# HTML

## **Objectives**

- Describe hypertext and HTML standards
- Understand HTML elements and markup tags
- Create the basic structure of an HTML file
- Learn HTML5 tags

### **Outline**

#### 1. Basic HTML

- hypertext
- tags & elements
- text formatting
- lists, hyperlinks, images
- tables, frames

#### 2. HTML5

### **Hypertext & HTML**

- HyperText Markup Language (HTML) is the language for specifying the *static* content of Web pages (based on SGML, the Standard Generalized Markup Language)
  - hypertext refers to the fact that Web pages are more than just text
    - can contain multimedia, provide links for jumping within the same document & to other documents
  - markup refers to the fact that it works by augmenting text with special symbols (tags) that identify the document structure and content type

# **Hypertext & HTML (cont.)**

- HTML 1 (Berners-Lee, 1989): very basic, limited integration of multimedia in 1993, Mosaic added many new features (e.g., integrated images)
- HTML 2.0 (IETF, 1995): tried to standardize these & other features, but late in 1994-96, Netscape & IE added many new, divergent features
- HTML 3.2 (W3C, 1997): attempted to unify into a single standard but didn't address newer technologies like Java applets & streaming video
- HTML 4.0 (W3C, 1997): attempted to map out future directions for HTML, not just react to vendors
- HTML 5 (W3C, 2014): adds new tags and attributes

# **Tags and Elements**

- HTML specifies a set of tags that identify structure of the document and the content type
  - tags are enclosed in < >
    - <img src="image.gif" /> specifies an image
  - most tags come in pairs, marking a beginning and ending
    - <title> and </title> enclose the title of a page
- An HTML *element* is an object enclosed by a pair (in most cases) of tags
  - <title>My Home Page</title> is a TITLE element
  - <b>This text appears bold.</b> is a BOLD element
  - Part of this text is <b>bold</b>. is a PARAGRAPH element that contains a BOLD element

An HTML document is a collection of elements (text/media with context).

### **Structural Elements**

- an HTML document has two main structural elements
  - HEAD contains setup information for the browser & the Web page
  - BODY contains the actual content to be displayed in the Web page

```
<html>
<!-- First file---->
<head>
<title>My first HTML document</title>
</head>
<body>
 Hello world! 
</body>
</html>
```

```
HTML documents : <html> and </html> tags
```

Comments: <!-- and -->

HEAD section: <head> and </head> tags

BODY section: <body> and </body>

view page

# <head> and <body> elements

- <head> element
  - Title
  - Cascading Style sheet information
  - "Meta" data, such as who authored the page, keywords
  - JavaScript code
- The <body> element
  - Paragraphs
  - Tables and lists
  - Images
  - JavaScript code
  - PHP code

## **Text Layout**

```
<html>
<!-- CS443 page02.html 17.09.14 -->
<head>
 <title>Text Layout</title>
</head>
<body>
 >
 This is a paragraph of text<br/>
 made up of two lines.
 >
 This is another paragraph with a
   GAP   between
 some of the words.
 >
     This paragraph is<br/>
 indented on the first line<br/>
 but not on subsequent lines.
 </body>
</html>
```

- For the most part, layout of the text is left to the browser
  - whitespace is interpreted as a single space
  - browser automatically wraps the text to fit the window size
- Can override some text layout
  - can specify a new paragraph (starts on a new line, preceded by a blank line) using
     ...
  - can cause a line break using the <br/>
  - can force a space character using

# **Separating Blocks of Text**

```
<html>
<!-- CS443 page03.html 15/08/06 -->
<head>
 <title>Blocks of Text</title>
</head>
<body>
  <h1>Major heading 1</h1>
  >
 Here is some text.
  <h2>Subheading</h2>
  >
 Here is some subtext.
  <hr/>
  <h1>Major heading 2</h1>
  >
  Here is some more text.
  </body>
</html>
```

 Can specify headings for paragraphs or blocks of text

```
•<h1>...</h1> tags produce a large, bold heading
```

•<h2>...</h2> tags produce a slightly smaller heading

•. . .

•<h6>...</h6> tags produce a tiny heading

Can insert a horizontal rule

•<hr/> draws line across window

# The Basic Web page – A Worked Example

```
<ht.ml>
<!-- CS443 page22.html 17.10.14 -->
  <head>
     <title> Bill Smiggins Inc. </title>
  </head>
  <body>
     <h1>Bill Smiggins Inc.</h1>
     <h2>About our Company...</h2>
     This Web site provides clients, customers,
        interested parties and our staff with all of
        the information that they could want on
        our products, services, success and failures.
     <hr/>
     <h3> Products </h3>
      We are probably the largest
     supplier of custom widgets, thingummybobs, and bits
     and pieces in North America. 
     <hr/>
  </body>
</ht.ml>
```

view page 11

### **Text Appearance**

```
<ht.ml>
<!-- CS443 page25.html 15.08.06 -->
<head>
 <title>Text Variations and Escape
Sequences</title>
</head>
<body>
 <h1>Text Variations</h1>
 We can use <b>simple</b> tags to
    <i>change</i> the appearance of
    <strong>text</strong> within
    <tt>Web pages</tt>.
    Even super<sup>script</sup>
    and sub<sub>scripts</sub> are
     <em>supported.
  <h1>Text Escape Sequences</h1>
 >
   & < &gt; &quot; &copy;
 <h1>Preformatted text</h1>
     <
        University of Liverpool
        Department of Computer Science
        Ashton Building, Ashton Street
        Liverpool, L69 3BX, UK
     </body>
</html>
```

- can specify styles for fonts
  - •<b>... </b> specify bold
  - •<i>... </i> specify italics
  - •<big>... </big> increase the size
  - •<small>... </small> decrease the size
  - •<em>...
    put emphasis
  - •<strong>...</strong> put more emphasis
  - •<sub>... </sub> specify a subscript
  - •<sup>... </sup> a superscript

### Lists

```
<html>
<!-- CS443page07.html 23.09.08 -->
<head> <title>(Sort of) Simple Lists</title>
 <style type="text/css">
 .my li:before { content: counter(list) ": ";
              counter-increment: list; }
 </style> </head>
<body>
... first list item... 
... second list item... 
<d1>
     <dt> Dweeb </dt>
  <dd>young excitable person who may
 mature into a <em>Nerd</em> </dd>
<dt> Hacker </dt>
    <dd> a clever programmer </dd>
<dt> Nerd </dt> <dd> technically bright but
      socially inept person </dd>
</d1>
counter-reset: list 29;" >
 Makes first item number 30.
 Next item continues to number
31.
</body>
</html>
```

- There are 3 different types of list elements
  - ... specifies an ordered list
    - <|i> identifies each list item
  - specifies unordered list
    - identifies each list item
  - <dl>...</dl> specifies a definition list
    - <dt> identifies each term
    - <dd> identifies its definition

view page

# **Hyperlinks**

```
<html>
                      17.10.14 -->
<!-- CS443page08.html
<head>
 <title>Hyperlinks</title>
</head>
<body>
  >
 <a href="http://www.liv.ac.uk">
 The University of Liverpool </a>
 <br/>
 <a href="page07.html"
target=" blank">
  Open page07 in a new window</a>
 </body>
</html>
```

view page

• Perhaps the most important HTML element is the hyperlink, or ANCHOR

- <a href="URL">...</a>
  - where URL is the Web address of the page
  - if the page is accessed over the Web, must start with http://
  - if not there, the browser will assume it is the name of a local file
- <a href="URL" target="\_blank">...</a>
  - causes the page to be loaded in a new Window

# **Hyperlinks (cont.)**

```
<html>
<!-- CS443 page09.html 21.09.12 -->
<head>
 <title>Internal Links in a Page</title>
</head>
<body>
  >
  ( <a href="#HTML">HTML</a>
    <a href="#HTTP">HTTP</a> |
    <a href="#IP">IP</a> |
    <a href="#TCP">TCP</a> ]
  < q >
  >
  Computer acronyms:
  <d1>
   <dt id="HTML">HTML</dt>
   <dd>HyperText Markup Language
   <dt id="HTTP">HTTP</dt>
   <dd>HyperText Transfer Protocol...</dd>
   <dt id="IP">IP</dt>
   <dd>Internet Protocol...</dd>
  <dt id="TCP">TCP</dt>
  <dd>Transfer Control Protocol...</dd>
  </dl>
 </body>
</html>
```

- for long documents, you can even have links to other locations in that same document
- <xxxx id="ident">...</xxxx>
  - ident is a variable for identifying this location
  - "xxxx" can be any HTML element
- <a href="#ident">...</a>
  - will then jump to that location within the file
- <a href="URL#ident">...</a>
  - can jump into the middle of another file just as easily

## **Images**

```
<img src="URL (or filename)" height="n" width="n"
alt="text" title= "text" />
```

view page

# Images (cont.)

- src specifies the file name (and can include a URL)
- width and/or height dimensions in pixel
- title displayed when the mouse is "hovered" over the picture
- alt text that is displayed when the image is missing, can't be loaded

### **Tables**

```
<html>
<!-- CS443 page11.html 17.10.14 -->
<head>
 <title>Tables</title>
</head>
<body>
<h2>A Simple Table</h2>
  Left Column 
    Right Column 
  Some data 
    Some other data 
  </body>
</html>
```

```
... specify a table element
```

```
... specify a row in the table
```

... specify table data (i.e., each column entry in the table)

view page

## Layout in a Table

```
<html>
<!-- CS443 page12.html 17.10.14 -->
<head>
<title>Table Layout</title>
</head>
<body>
Left<br/>Column
  <td style="border: 1px solid;
    vertical-align: top;">
      Right Column
 Some data
   Some data
 </body>
</html>
```

Border on tables using the "style" attribute

Horizontal & vertical layout within cells

Layout to an entire row

#### **Table Width**

```
<html>
<!-- CS443 page13.html 17.10.14 -->
<head>
 <title>Table Width</title>
</head>
<body>
left-most 
   right-most
  </body>
</html>
```

- by default, the table is sized to fit the data
- can override & specify the width of a table relative to the page

#### For example

### **Other Table Attributes**

```
< html>
<!-- CS443 page14.html 17.10.14 -->
<head>
 <title>Table Formatting</title>
<style type="text/css" media="screen">
   table { border: 1px solid; padding: 1px;}
   th, td { border: 1px solid; padding: 10px;
           text-align: center; }
 </style>
</head>
<body>
 \langle t.r \rangle
    HEAD1 HEAD2
HEAD3
   <t.r>
    one two three
    four 
     five 
   </t.r>
    six  seven 
  </body>
                         view page
</html>
```

- •Can control the space between cells & margins within cells using "padding" attribute
- Can add headings
- is similar to but displays heading centered in bold
- Can have data that spans more than one column

Can span more than one row

#### **Content vs. Presentation**

- Most HTML tags define content type, independent of presentation.
  - exceptions? (e.g. <b> ..... </b> for bold text and <i> ..... </i> for italicized text)
- Style sheets associate presentation formats with HTML elements.
  - CSS1: developed in 1996
  - CSS2: released in 1998
  - CSS3: introduced in 1999, lastest version (as of 2022)
- The trend has been towards an increasing separation of the <u>content</u> of webpages from the <u>presentation</u> of them.
- Style sheets allow us to maintain this separation, which allows for easier maintenance of webpages, and for a consistent look across a collection of webpages.

# Content vs. Presentation (cont.)

- Style sheets can be used to specify how tables should be rendered, how lists should be presented, what colors should be used on the webpage, what fonts should be used and how big/small they are, etc.
- HTML style sheets are known as *Cascading Style Sheets*, since can be defined at three different levels
  - 1.inline style sheets apply to the content of a single HTML element
  - 2.document style sheets apply to the whole BODY of a document
  - 3.external style sheets can be linked and applied to numerous documents, might also specify how things should be presented on screen or in print lower-level style sheets can override higher-level style sheets
- User-defined style sheets can also be used to override the specifications of the webpage designer. These might be used, say, to make text larger (e.g. for visually-impaired users).

# **Inline Style Sheets**

```
<html>
<!-- CS443 page17.html 17.10.14 -->
<head>
 <title>Inline Style Sheets</title>
</head>
<body>
 serif;
           text-align:right">This is a
 right-justified paragraph in a sans
serif
 font (preferably Arial), with some
 <span style="color:green">green
text</span>.
 And <a style="color:red;"
                 text-decoration:none;
                 font-size:larger;"
         href="page01.html">here</a>
    is a formatted link.
 </body>
</html>
                 view page
```

- Using the style attribute, you can specify presentation style for a single HTML element
- within tag, list sequence of property:value pairs separated by semi-colons

```
font-style:italic
font-weight:bold
font-size:12pt font-size:large font-size:larger

color:red color:#000080
background-color:white

text-decoration:underline
text-decoration:none
text-align:left text-align:center
text-align:right text-align:justify
vertical-align:top vertical-align:middle
vertical-align:bottom
```

font-family:Courier,monospace

# Inline Style Sheets (cont.)

```
<html>
<!-- CS443 page18.html 17.09.09 -->
<head>
 <title>Inline Style Sheets</title>
</head>
<body>
 Here is an image
   <imq src="VictoriaBldg.jpeg"</pre>
      alt="image of Victoria Building"
      style="margin-left:0.3in;
            margin-right:0.3in;
            vertical-align:middle;
            border-style:double;
            border-color:blue" />
   embedded in text.
 one thing
  or another
   whitespace:pre">
    with this
            that
    or
   </body>
</html>
```

#### •more style properties & values

margin-left:0.1in margin-right:5%

margin:3em

padding-top:0.1in padding-bottom:5%

padding:3em

border-width:thin border-width:thick

border-width:5

border-color:red

border-style:dashed border-style:dotted border-style:double border-style:none

whitespace:pre

list-style-type:square list-style-type:decimal

list-style-type:lower-alpha

list-style-type:upper-roman

# Inline Style Sheets (cont.)

```
< ht.ml>
<!-- CS443 page19.html 17.10.14 -->
<head>
 <title> Inline Style Sheets </title>
</head>
<body>
 <caption style="color:red;</pre>
             font-style:italic;
             text-decoration:underline">
    Student data. </caption>
   name   age 
  <t.r>
    Chris Smith  19 
  <t.r>
    Pat Jones  20 
  <t.r>
    Doogie Howser  9 
  </t.r>
</body>
</html>
               view page
```

•style sheets can be applied to tables for interesting effects

## **Document Style Sheets**

- Inline style sheets apply to individual elements in the page.
  - using inline style directives can lead to inconsistencies, as similar elements are formatted differently
    - e.g., we might like for all <h1> elements to be centered
  - inline definitions mix content & presentation
    - → violates the general philosophy of HTML
- As a general rule, inline style sheet directives should be used as sparingly as posible
- Alternatively, document style sheets allow for a cleaner separation of content and presentation.
  - style definitions are placed in the <head> of the page (within STYLE tags)
  - can apply to all elements, or a subclass of elements, throughout the page sible.

### **Document Style Sheets**

```
<html>
<!-- CS443 page20.html 17.10.14 -->
<head>
  <title>Document Style Sheets</title>
  <style type="text/css">
     h1 {color:blue;
         text-align:center}
     p.indented {text-indent:0.2in}
  </style>
</head>
<body>
  <h1> Centered Title </h1>
  This paragraph
will have the first line indented, but
subsequent lines will be flush. 
  This paragraph will not be
indented.
  \langle h1 \rangle The End \langle /h1 \rangle
</body>
</html>
```

- document style sheets ensure that similar elements are formatted similarly
- can even define subclasses of elements and specify formatting
  - p.indented defines subclass of paragraphs
  - inherits all defaults of
  - adds new features

to specify this newly defined class, place class="ID" attribute in tag

•note how "clean" the <body> element is

# **Document Style Sheets (cont.)**

```
< ht.ml>
<!-- CS443 page21.html 17.10.14 -->
<head>
 <title> Inline Style Sheets </title>
<style type="text/css">
    table {font-family:Arial, sans-serif}
    caption {color:red;
            font-style:italic;
            text-decoration:underline}
    th {background-color:red}
 </style>
</head>
<body>
 <caption> Student data. </caption>
   \langle tr \rangle \langle th \rangle name \langle /th \rangle \langle th \rangle age \langle /th \rangle \langle /tr \rangle
    Doogie Howser  9 
</body>
</html>
```

- document style sheets are especially useful in formatting tables
- •effectively separates content from presentation
- what if you wanted to right-justify the column of numbers?
- what if you changed your mind?

view page

#### **Pseudo-Elements**

```
<html>
<!-- CS443 page23.html 17.10.14 -->
<head>
 <title>Title for Page</title>
 <style type="text/css">
     a {color : red;
        text-decoration : none;
        font-size : larger}
     a:visited {color : black}
     a:active {color : orange}
     a:hover {color : blue}
     p:first-letter {font-size : large;
             color : white;
             background-color : darkblue}
 </style>
</head>
<body>
  Welcome to my Web page. I am so
 happy you are here.
 > Be sure to visit
 <a href="http://www.cnn.com">CNN</a>
 for late-breaking news.
 </body>
</html>
                             view page
```

•pseudo-elements are used to address sub-parts of elements

can specify appearance of link in various states

```
:visited :active :hover
```

 can specify format of first line in page or paragraph

```
:first-line
```

 can specify format of first letter in page or paragraph

```
:first-letter
```

• Danger: changing the look of familiar elements is confusing

# **External Style Sheets**

- modularity is key to the development and reuse of software
  - design/implement/test useful routines and classes
  - package and make available for reuse
  - saves in development cost & time
  - central libraries make it possible to make a single change and propagate the changes
- external style sheets place the style definitions in separate files
  - multiple pages can link to the same style sheet, consistent look across a site
  - possible to make a single change and propagate automatically
  - represents the ultimate in content/representation separation

# **Modularity & Style Sheets**

```
< ht.ml>
<!-- CS443 page26.html 17.10.14 -->
<head>
  <title>Title for Page</title>
  <link rel="stylesheet"</pre>
        type="text/css"
        href="myStyle.css"
        title="myStyle" />
</head>
<body>
<h1>Centered Title</h1>
 This paragraph
will have the first line indented, but
subsequent lines will be flush.
This paragraph will not be
indented.
 \langle h1 \rangleThe End\langle h1 \rangle
</body>
                          view page
</html>
```

```
/* myStyle.css CS443 02.09.05 */
h1 {color : blue; text-align : center}
p.indented {text-indent:0.2in}
```

- •Ideally, the developer(s) of a Web site would place all formatting options in an external style sheet.
- •All Web pages link to that same style sheet for a uniform look.
- simplifies Web pages since only need to specify structure/content tags
- Note: no <style> tags are used in the external style sheet

# <div> and <span> Tags

- Problem: font properties apply to whole elements, which are often too large
  - Solution: a new tag to define an element in the content of a larger element <span>
  - <span> is an inline element used to mark up a part of text

```
Now is the <span> best time </span> ever!
```

Use <span> to apply a document style sheet definition to its content

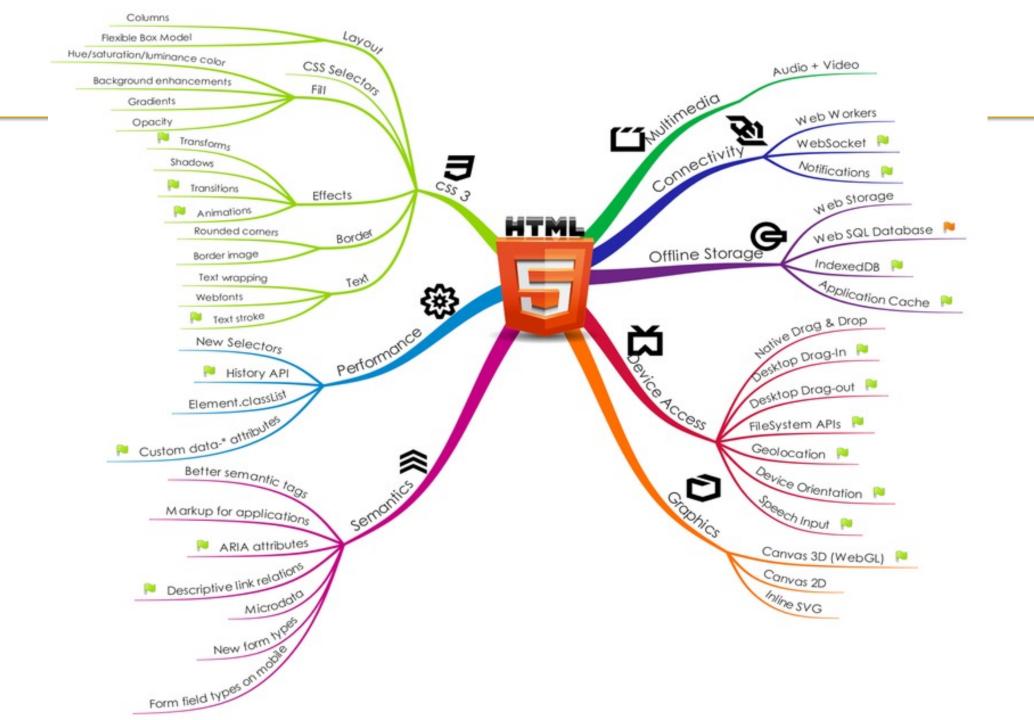
```
<style type = "text/css">
  .bigred {font-size: 24pt;
  font-family: Ariel; color: red}
  </style>
  ...
   Now is the <span class="bigred">
        best time </span> ever!
```

■ The <span> tag is similar to other HTML tags, they can be nested and they have id and class attributes

## **Outline**

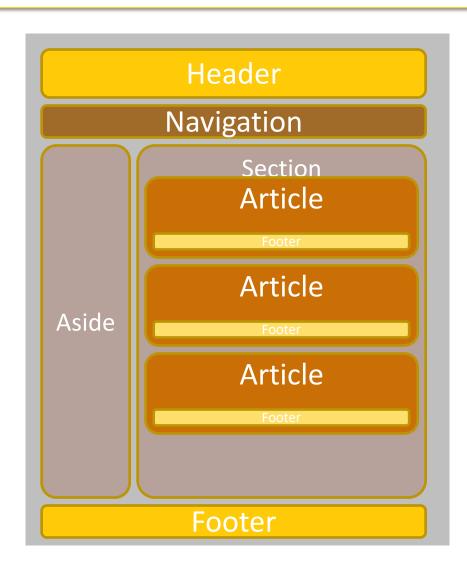
1. Basic HTML

**2.** HTML5



```
<!DOCTYPE html>
<html>
   <head>
      <meta charset="utf-8">
      <title>...</title>
   </head>
   <body>
      <header>...</header>
      <nav>...</nav>
      <article>
        <section>...</section>
      </article>
      <aside>...</aside>
      <fiqure>...</fiqure>
      <footer>...</footer>
   </body>
</html>
```

- •HTML 5 specify DOCTYPE as follows: <!DOCTYPE html>
- •specify Character Encoding as follows: <meta charset="UTF-8">
- •New tags introduced in HTML5 for better structure
  - header This tag represents the header of a section.
  - footer This tag represents a footer for a section and can contain information about the author, copyright information, etc.
  - nav This tag represents a section of the document intended for navigation.
  - dialog This tag can be used to mark up a conversation.
  - figure This tag can be used to associate a caption together with some embedded content, such as a graphic or video.



- section This tag represents a generic document or application section. It can be used together with h1-h6 to indicate the document structure.
- article This tag represents an independent piece of content of a document, such as a blog entry or newspaper article.
- aside This tag represents a piece of content that is only slightly related to the rest of the page.

HTML5 offers new elements for media content:

height="240"> <a href="video.ogv">Download movie</a>

</video>

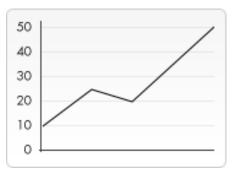
Tag	Description
<audio></audio>	Defines sound content
<video></video>	Defines a video or movie
<source/>	Defines multiple media resources for <video> and <audio></audio></video>
<embed/>	Defines a container for an external application or interactive content (a plug-in)
<track/>	Defines text tracks for <video> and <audio></audio></video>

#### <canvas> element:

Tag	Description	
<canvas></canvas>	Used to draw graphics, on the fly, via scripting (usually JavaScript)	

```
function draw() {
    var ctx =
   document.getElementById('canvas').getContext('2d');
    var img = new Image();
    img.onload = function() {
      ctx.drawImage(img,0,0);
      ctx.beginPath();
      ctx.moveTo(30,96);
      ctx.lineTo(70,66);
      ctx.lineTo(103,76);
      ctx.lineTo(170,15);
      ctx.stroke();
    img.src = 'images/backdrop.png';
```





New input elements:

button checkbox color date datetime datetime-local email file hidden image

month number password radio range reset search submit tel text time url week

