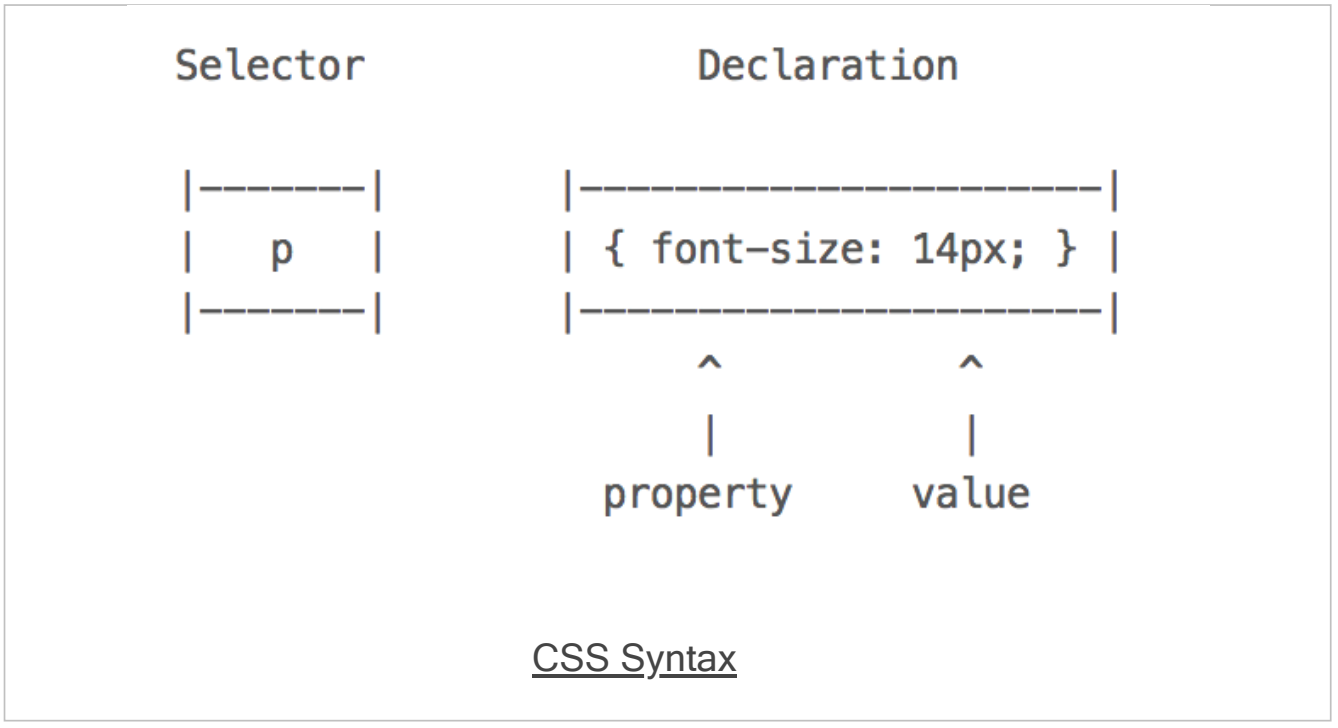
CSS Basics - comments

- add comments to help describe the selector and its properties,

```
/* 'color' can be set to a named value, HEX value (e.g. #444) &c. */
p {
  color: blue;
  font-size: 14px;
  }
```

- comments can be added before the selector or within the braces
- Demo - CSS Basics

Image - CSS Syntax



CSS Syntax

CSS Basics - display

- display HTML elements in one of two ways
  - *inline - e.g. `<a>` or `<span>`*
  - *displays content on the same line*

```
<div class="content">
  <p>
    <a href="...">Philae</a> is a <span>Ptolemaic</span> era temple in Egypt.
  </p>
</div>
```

- more common to display elements as `block-level` instead of `inline` elements
- element's content rendered on a new line outside flow of content
- a few sample block elements include,
  - *`<article>`, `<div>`, `<figure>`, `<main>`, `<nav>`, `<p>`, `<section>`…*
- *block-level* is not technically defined for new elements in HTML5
- Demo - CSS Basics - Add a Class

CSS Basics - inline elements

Current inline elements include, for example:

- b | big | i | small
- abbr | acronym | cite | dfn | em | strong | var
- a | br | img | map | script | span | sub | sup
- button | input | label | select | textarea
- …

Source - MDN - Inline Elements

n.b. not all inline elements supported in HTML5

CSS Basics - block-level elements

Current block-level elements include:

- address | article | aside | blockquote | canvas | div
- fieldset | figure | figcaption | footer | form
- h1 | h2 | h3 | h4 | h5 | h6
- header | hgroup | hr | main | nav
- ol | output | p | pre | section | table | tfoot | ul | video
- …

Source - MDN - Block-level Elements

n.b. *block-level* is not technically defined for new elements in HTML5

CSS Basics - HTML5 content categories - part 1

- **block-level** is not technically defined for new elements in HTML5
- now have a slightly more complex model called **content categories**
- includes three primary types of content categories

These include,

- **main content categories** - describe common content rules shared by many elements
- **form-related content categories** - describe content rules common to form-related elements
- **specific content categories** - describe rare categories shared by only a small number of elements, often in a specific context

CSS Basics - HTML5 content categories - part 2

- **Metadata content** - modify presentation or behaviour of document, setup links, convey additional info…
  - *<base>, <command>, <link>, <meta>, <noscript>, <script>, <style>, <title>*
- **Flow content** - typically contain text or embedded content
  - *<a>, <article>, <canvas>, <figure>, <footer>, <header>, <main>…*
- **Sectioning content** - create a section in current outline to define scope of <header> elements, <footer> elements, and *heading* content
  - *<article>, <aside>, <nav>, <section>*
- **Heading content** - defines title of a section, both explicit and implicit sectioning
  - *<h1>, <h2>, <h3>, <h4>, <h5>, <h6>, <hgroup>*

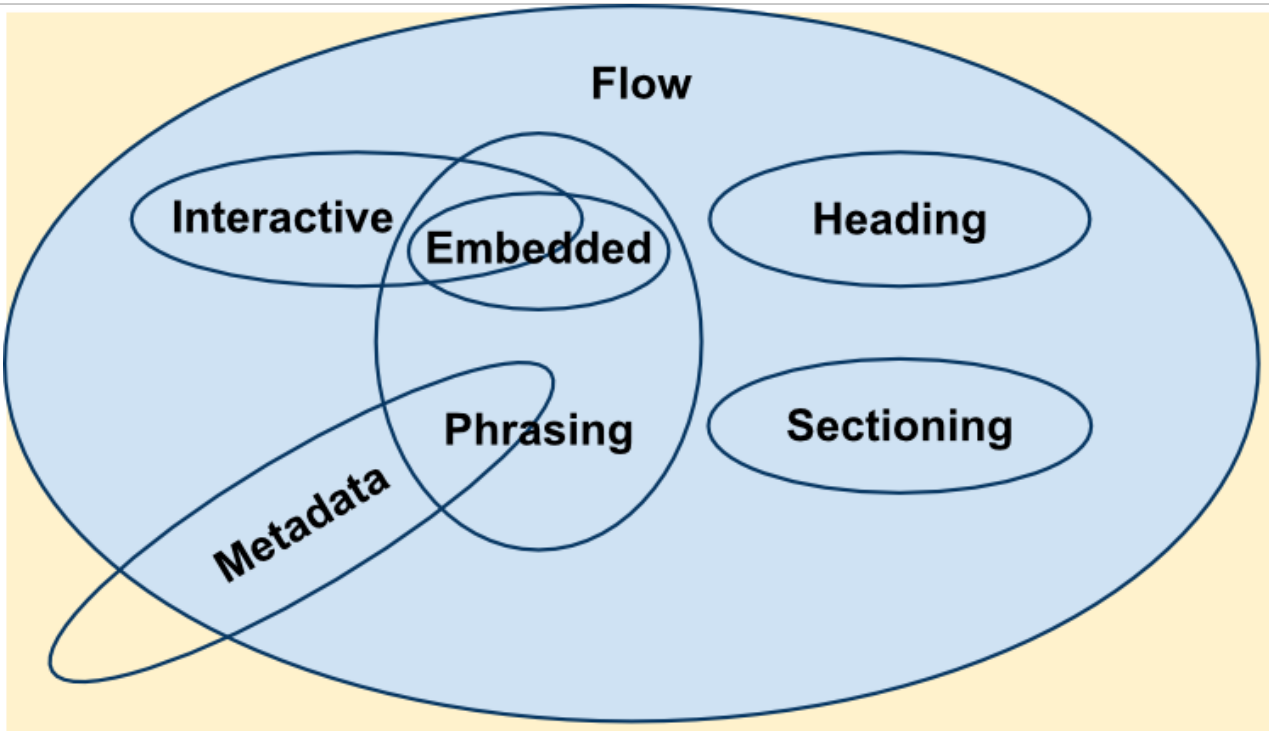
Source - MDN Content Categories

CSS Basics - HTML5 content categories - part 3

- **Phrasing content** - defines the text and the mark-up it contains
  - *`<audio>`, `<canvas>`, `<code>`, `<img>`, `<label>`, `<script>`, `<video>`…*
  - *other elements can belong to this category if certain conditions are met. e.g. `<a>`*
- **Embedded content** - imports or inserts resource or content from another mark-up language or namespace
  - *`<audio>`, `<canvas>`, `<embed>`, `<iframe>`, `<img>`, `<math>`, `<object>`, `<svg>`, `<video>`*
- **Interactive content** - includes elements that are specifically designed for user interaction
  - *`<a>`, `<button>`, `<details>`, `<embed>`, `<iframe>`, `<keygen>`, `<label>`, `<select>`, `<textarea>`*
  - *additional elements, available under specific conditions, include*
    - `<audio>`, `<img>`, `<input>`, `<menu>`, `<object>`, `<video>`
- **Form-associated content** - elements contained by a form parent element
  - *`<button>`, `<input>`, `<label>`, `<select>`, `<textarea>`…*
  - *there are also several sub-categories, including listed, labelable, submittable, resettable*

Source - MDN Content Categories

Image - HTML5 Content Categories



HTML5 Content Categories

Source - MDN - Content Categories

CSS Basics - box model - part 1

- consideration of the CSS box model
- a document's attempt to represent each element as a rectangular box
- boxes and properties determined by browser rendering engine
- browser calculates size, properties, and position of these required boxes
- properties can include, for example,
  - *colour, background features, borders, width, height…*
- box model designed to describe an element's required space and content
- each box has a series of edges,
  - *margin edge*
  - *border edge*
  - *padding edge*
  - *content edge*

CSS Basics - box model - part 2

Content

- box's **content area** describes element's actual content
- properties can include `color`, `background`, `img`…
  - *apply inside the **content** edge*
- dimensions include **content width** and **content-height**
- content size properties (assuming that the `box-sizing` property remains default) include,
  - *`width`, `min-width`, `max-width`, `height`, `min-height`, `max-height`*

Demo - CSS Box Model

- Demo - CSS Box Model

CSS Basics - box model - part 3

Padding

- box's **padding area** includes the extent of the padding to the surrounding border
- background, colour etc properties for a content area extend into the padding
  - *we often consider the padding as extending the content*
- padding itself is located in the box's **padding edge**
- dimensions are the width and height of the **padding-box**.
- control space between padding and content edge using the following properties,
  - `padding-top`, `padding-right`, `padding-bottom`, `padding-left`
  - `padding` *(sizes calculated clock-wise)*

Demo - CSS Box Model - Padding

- JSFiddle - CSS Box Model

CSS Basics - box model - part 4

Border

- **border area** extends **padding area** to area containing the borders
- it becomes the area inside the **border edge**
- define its dimensions as the width and height of the **border-box**
- calculated area depends upon the width of the `border` we set in the CSS
- set size of our border using the following properties in CSS,
  - *`border-width`*
  - *`border`*

Demo - CSS Box Model - Border

- JSFiddle - CSS Box Model

CSS Basics - box model - part 5

Margin

- **margin area** can extend this border area with an empty area
  - *useful to create a defined separation of one element from its neighbours*
- dimensions of area defined as width and height of the **margin-box**
- control size of our margin area using the following properties,
  - `margin-top`, `margin-right`, `margin-bottom`, `margin-left`
  - `margin` *(sizes calculated clock-wise)*

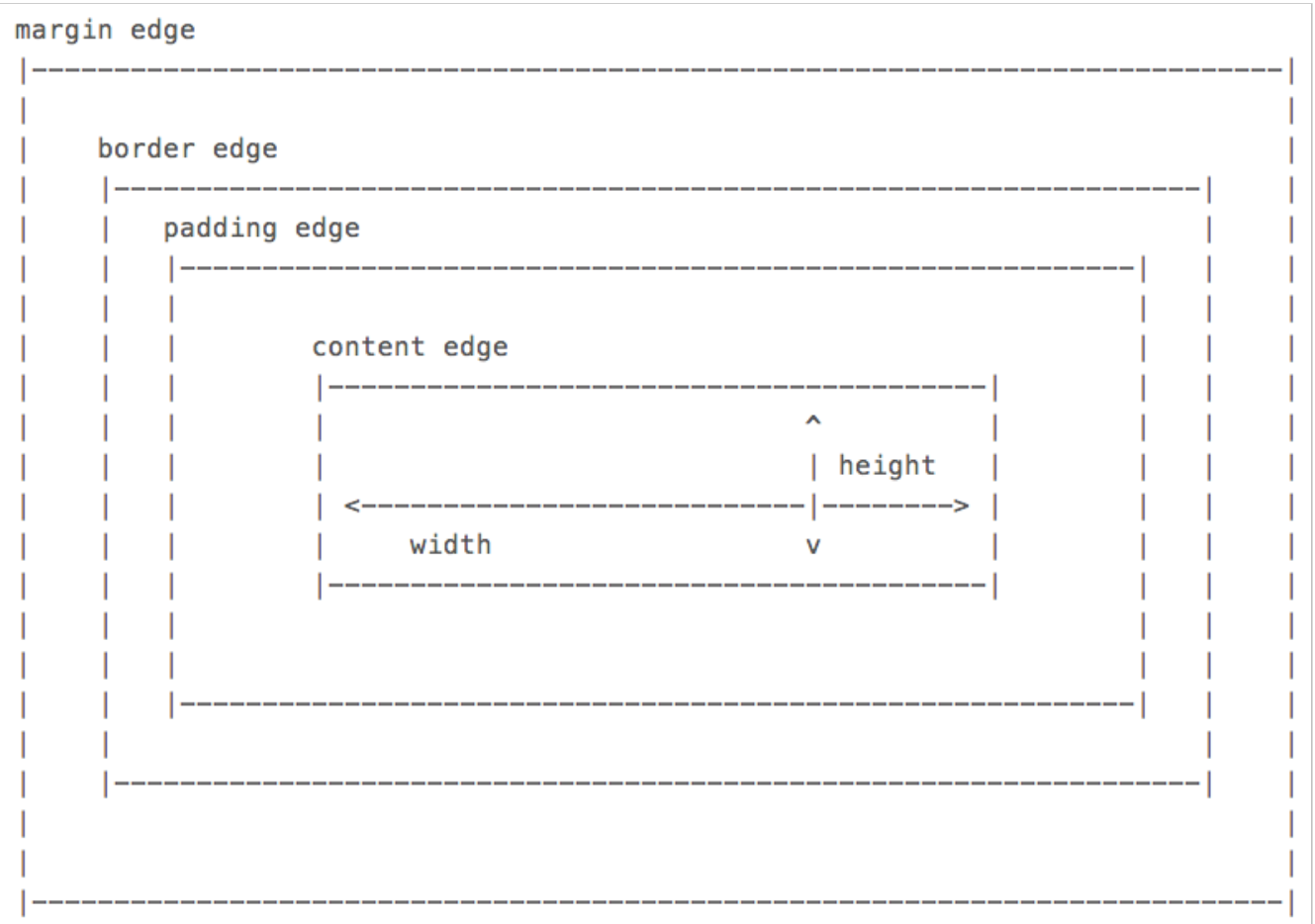
Demo - CSS Box Model - Margin

- JSFiddle - CSS Box Model

Demo - CSS Box Model

- Demo - CSS Box Model

Image - CSS Box Model



CSS Box Model

Source - MDN - CSS Box Model

Demo - CSS Box Model - Interactive

- interactive Box Model

Demos

- HTML
  - *Basic Attribute*
  - *Basic Attribute 2*
  - *Basic group*
  - *Basic group style*
  - *Basic list items*
  - *Basic menu tabs*
  - *Basic table caption*
  - *Basic table for presentation*
  - *Basic table with accessibility*
  - *Basic table with head, foot, body*
  - *Basic table with headers*
  - *Basic table with summary*
  - *DOM Basics - Sample*
  - *List Toggle Children*
  - *List Toggle Sibling*
  - *Semantic example usage*
  - *Toggle horizontal with animation*
  - *Toggle vertical with animation*
- HTML5
  - *Basic structure*
  - *New elements added*
  - *Semantic structuring*
  - *HTML5 Video playback*
  - *HTML5 Audio playback*
- HTML5 Canvas demos
  - *HTML5 Canvas - Rectangle*
  - *HTML5 Canvas - Square*

- *HTML5 Canvas - Assorted Shapes*
- *HTML5 Canvas - Retro Breakout Game*
- *please see links in slides for further examples...*

- CSS
  - *CSS Basics*
  - *CSS - Box Model*
  - *CSS - Interactive Box Model*
- CSS - JSFiddle tests
  - *CSS Box Model*
  - *CSS Box Model Padding*

Resources

part 1

- Jaffe, Jim., *Application Foundations For The Open Web Platform*. W3C. 10.14.2014. http://www.w3.org/blog/2014/10/application-foundations-for-the-open-web-platform/
- MDN - Using Dynamic Styling Information
- The Unicode Consortium
- Unicode Information
  - *Unicode examples*
- W3 Docs for further details

part 2

- Can I Use_____?
  - *e.g. Can I Use Drag and Drop?*
- Check browser compatibility using HTML5 Test
- HTML Colour Picker
- HTML5 Audio & Codecs
- JS Info - DOM Nodes
- MDN Documentation
  - *Block-level Elements*
  - *Content Categories*
  - *CSS Box Model*
  - *CSS Selectors*
  - *Global Attributes*
  - *HTML developer guide*
  - *requestAnimationFrame*

- *Section element*

- W3C Documentation
  - *Section element*
- HTML5 Canvas - fun examples
  - *Destroy things in a video*
  - *Particles*
  - *Curtain*
  - *Jelly*
  - *Canvas cycle*