HTML: Hypertext Markup Language

Lecture 16

HTML

- Hypertext Markup Language
- Key ideas:
  1. Connect documents via (hyper)links
     - Visual point-and-click
     - Distributed, decentralized set of documents
  2. Describe *content* of document, not style
     - Structure with semantics
     - Separation of concerns
- Rephrasing these key ideas:
  1. *Hypertext*
  2. *Markup*

Markup: Describing Content

- WYSIWYG
  - A paragraph or bulleted list in MS Word
  - Benefits:
    - No surprises in final appearance
    - Quick and easy
    - Control: Author can use visual elements to stand in for structural elements
- WYSIWYM
  - A paragraph or list in LaTeX
  - Benefits:
    - More information in document (visual & semantic)
    - Lack of Control: Author doesn't know how to apply visual elements *properly* for structure

Abstraction vs Representation

To Do List

1. Study for midterm
2. Sleep


```
\section{To Do List}
\begin{enumerate}
  \item{Study for midterm}
  \item{Sleep}
\end{enumerate}
```

Authors Lack Requisite Expertise

- What's wrong with the following page?

Chapter 9

Now that we have the ability to display a catalog containing all our wonderful products, it would be nice to be able to sell them. We will need to cover sessions, models, and adding a button to a view. So let's get started.

Iteration D1: Finding a Cart

...

Evolution of HTML

- HTML (Berners-Lee, early 90's)
- HTML 2.0 (W3C, '95)
- HTML 3.2 (W3C, '97)
- HTML 4.0 (W3C, '97)
  - To form a more perfect union…
- HTML 4.01 (W3C, '99)
  - To smooth out the edges… big dog for years
- The great schism
  - W3C: XHTML 1.0 ('00), 1.1 ('01), 2.0
  - Everyone else: HTML Forms, WHAT…
- Capitulation ('09): W3C abandons XHTML 2.0
- HTML5 (October 2014)
  - One ring to rule them all… (includes XHTML5)
  - Living standard: html.spec.whatwg.org/dev

Page Validation

- Design-by-contract:
  - Weak requires, but strong ensures
  - Permissive in input, but strict in output
- Browsers (taking HTML as input) are permissive
  - "Tag soup" still renders
- Web authors (writing HTML as output) should be as strict as possible
  - But permissive browsers hide errors!
- Solution: use a validator
  - See validator.w3.org
  - Checks for syntax problems only

Example


```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Something Short and Sweet</title>
    <meta charset="utf-8" />
  </head>
  <body>
    <p>
      Hello <a href="planet.html">World</a>!
      <br />
      <img src="pic.png" alt="a globe" />
    </p>
  </body>
</html>
```

Example


```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Something Short and Sweet</title>
    <meta charset="utf-8" />
  </head>
  <body>
    <p>
      Hello <a href="planet.html">World</a>!
      <br />
      <img src="globe.png" alt="a globe"/>
    </p>
  </body>
</html>
```

Example (Rewritten)


```
<!DOCTYPE html> <html lang="en"> <head>
<title>Something Short and Sweet</title> <meta
charset="utf-8" /> </head> <body> <p> Hello <a
href="planet.html">World</a>! <br /> <img
src="pic.png" alt="a globe" /> </p> </body>
</html>
```

Type Declaration for HTML 5


```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Something Short and Sweet</title>
    <meta charset="utf-8" />
  </head>
  <body>
    <p>
      Hello <a href="planet.html">World</a>!
      <br />
      <img src="pic.png" alt="a globe" />
    </p>
  </body>
</html>
```

Document Type Declarations

- HTML 5

```
<!DOCTYPE html>
```

- HTML 4.01

```
<!DOCTYPE HTML
   PUBLIC "-//W3C//DTD HTML 4.01//EN"
   "http://www.w3.org/TR/html4/strict.dtd">
```

- XHTML 1.0 Strict

```
<!DOCTYPE html
   PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
```

Type Declaration for HTML 5

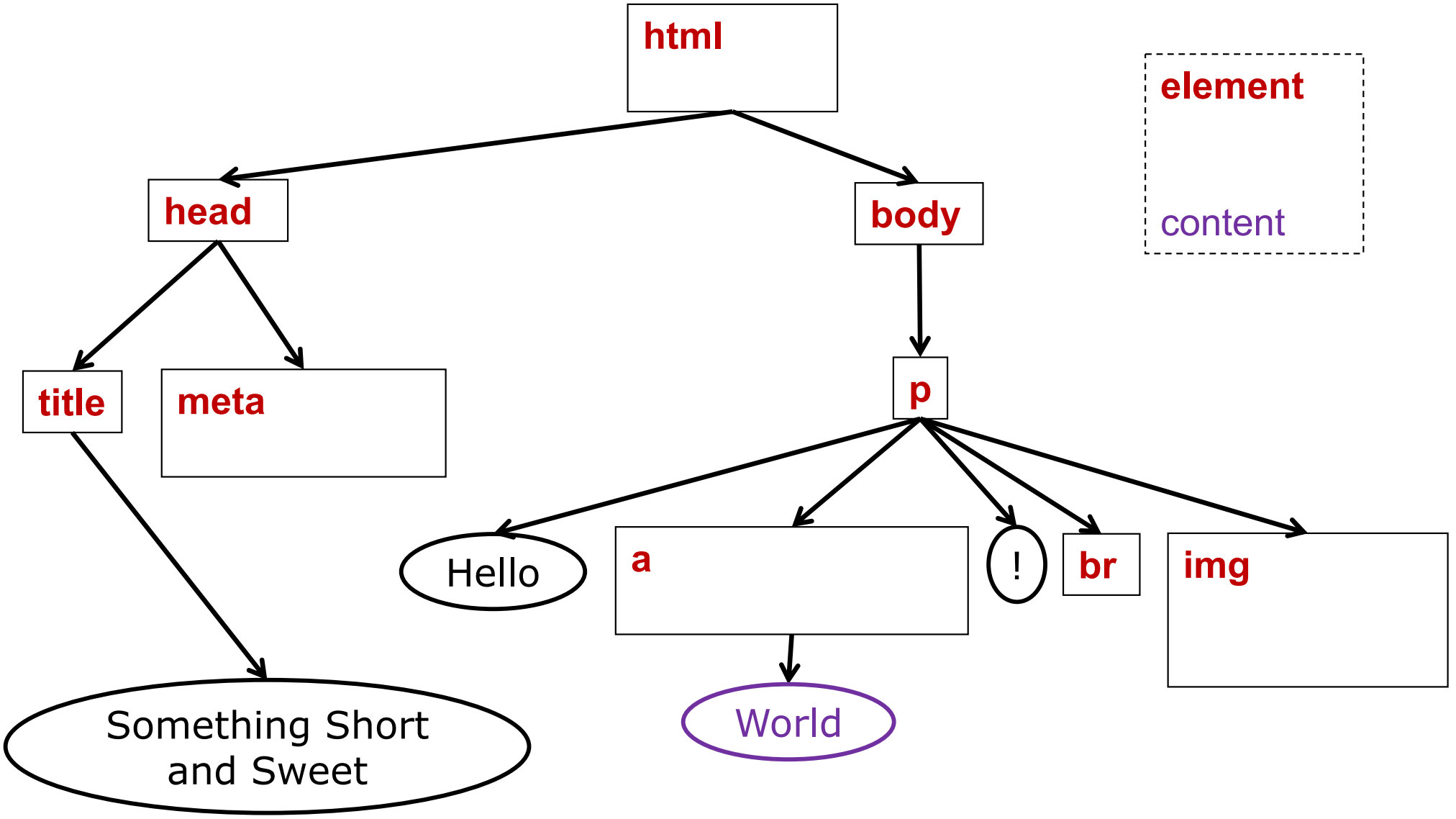

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Something Short and Sweet</title>
    <meta charset="utf-8" />
  </head>
  <body>
    <p>
      Hello <a href="planet.html">World</a>!
      <br />
      <img src="pic.png" alt="a globe" />
    </p>
  </body>
</html>
```

Element Tags: Nested Start/End


```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Something Short and Sweet</title>
    <meta charset="utf-8" />
  </head>
  <body>
    <p>
      Hello <a href="planet.html">World</a>!
      <br />
      <img src="pic.png" alt="a globe" />
    </p>
  </body>
</html>
```

start tag
content
end tag

Structure: Nesting of Elements

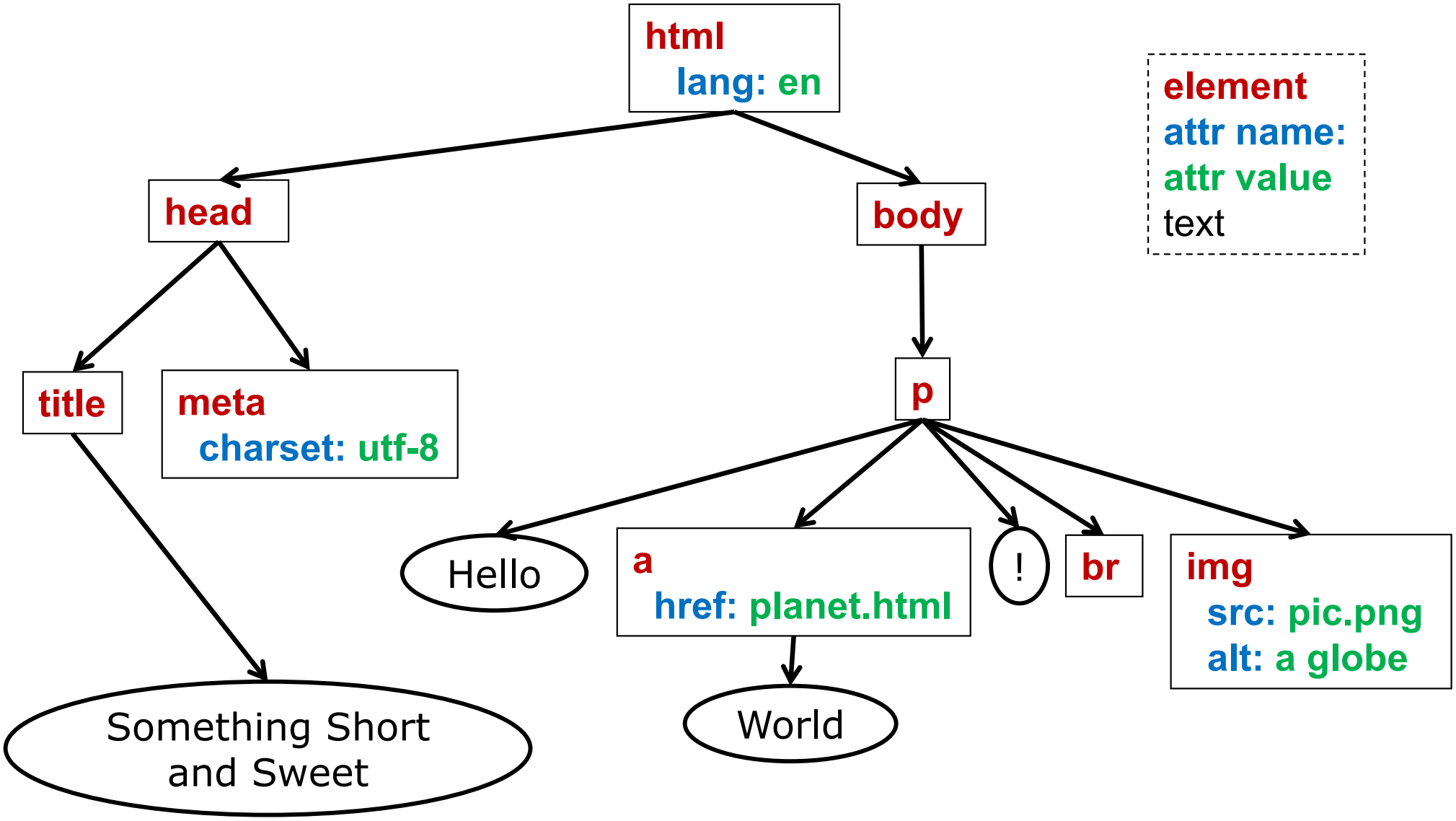


Attributes: Name/Value Pairs


```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Something Short and Sweet</title>
    <meta charset="utf-8" />
  </head>
  <body>
    <p>
      Hello <a href="planet.html">World</a>!
      <br />
      <img src="pic.png" alt="a globe" />
    </p>
  </body>
</html>
```

codepen.io/cse3901/pen/MWNwqZQ

Structure of Example



HTML Entities

- Familiar problem: Encoding
  - Is **
** a tag or (literal) content?
  - Meta-characters (e.g. '<') need to be escaped
- HTML entities represent a literal

  &#*dddd*;
  - Where ***dddd*** is the "unicode code point" (as a decimal number)

    &#x*hhhh*;
  - Where ***hhhh*** is the code point in hex

    &*name*;
  - Where ***name*** is from a small set (lt, gt, amp…)
- Examples:

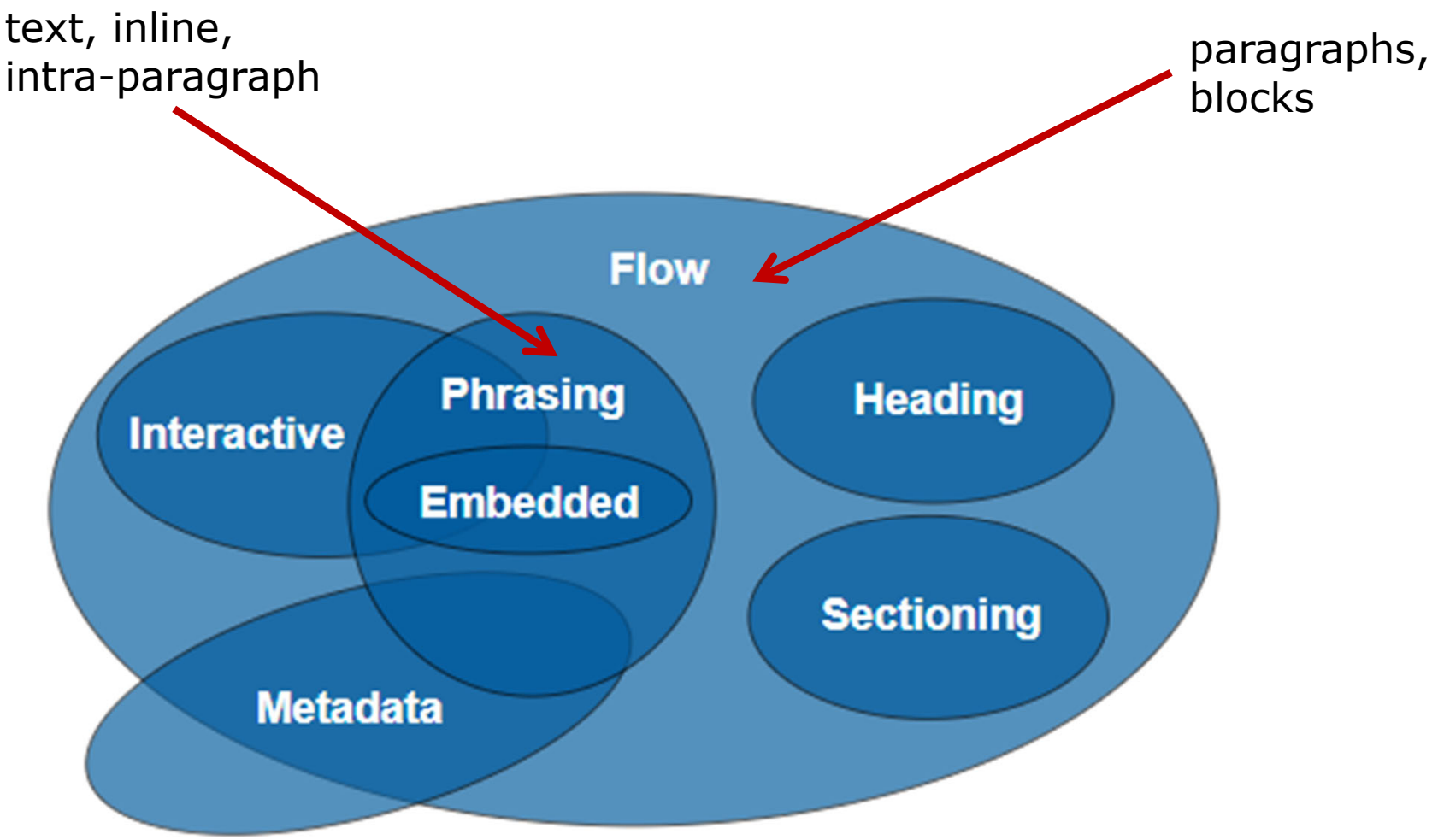
  < < < < <

  ♥ ♥ ♥

Kinds of Elements

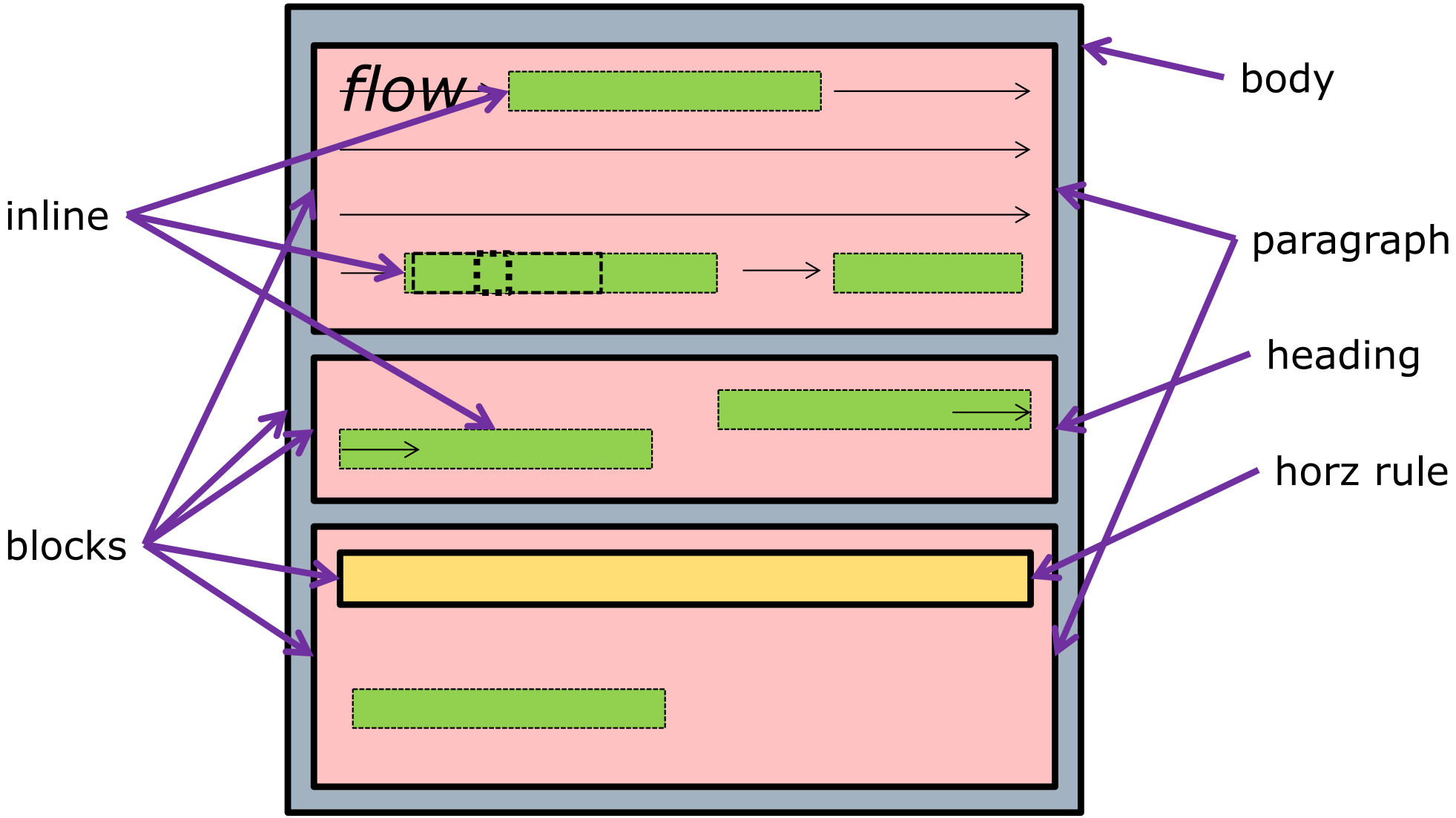
1. Document structure elements
   - Root of tree is always <html>
   - Two children: <head>, <body>
2. Head elements
   - (Meta) information about document
3. Body elements, (roughly) two kinds:
   1. Block
      - Content that stands alone
      - Starts new line of text (interrupts the "flow")
      - May contain other elements (block or inline)
   2. Inline
      - Intimately part of surrounding context
      - Does not interrupt "flow" of text
      - May contain other inline elements

HTML 5 Content Model



https://www.w3.org/TR/2011/WD-html5-20110525/content-models.html#kinds-of-content

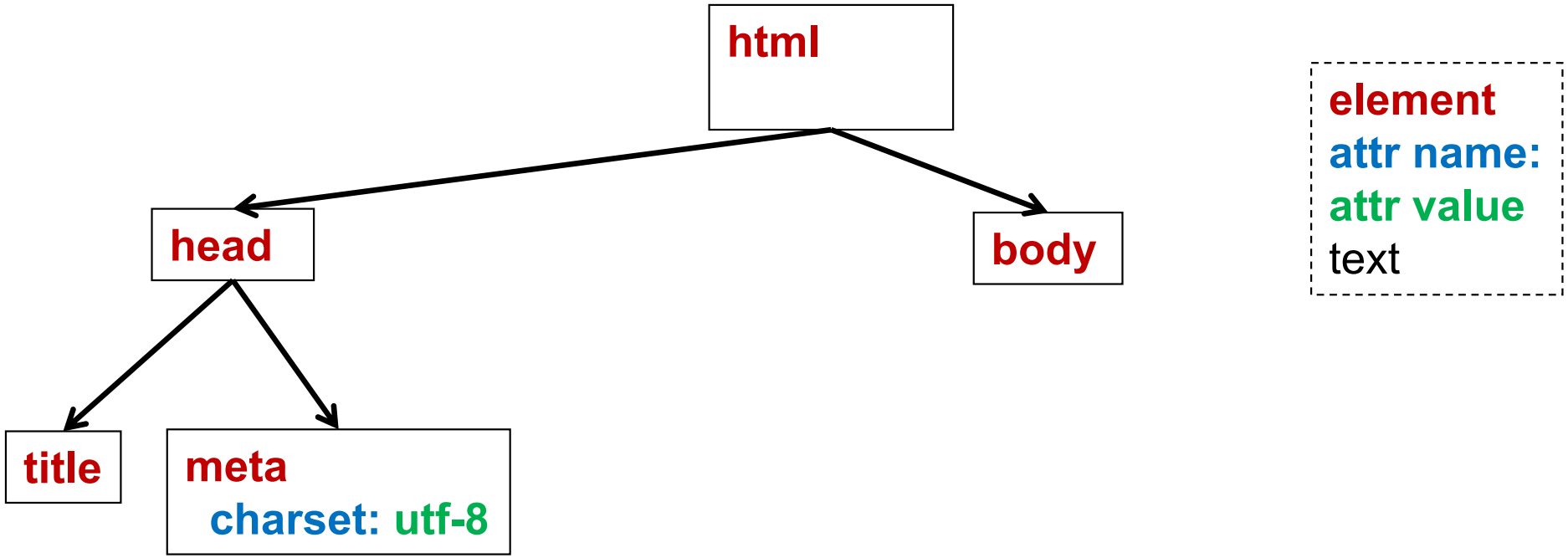
Block vs Inline



Demo: Developer Tools

- Chrome > Web Developer > Inspector
- HTML as structured (nested) text
- Edit html text, element attributes, structure

Required Structure for HTML5



Common Head Elements

- <title>: required, must be only text
  - May be displayed in window title bar
- <script>: client-side code to run
- <link>: other documents to use
  - Commonly used for style information
- <meta>: information about the information (document)
  - <meta http-equiv="…" content="…" /> becomes a header field in HTTP response!

    <meta http-equiv="Content-Type" content=

    <meta http-equiv="Location" content=…

    <meta http-equiv="Last-modified" content=…
  - <meta name="keywords" content="..." />

Common Block Elements in Body

- Text
  - Paragraph <p>, horizontal rule <hr>
  - Headings <h1> <h2> … <h6>
  - Preformatted <pre>, quotations <blockquote>
- Lists
  - Ordered <ol>, unordered <ul>, definition <dl>
  - Item in list <li> (<dt> <dd> for definitions)
- Table <table>
- Form <form> (and some form elements)
- Sectioning (HTML 5)
  - Article <article>, section <section>
  - Header <header>, footer <footer>
  - Canvas <canvas>
- Generic container for flow content

Common Inline Elements

- Anchor <a>
- Phrasing and text
  - Emphasis , strong emphasis
  - Code snippet <code>
  - Inline quotation <q>
  - Inserted text <ins>, deleted text <del>
- Image <img>
- Form elements
- Generic container within flow content
- Visual markup: deprecated
  - Bold <b>, italic <i>, underline <u>
  - Typewriter font <tt>
  - Font control <font>

And Don't Forget Comments

- Comments set off by <!-- … -->
- Beware: they do not nest

Tables

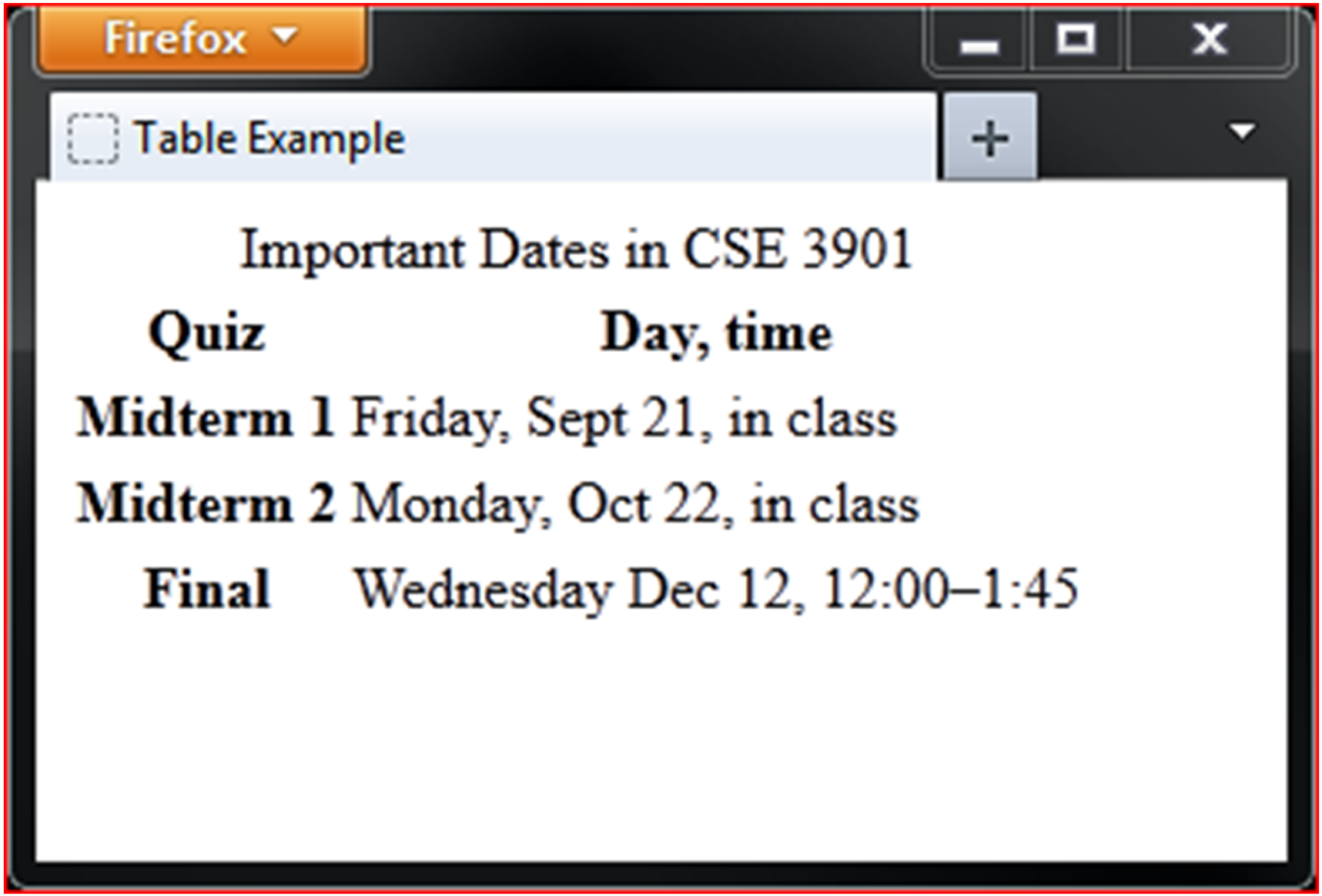
- Row <tr>
- Cell of data <td>
- Header cell (for row or column) <th>
- Caption <caption>
- And some more exotic ones too
  - Header (repeat if splitting) <thead>
  - Body <tbody>
  - Footer (repeat if splitting) <tfoot>

Table Example


```
<table>
<caption> Important Dates in CSE 3901 </caption>
<tr> <th scope="col">Quiz</th>
     <th scope="col">Day, time</th>
</tr>
<tr> <th scope="row">Midterm 1</th>
     <td> Friday, Sept 21, in class</td>
</tr>
<tr> <th scope="row">Midterm 2</th>
     <td> Monday, Oct 22, in class</td>

</tr>
<tr> <th scope="row">Final</th>
     <td> Wednesday Dec 12,
          12:00&ndash;1:45 </td>
</tr>
</table>
```

Table Example Rendered



Hyperlinks

- Anchor tag with href attribute

```
<a href=…>some text</a>
```

some text

- Clickable element
- Click results in: an HTTP request
  - GET request
  - URL from value of href attribute
- What about arguments?
  - Must be “hard coded” in attribute value

```
<a href="summary?lang=en">notes</a>
```

Forms

- General mechanism for client to make HTTP requests
  - GET or POST

```
<form action="path" method="get">
```

  - HTTP arguments come from nested inputs

```
<input… name="color">
```

- User input: `<input name="…" type="…"… />`
  - Text fields `<input type="text"…`
  - Radio buttons `<input type="radio"…`
  - Checkboxes `<input type="checkbox"…`
  - Hidden `<input type="hidden"…`
- Button `<button type="…">`
  - Default type is submit, which sends the request
- Information (not input): `<label>`

Example

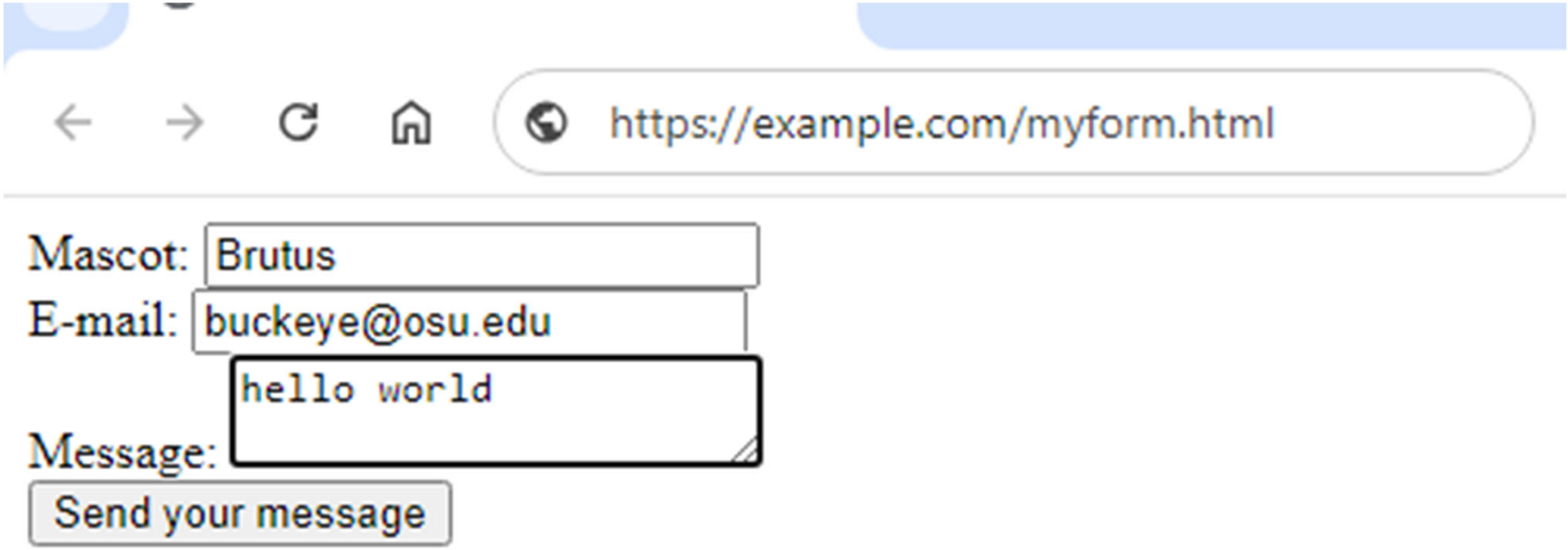

```
<form action="/my-handling-form-page" method="post">
    <div>
        <label for="name">Mascot:</label>
        <input type="text" id="name" name="mascot_name" />
    </div>
    <div>
        <label for="mail">E-mail:</label>
        <input type="email" id="mail" name="mascot_mail" />
    </div>
    <div>
        <label for="msg">Message:</label>
        <textarea id="msg" name="message"></textarea>
    </div>

    <div class="button">
        <button>Send your message</button>
    </div>
</form>
```

codepen.io/cse3901/pen/VwxQPyy

Form Rendered

Form Modified by User



Form Submitted

- When button (with type submit) is clicked
- HTTP request is sent, with
  - Verb per form's *method*
  - URL per form's *action*
  - Arguments per form's *inputs*
    - Input's name attribute is the argument name
    - Value (usually user controllable) is the argument value
- Example:

```
POST /my-handling-form-page HTTP/1.1
Host: www.example.com
Content-Type: application/x-www-form-urlencoded
Content-Length: 68

mascot_name=Brutus&mascot_mail=buckeye%40osu.edu
&message=hello+world
```

Summary

- Evolution of HTML: HTML 5
  - Tension between permissive and strict
  - Page validation
- An HTML document is a tree
  - Elements are nodes, text is leaves
  - Elements have attributes
- Head elements: meta information
- Body elements: content
  - Block elts: para, heading, list, table, div
  - Inline elts: anchor, img, emphasis, span
- Forms: user-controlled HTTP params