Welcome to 12-780

Advanced Python and Javascript Prototyping for Infrastructure Systems

Lecture 2: HTML and CSS

Instructor: Xuesong (Pine) Liu

Carnegie Mellon

What's HTML

- HTML is a **markup** language for **describing** web documents (web pages).

- HTML stands for **H**yper **T**ext **M**arkup **L**anguage

- A markup language is a set of **markup tags**

- HTML documents are described by **HTML tags**

- Each HTML tag **describes** different document content

Carnegie Mellon

HTML Tags

- **Keywords** (**tag names**) surrounded by **angle brackets**:
  - <tagname>content</tagname>

- Tags usually come in pairs
- Certain tags can be inside of other tags

HTML Tags

- The **DOCTYPE** declaration defines the document type to be HTML
- The text between **<html>** and **</html>** describes an HTML document
- The text between **<head>** and **</head>** provides information about the document itself. It will not be shown in the browser.
- The text between **<title>** and **</title>** provides a title for the document
- The text between **<body>** and **</body>** describes the visible page content
- The text between **<h1>** and **</h1>** describes a heading
- The text between **<p>** and **</p>** describes a paragraph

```
<!DOCTYPE html>
<html>
 <head>
  <title>Page Title</title>
 </head>
 <body>
  <h1>My First Heading</h1>
  <p>My first paragraph.</p>
 </body>
</html>
```

Common tags

- Headings – 1-6 levels
  - `<h1>Content</h1>, <h2></h2>…, <h6></h6>`
- Paragraph
  - `<p>Content</p>`
- Hyperlinks
  - `<a href="http://www.cmu.edu">CMU</a>`
  - Hyperlinks are the interactive component in HTML pages.
- Images
  - `<img src="w3schools.jpg" alt="W3Schools.com" width="104" height="142">`
- Table
  - `<table><tr><td>…`

Carnegie Mellon

Tag attributes

- Tags usually come with specific attributes
  - \This is a link\
    - href: URL of the link
  - \<img src="w3schools.jpg" alt="W3Schools.com" width="104" height="142">
    - src: URL of the image file
    - alt: Alternative text if the image file cannot be downloaded
    - width, height: Size of the image file

    - How to specify the location of the image file?

  - Common attributes
    - id: A unique identifier to locate the tag element
    - style: Specify a list of attributes, such as font, color, location, dimension, etc.
    - class: Name of a group of element that share same style attributes.

Link tag - <a>

- ## Other attributes
  - ### target – specify how the new link will be opened.
    - _blank Opens the linked document in a new window or tab
    - _self   Opens the linked document in the same frame as it was clicked (this is default)
    - _parent   Opens the linked document in the parent frame
    - _top   Opens the linked document in the full body of the window
    - framename   Opens the linked document in a named frame

- ## Image as a link
  -
     <img src="smiley.gif" alt="HTML tutorial" style="width:42px;height:42px;border:0">

Table - <table>

- Tables are defined with the **<table>** tag.
- Tables are divided into **table rows** with the **<tr>** tag.
- Table rows are divided into **table data** with the **<td>** tag.

- Specify a column or row that spans
    – <tr colspan="number">
    – <td rowspan="number">

- Specify a group of columns
    – <colgroup>
- A table can be nested in another table

List -

- Ordered or unordered list of items

- Used a lot in menu.

-
    Coffee
    Tea
    Milk

Block and inline element

- <div> block grouping element
  - A container that group a set of other elements
  - Commonly used to specify a layer on the webpage

- <span> inline grouping element
  - A container that group a set of other elements
  - Commonly used to highlight some contents inside other elements

Styles

- Every tag has a default style, which can be changed using the style attribute, or specified in CSS
  - style="*property*:*value*"
- Every tag have common and special style attributes
- Common attributes
  - color - Text color
  - font-family- System font
  - font-size
  - text-align – position of the text in the element
  - background-color, background-image, …
  - border – visible element border
  - margin – Space inside the border
  - padding – space outside the border

Carnegie Mellon

Style for a group (class) of elements

- ## CSS

  tag { *property*:*value; property:value* }

  *.**class*** { *property*:*value; property:value* }

  #id { *property*:*value; property:value* }

- ## element
  - Name of the HTML tag that will be specified with the style

    p   {color:green}
  - Can be further specified using *class* and *id* attributes of the tag
    - class: Name of a group of elements (does not need to be the same tag)

      <p class="error">I am different</p>

      .class   {color:green}
    - id: An unique id of one HTML element

      <p id="text1">I am different</p>

      #text1   {color:green}

Four ways to specifying the style

- Inline: using the style attributes in tag

- **Internal**: using a <style> tag in the <head> section

```
<!DOCTYPE html>
<html>
<head>
<style>
p  {
    color:red;
    font-family:courier;
    font-size:160%;
}
</style>
</head>
<body>
<p>This is a paragraph.</p>
</body>
</html>
```

- External: using one or more external CSS files

- Dynamic: using Javascript to change the style attribute of the tag element

Carnegie Mellon

Four ways to specifying the style

- Inline: using the style attributes in tag

- Internal: using a <style> tag in the <head> section

- **External**: using one or more external CSS files

```
<!DOCTYPE html>
<html>
<head>
    <link rel="stylesheet" href="styles.css">
</head>
<body>
<p>This is a paragraph.</p>
</body>
</html>
```

- Dynamic: using Javascript to change the style attribute of the tag element

Carnegie Mellon

Four ways to specifying the style

- Inline: using the style attributes in tag
- Internal: using a <style> tag in the <head> section
- External: using one or more external CSS files
- Dynamic: using Javascript to change the style attribute of the tag element

- Any order?
  - Inline, internal and external are all loaded with the webpage
  - Inline style will be used if available
  - Internal and External, depending on which comes last (overwrite)
  - Dynamic – only change when the code is executed

HTML5

- The latest version of HTML standard

- Goal: Replace Flash…

- Proposed in 2008. Final approval in 2014
  - HTML4 since 1997

- Provides a list of new tags and styles
  - Graphics tags: Canvas and svg
  - Semantic tags: Header, footer, article and section
  - Multimeidia: Audio, video
  - …
- New APIs in javascript
  - Web workers for multi-threads
  - Drag and drop
  - Geolocation
  - Local storage
  - …

Powerful CSS

- CSS has specified a lot of useful interactions that can be directly used without any coding
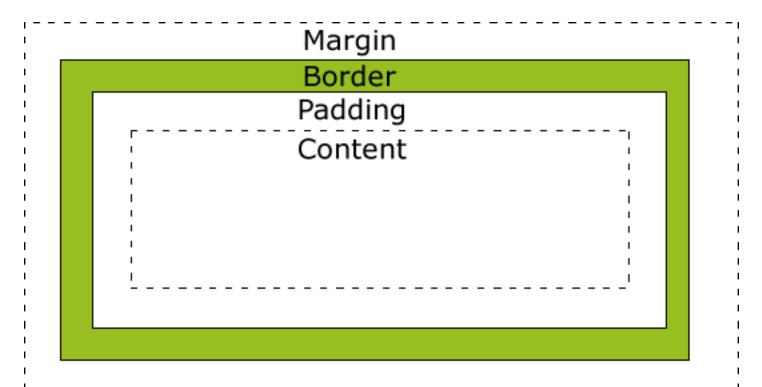- E.g., states
- <a> tag can have several states

```
/* unvisited link */
a:link {
    color: red;
}
/* visited link */
a:visited {
    color: green;
}
```

```
/* mouse over link */
a:hover {
    color: hotpink;
}
/* selected link */
a:active {
    color: blue;
}
```

Carnegie Mellon

CSS3

- CSS3 is the latest version of CSS standard.
- Provided a list of useful functions
  - Selectors
  - Box Model
  - Backgrounds and Borders
  - Image Values and Replaced Content
  - Text Effects
  - 2D/3D Transformations
  - Animations
  - Multiple Column Layout
  - User Interface
- http://www.w3schools.com/css/css3_intro.asp

CSS Box Model

- Providing spacing attributes for any HTML tags
- http://www.w3schools.com/css/tryit.asp?filename=try css_boxmodel_width

Margin

Border

Padding

Content

Carnegie Mellon

CSS Display

- Display: Determine whether the tag will be drawn.
  - http://www.w3schools.com/cssref/pr_class_display.asp

- Visibility: Determine whether the tag will be shown.
  - http://www.w3schools.com/cssref/pr_class_visibility.asp

Carnegie Mellon

CSS3 round corner

- border-radius

- Perfect for buttons

- http://www.w3schools.com/css/tryit.asp?filename=trycss3_border-radius2

Carnegie Mellon

CSS3 Shadow

- Text-shadow: shadow effects for texts in any tag.

- Box-shadow: shadow effects for any elements, but only works on the boundry

- http://www.w3schools.com/css/css3_shadows.asp

CSS3 2D transformation

- Methods for tranformation
  - translate()
  - rotate()
  - scale()
  - skewX()
  - skewY()
  - matrix()

- http://www.w3schools.com/css/css3_2dtransforms.asp

Carnegie Mellon

CSS3 3D transformation

- Similar methods as 2D transformation, but with a z axis

- http://www.w3schools.com/css/css3_3dtransforms.asp

CSS3 Transition

- Change property of style during a given time

- transition: propertyname, duration
  - Property can also be a transformation

- http://www.w3schools.com/css/css3_transitions.asp

CSS3 Animation

- Provide functions like Flash without coding!

- http://www.w3schools.com/css/css3_animations.asp

CSS frameworks

- A set of predefined CSS libraries that can be applied

- Contains predefined class names

- Bootstrap

- Concise

- Kube

- Responsive Grid System

- Sematic UI

- …

Carnegie Mellon