Comp 324/424 - Client-side Web Design

Fall Semester 2018 - Week 3

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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

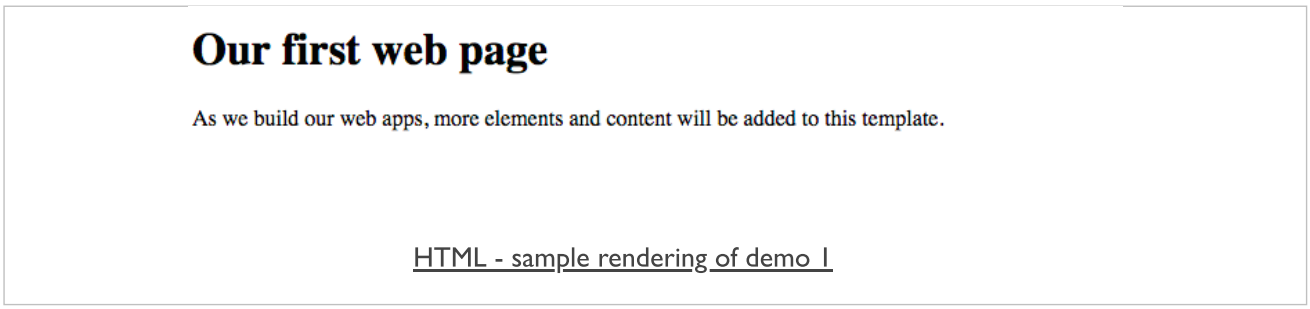
HTML5 - Comments

- 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>
```

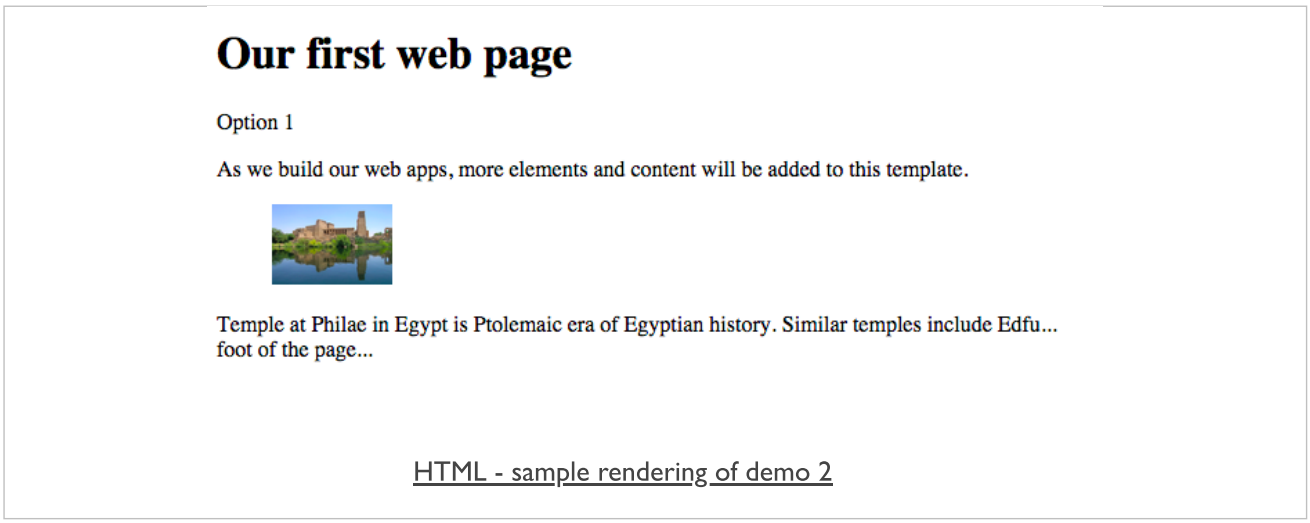
- better structure underlying documents
  - *add clear semantic divisions*

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*

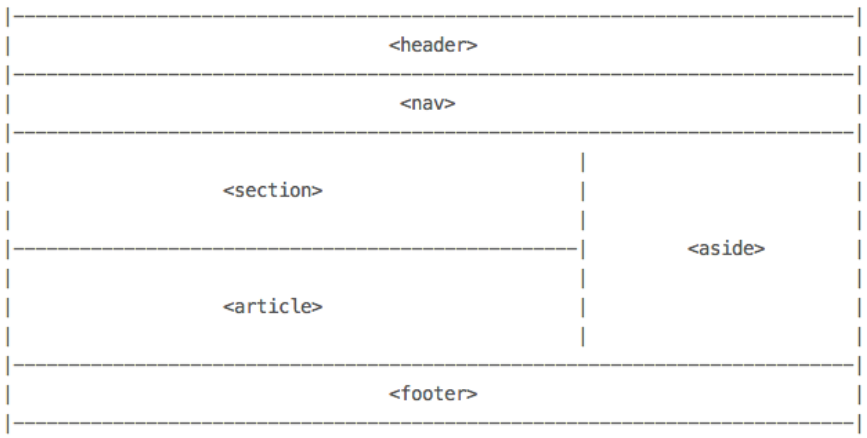
HTML5 - Semantic elements and structure

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

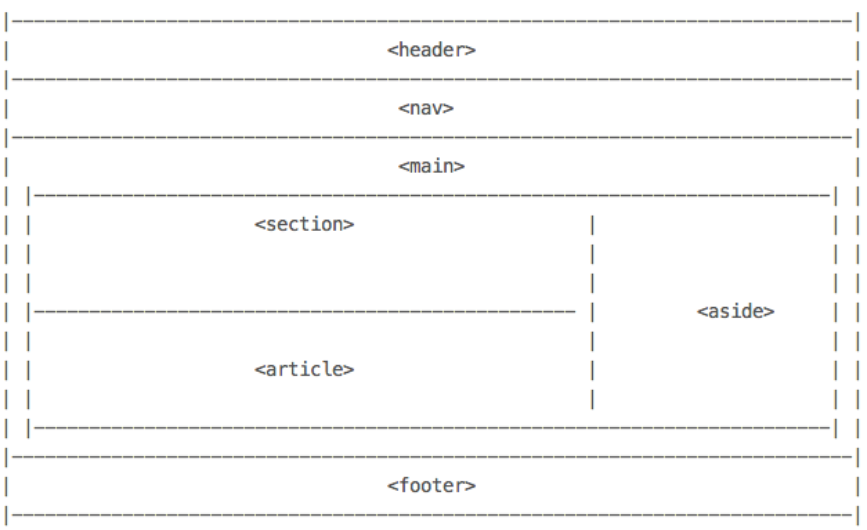
semantic elements



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/

fun exercise

Choose one of the following app examples,

- magazine or news reader
  - *e.g. a local newspaper, or perhaps a news aggregator*
- social media aggregator
  - *collect and display updates and news from various social media APIs*
- gaming portal for a community
  - *collect latest scores, news, comments, photos &c. for a chosen game*

Then, consider the following

- initial HTML5 structural design and layout
- required semantic markup for a chosen example page
  - *e.g. elements and nested usage, structure &c.*
- structural parts of the app with regular updates
  - *e.g. news and content update...*

~ 10 minutes

Demos

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

Resources

- Can I Use_____?
  - *e.g. Can I Use Drag and Drop?*
- Check browser compatibility using HTML5 Test
- HTML5 Audio & Codecs
- MDN Documentation
  - *Section element*
- W3C Documentation
  - *Section element*

Extras

- HTML5 Canvas - fun examples
  - *Destroy things in a video*
  - *Particles*
  - *Curtain*
  - *Jelly*
  - *Canvas cycle*