

IN4MATX 133: User Interface Software

Lecture 2:
HTML & Accessibility

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A0 Summary

- A lot of interest in web and mobile languages
- A moderate amount of interest in learning what it means to implement with people's needs in mind
- A few people wanted portfolio pieces or practical skills
- A few people weren't sure, just thought the class sounded interesting

A0 Summary

- Most of you feel at least somewhat confident in Python & Java
- Less so with web technologies
 - ~66% felt confident in HTML & CSS, ~50% JavaScript
 - Much less for Angular/Mobile
 - ~66% GitHub

A0 Summary

- Whatever your situation, you're not alone
 - If you're having trouble, don't be afraid to ask questions on Slack
 - If you're more experienced, please answer your classmate's questions!
- We'll go over the core concepts, starting with HTML today
 - There's always so much more to learn
 - Online resources like StackOverflow, W3Schools, Mozilla Documentation are all immensely helpful

A0 is due Friday

- If you got a 7, etc. on the syllabus quiz, please take it again

Survey for points begin next lecture (1/11)

- Assuming today goes smoothly

Questions in class

- To the extent possible, I'll try to answer questions you post in chat during lecture
- But I might defer some questions to Slack after class
- I might also miss some questions
- Regardless, feel free to post questions to Slack after lectures
 - Someone will answer (classmates, TAs, me)

Live demos

Live demos

- When possible, I'll try to live demo coding concepts during lecture
- I'll aim to post the starter and solution code on the class website before class
 - You can follow along, and I'm including the solution if I go too fast
- Live coding is hard! I will inevitably mess up
 - Unmute and correct me when you see mistakes

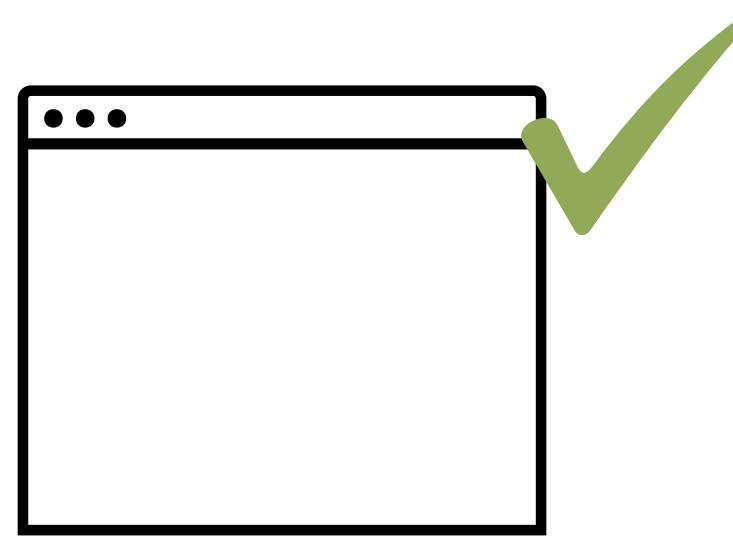


Today's goals

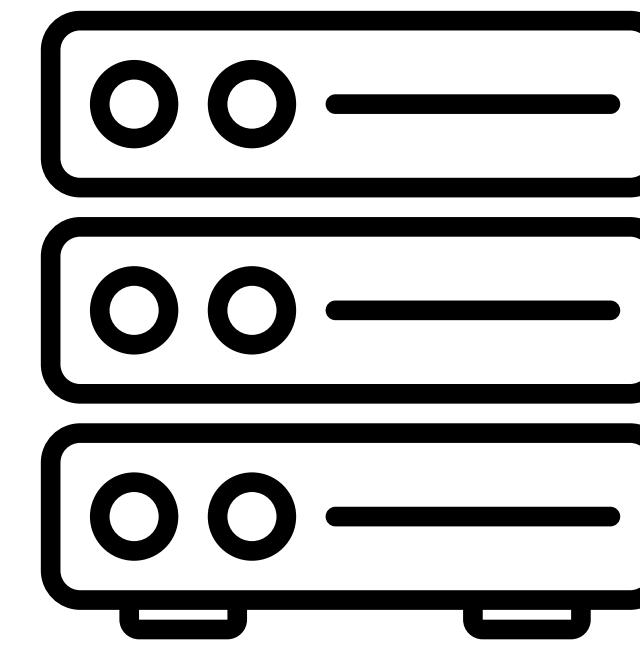
By the end of today, you should be able to...

- Describe the fundamentals of web communication
- Identify the syntax of HTML tags and attributes and describe their roles
- Create a HTML template which follows W3C specifications
- Explain the importance of accessible and semantically meaningful markup
- Generate markup which meets accessibility standards

Client-side web development

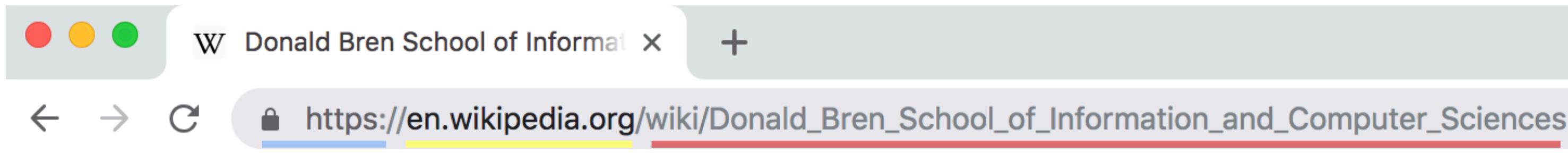


Your browser

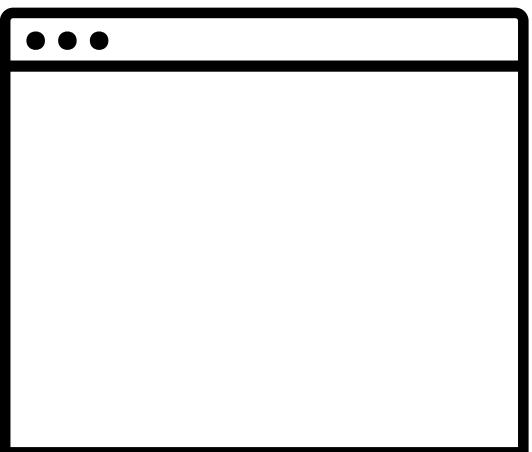


Web server

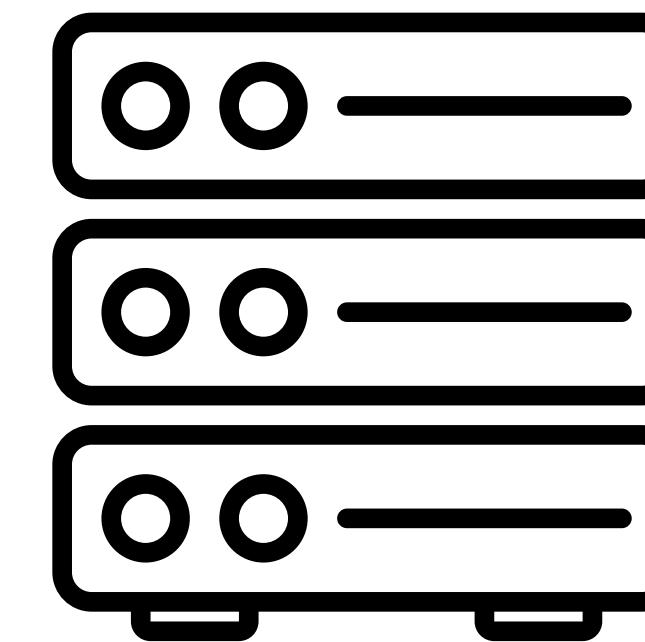
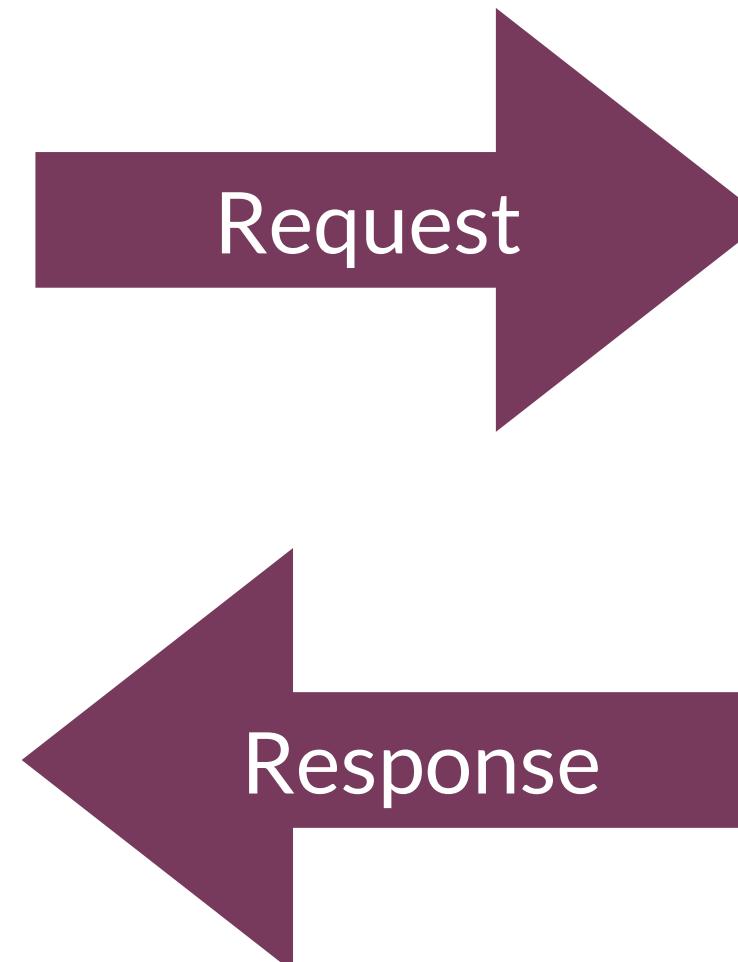
Using the internet



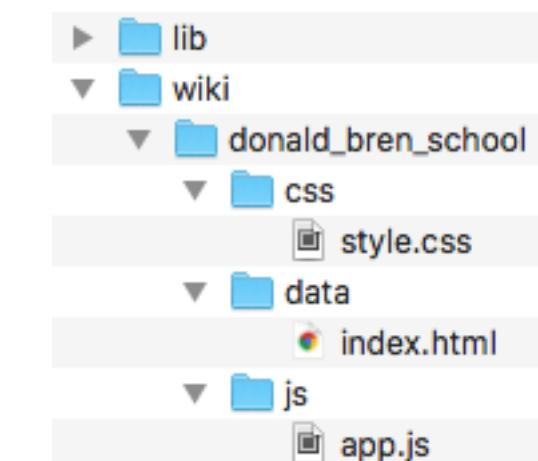
"Hey Wikipedia, I'd like to see the page for the school of ICS!"

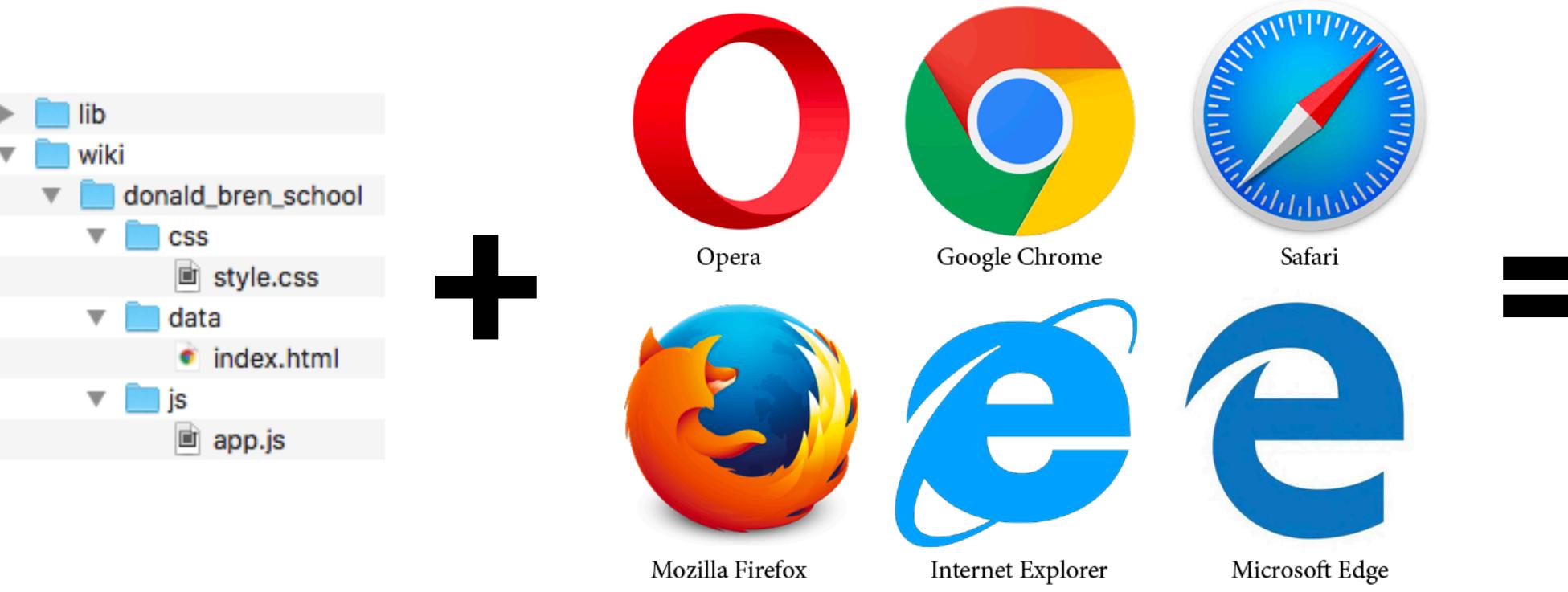


Your browser



Web server





Donald Bren School of Information and Computer Sciences

From Wikipedia, the free encyclopedia

Coordinates: 33.6432°N 117.842°W

This article has multiple issues. Please help [improve it](#) or discuss these issues on the [\[hide\]](#) [talk page](#). ([Learn how and when to remove these template messages](#))

- This article **contains content that is written like an advertisement**. (April 2016)
- This article **may rely excessively on sources too closely associated with the subject**, potentially preventing the article from being verifiable and neutral. (January 2015)

The Donald Bren School of Information and Computer Sciences, also known colloquially as UCI's School of ICS or simply the Bren School, is an academic unit of University of California, Irvine (UCI), and the only dedicated school of computer science in the University of California system. Consisting of nearly three thousand students, faculty, and staff,^[2] the school maintains three buildings in the South-East artery of UCI's undergraduate campus, and maintains student body and research affiliations throughout UCI.^{[3][4]}

The school of ICS consists of three departments: Computer Science, Informatics, and Statistics. The combined groupings focus the school around the fields of computing and processing of information. The departments confer eight undergraduate, eleven masters, and seven doctoral degrees in total, with some degree programs cooperating with affiliated schools.^[5]



Donald Bren Hall, one of the buildings on the campus of the Bren School^[1]

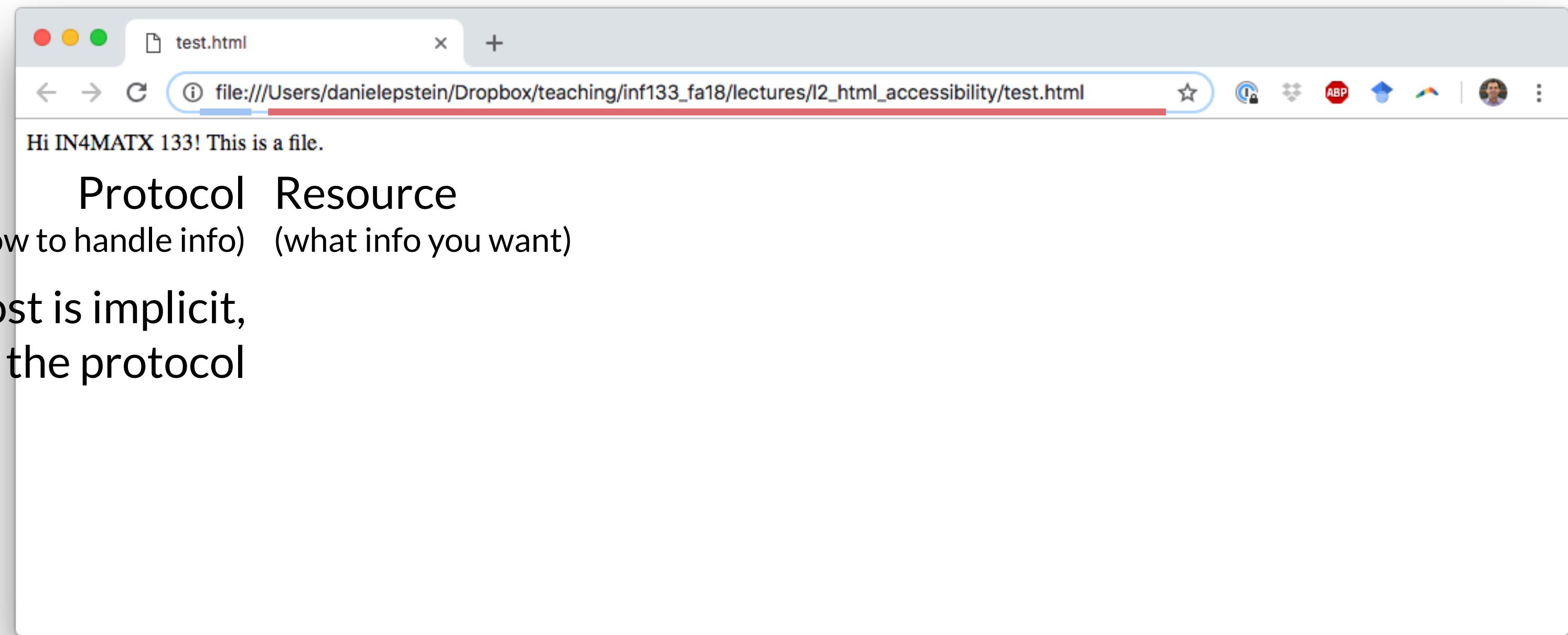
**Fundamentally, the web is
designed to send files around**

So what does a file on the web look like?

A screenshot of a dark-themed code editor window titled "test.html". The editor displays a single line of code: "1 Hi IN4MATX 133! This is a file.". The status bar at the bottom shows "Line 1, Column 32", "Tab Size: 4", and "HTML".

```
1 Hi IN4MATX 133! This is a file.
```

Same file, opened in Chrome



**What if we wanted to specify
how the content is rendered?**

HTML (HyperText Markup Language)

- Adds meaning to text
- Links documents to one another
 - Vanneaver Bush, hypertext vision



Tags

`<div>` ← Open/start tag

Content goes here. ← Content

`</div>` ← Close/end tag

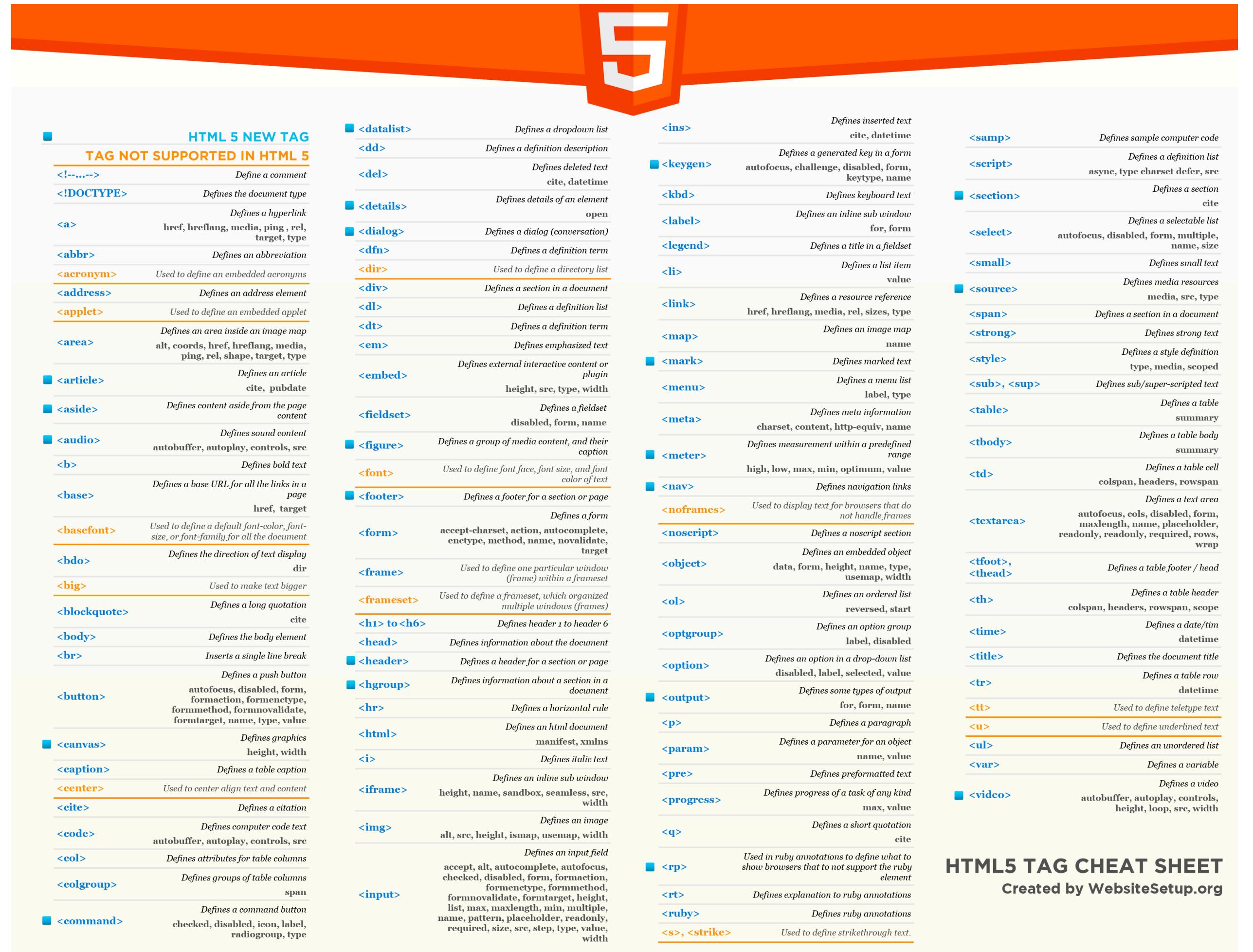
Whitespace and tag case are ignored

Some common tags

```
<h1>Heading level 1</h1>
<h2>Heading level 2</h2>
...
<p>A paragraph</p>
<!--A comment-->
<img> An image
<ul> An unordered list (bullets)
<li> A list item
<table> A data table
<strong> Important content (bolded)
<em> Emphasized content (italicized)
<div> A division (section) of content
```

Tags

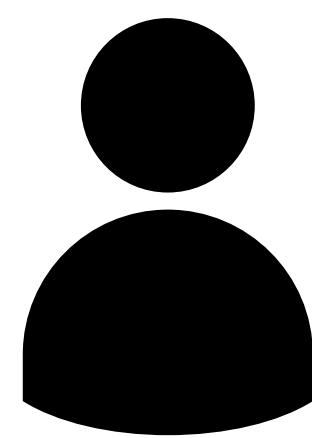
- There are hundreds of tags!
- You may not use them all, but it's good to explore them
- Search on Google or W3C to understand each tag's purpose
- <https://www.w3schools.com/tags/>



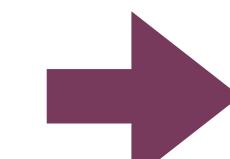
This image shows a comprehensive HTML5 tag cheat sheet titled "HTML5 TAG CHEAT SHEET" created by WebsiteSetup.org. The page features a large orange header with the number "5" and the word "HTML5". Below the header is a table listing over 100 HTML tags, each with a brief description of its purpose and attributes.

HTML 5 NEW TAG	
TAG NOT SUPPORTED IN HTML 5	
<!--...-->	Define a comment
<!DOCTYPE>	Defines the document type
<a>	Defines a hyperlink href, hreflang, media, ping, rel, target, type
<abbr>	Defines an abbreviation
<acronym>	Used to define an embedded acronym
<address>	Defines an address element
<applet>	Used to define an embedded applet
<area>	Defines an area inside an image map alt, coords, href, hreflang, media, ping, rel, shape, target, type
<article>	Defines an article cite, pubdate
<aside>	Defines content aside from the page content
<audio>	Defines sound content autobuffer, autoplay, controls, src
	Defines bold text
<base>	Defines a base URL for all the links in a page href, target
<basefont>	Used to define a default font-color, font-size, or font-family for all the document
<bdo>	Defines the direction of text display dir
<big>	Used to make text bigger
<blockquote>	Defines a long quotation cite
<body>	Defines the body element
 	Inserts a single line break
<button>	Defines a push button autofocus, disabled, form, formaction, formenctype, formmethod, formnovalidate, formtarget, name, type, value
<canvas>	Defines graphics height, width
<caption>	Defines a table caption
<center>	Used to center align text and content
<cite>	Defines a citation
<code>	Defines computer code text autobuffer, autoplay, controls, src
<col>	Defines attributes for table columns
<colgroup>	Defines groups of table columns span
<command>	Defines a command button checked, disabled, icon, label, radiogroup, type
<datalist>	Defines a dropdown list
<dd>	Defines a definition description
	Defines deleted text cite, datetime
<details>	Defines details of an element open
<dialog>	Defines a dialog (conversation)
<dfn>	Defines a definition term
<dir>	Used to define a directory list
<div>	Defines a section in a document
<dl>	Defines a definition list
<dt>	Defines a definition term
	Defines emphasized text
<embed>	Defines external interactive content or plugin height, src, type, width
<fieldset>	Defines a fieldset disabled, form, name
<figure>	Defines a group of media content, and their caption
	Used to define font face, font size, and font color of text
<footer>	Defines a footer for a section or page
<form>	Defines a form accept-charset, action, autocomplete, enctype, method, name, novalidate, target
<frame>	Used to define one particular window (frame) within a frameset
<frameset>	Used to define a frameset, which organized multiple windows (frames)
<h1> to <h6>	Defines header 1 to header 6
<head>	Defines information about the document
<header>	Defines a header for a section or page
<hgroup>	Defines information about a section in a document
<hr>	Defines a horizontal rule
<html>	Defines an html document manifest, xhtml
<i>	Defines italic text
<iframe>	Defines an inline sub window height, name, sandbox, seamless, src, width
	Defines an image alt, src, height, ismap, usemap, width
<input>	Defines an input field accept, alt, autocomplete, autofocus, checked, disabled, form, formaction, formenctype, formmethod, formnovalidate, formtarget, height, list, max, maxlength, min, multiple, name, pattern, placeholder, readonly, required, size, src, step, type, value, width
<ins>	Defines inserted text cite, datetime
<keygen>	Defines a generated key in a form autofocus, challenge, disabled, form, keytype, name
<kbd>	Defines keyboard text
<label>	Defines an inline sub window for, form
<legend>	Defines a title in a fieldset
	Defines a list item value
<link>	Defines a resource reference href, hreflang, media, rel, sizes, type
<map>	Defines an image map name
<mark>	Defines marked text
<menu>	Defines a menu list label, type
<meta>	Defines meta information charset, content, http-equiv, name
<meter>	Defines measurement within a predefined range high, low, max, min, optimum, value
<nav>	Defines navigation links
<noframes>	Used to display text for browsers that do not handle frames
<noscript>	Defines a noscript section
<object>	Defines an embedded object data, form, height, name, type, usemap, width
	Defines an ordered list reversed, start
<optgroup>	Defines an option group label, disabled
<option>	Defines an option in a drop-down list disabled, label, selected, value
<output>	Defines some types of output for, form, name
<p>	Defines a paragraph
<param>	Defines a parameter for an object name, value
<pre>	Defines preformatted text
<progress>	Defines progress of a task of any kind max, value
<q>	Defines a short quotation cite
<rp>	Used in ruby annotations to define what to show browsers that do not support the ruby element
<rt>	Defines explanation to ruby annotations
<ruby>	Defines ruby annotations
<s>, <strike>	Used to define strikethrough text

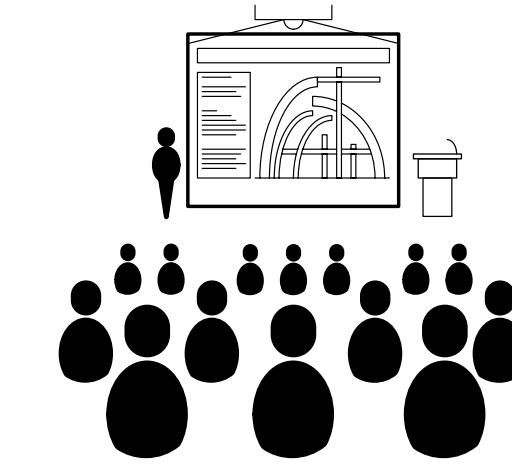
Question



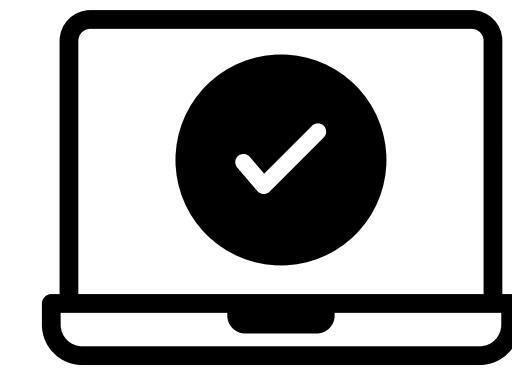
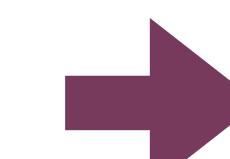
Answer
individually



Reveal
responses



Classwide
discussion



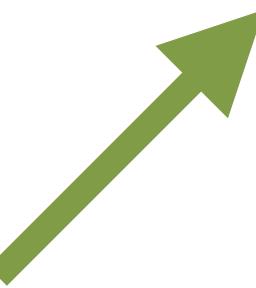
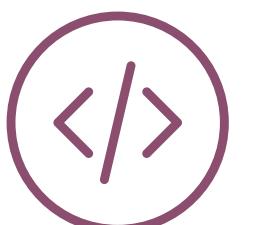
Reveal
correct answer

<https://forms.gle/yWPN3SHkuwqDzAn59>

Same link for every question!



Code



Code in top-right corner!
(case-sensitive)

Question



How would you specify a `<div>` with the `<p>` (paragraph) I love HTML!?

`</>` tags
Code!

- A `<div><p>I love HTML !`
- B `<div><p>I love HTML !</p>`
- C `<div><p>I love HTML !<p><div>`
- D `<div><p>I love HTML !</p></div>`
- E `<div><p>I </p>love<p> HTML !</p></div>`

Question



How would you specify a `<div>` with the `<p>` (paragraph) I love HTML!?

- A `<div><p>I love HTML !`
- B `<div><p>I love HTML !</p>`
- C `<div><p>I love HTML !<p><div>`
- D `<div><p>I love HTML !</p></div>`
- E `<div><p>I </p>love<p> HTML !</p></div>`

Nesting

- The Content of a tag can contain other HTML tags

```
<div><p>I <strong>love</strong> HTML!</p></div>
```

Let's make a shopping list

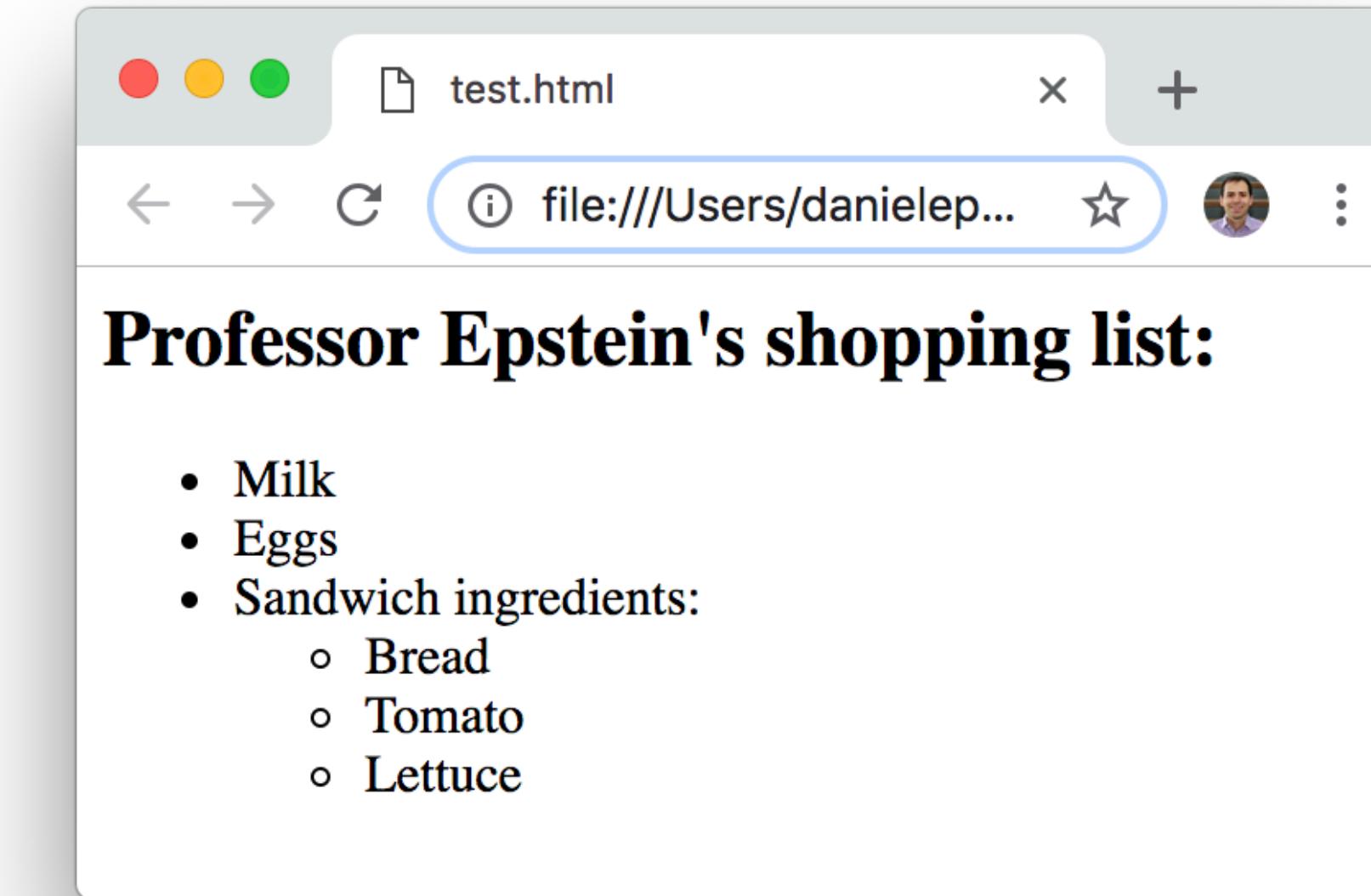
Professor Epstein's shopping list

- Milk
- Eggs
- Sandwich ingredients:
 - Bread
 - Tomato
 - Lettuce



Nesting: lists

```
<h2>Professor Epstein's shopping list:</h2>
<ul>
  <li>Milk</li>
  <li>Eggs</li>
  <li>Sandwich ingredients:
    <!--Lists can be nested!-->
    <ul>
      <li>Bread</li>
      <li>Tomato</li>
      <li>Lettuce</li>
    </ul>
  </li>
</ul>
```



Nesting: HTML

- By convention, HTML is specified via the **Content** of an `<html>` element.

```
<html> ← Start of HTML document  
<body> ← Start of body (visible) content  
  <h1>Hello, IN4MATX 133 !</h1>  
  <p>HTML is <em>great</em>!</p>  
</body> ← End of body content  
</html> ← End of HTML document
```

Attributes

- Attributes specify options and add meaning
- Attributes are space-separated lists of names and values.
 - Kind of like variables
 - Almost always Strings

```
<div attributeA="valueA" attributeB="valueB">  
    Content goes here  
</div>
```

Attributes

```
<a href="http://inf133-fa18.depstein.net/">IN4MATX 133</a>
```



anchor hypertext
(hyperlink) reference

```

```



source



alternative text
for screen readers



img tags have no (text)
content, so no closing tag

```
<html lang="en">
```

...

```
</html>
```

Language of document
is English

HTML structure

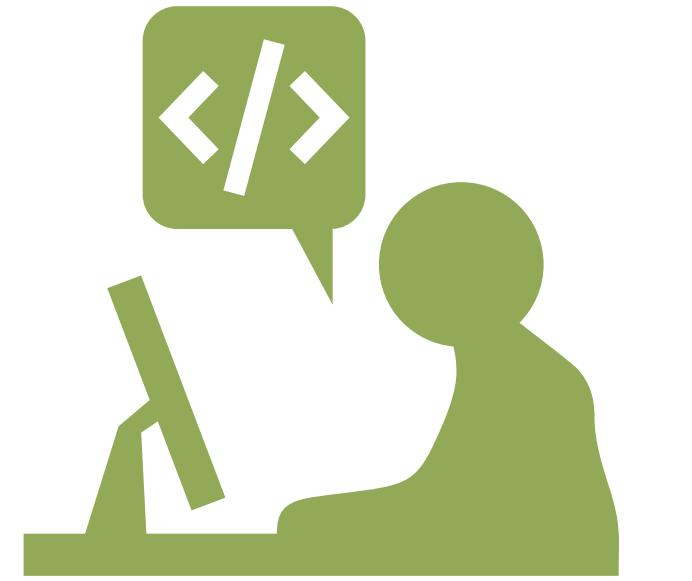
```
<!DOCTYPE html> ← Document format
<html lang="en"> ← Specify language
<head> ← Document header (content that's not shown)
    <meta charset="UTF-8"> ← Character set (for non-latin characters)
    <meta name="author" content="your name"> ← For search engines
    <title>My Webpage</title> ← Webpage title in tab
</head>
<body> ← Document body (content that's shown)
    <h1>Hello, world!</h1>
    ...
</body>
</html>
```

HTML structure

- Surprisingly, browsers are accommodating about HTML structure
- No “compiler errors”
- However, validation can help ensure browser compatibility and site usability

HTML structure

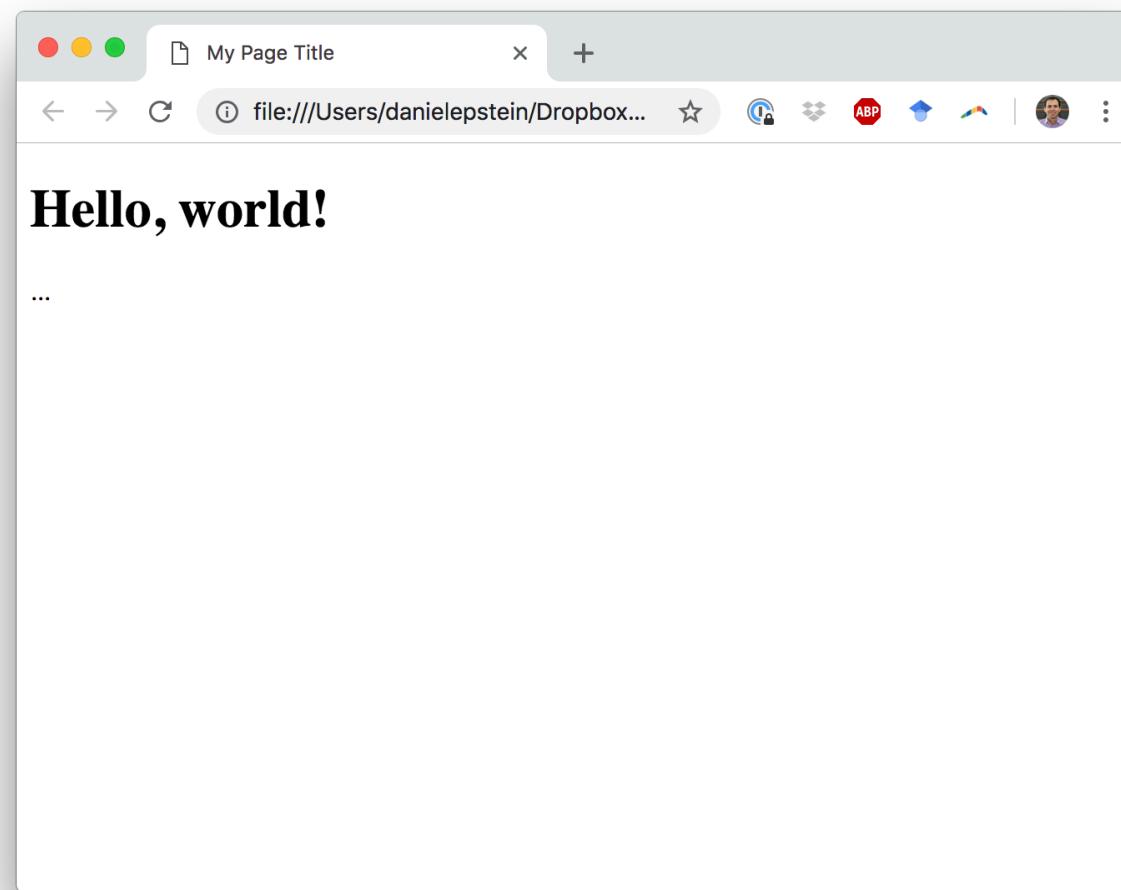
```
<h1>Hello, world!</h1>
```



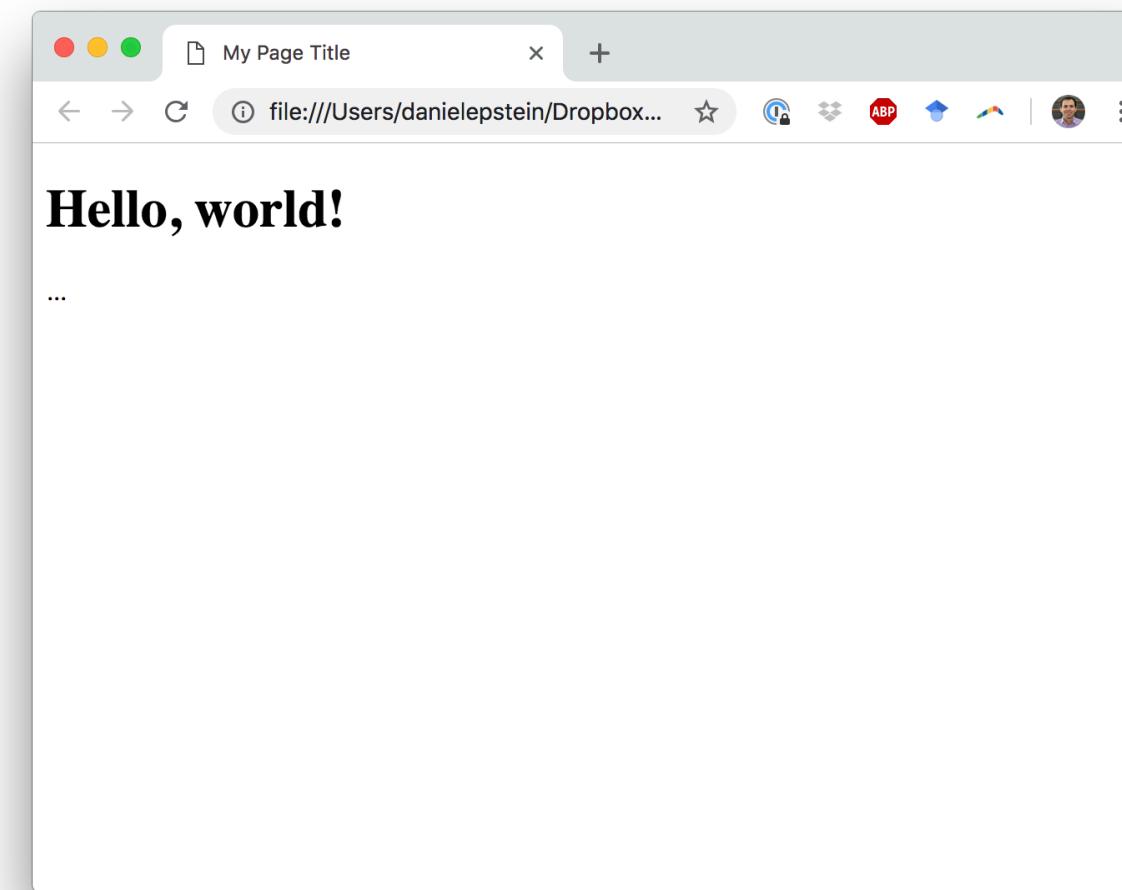
(live demo!)

HTML structure

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="author" content="your name">
  <title>My Page Title</title>
</head>
<body>
  <h1>Hello, world!</h1>
  ...
</body>
</html>
```



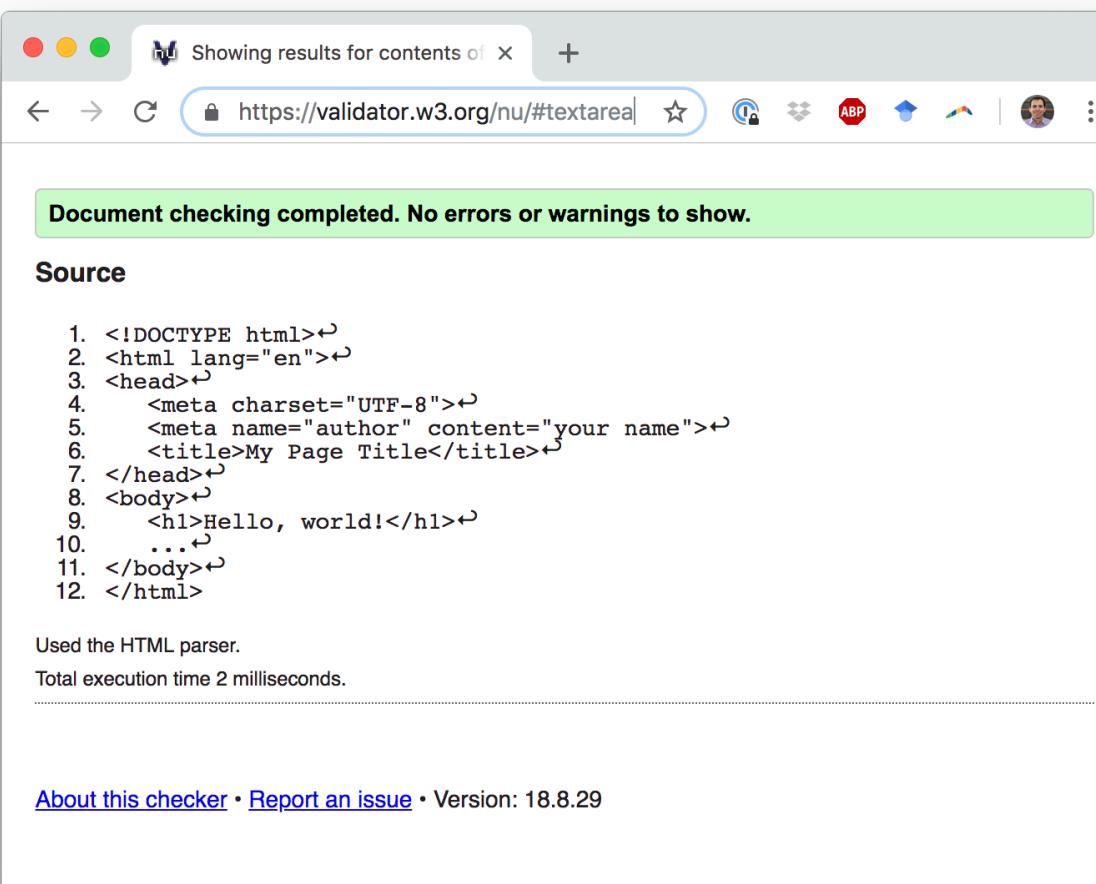
```
<html>
<head>
  <title>My Page Title</title>
</head>
<body>
  <h1>Hello, world!</h1>
  <p>...</p>
```



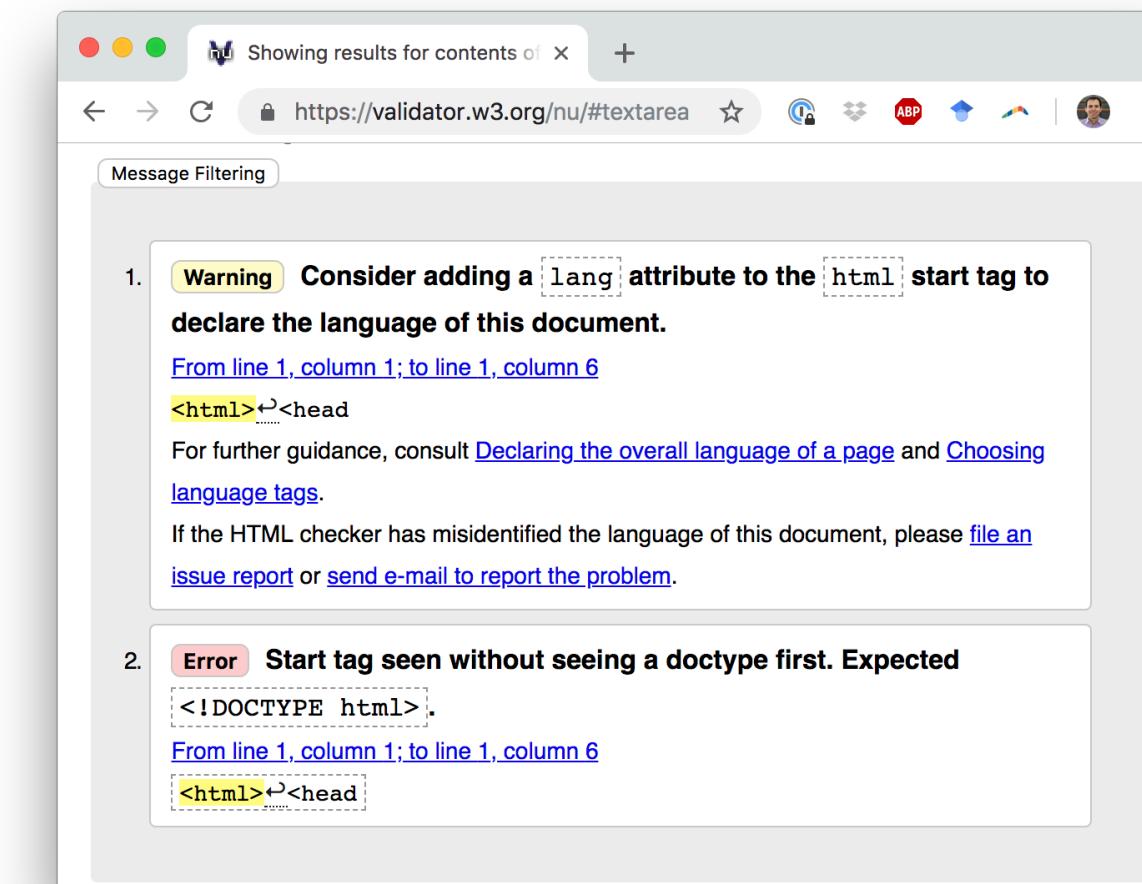
W3C validator

<https://validator.w3.org/>

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="author" content="your name">
  <title>My Page Title</title>
</head>
<body>
  <h1>Hello, world!</h1>
  ...
</body>
</html>
```



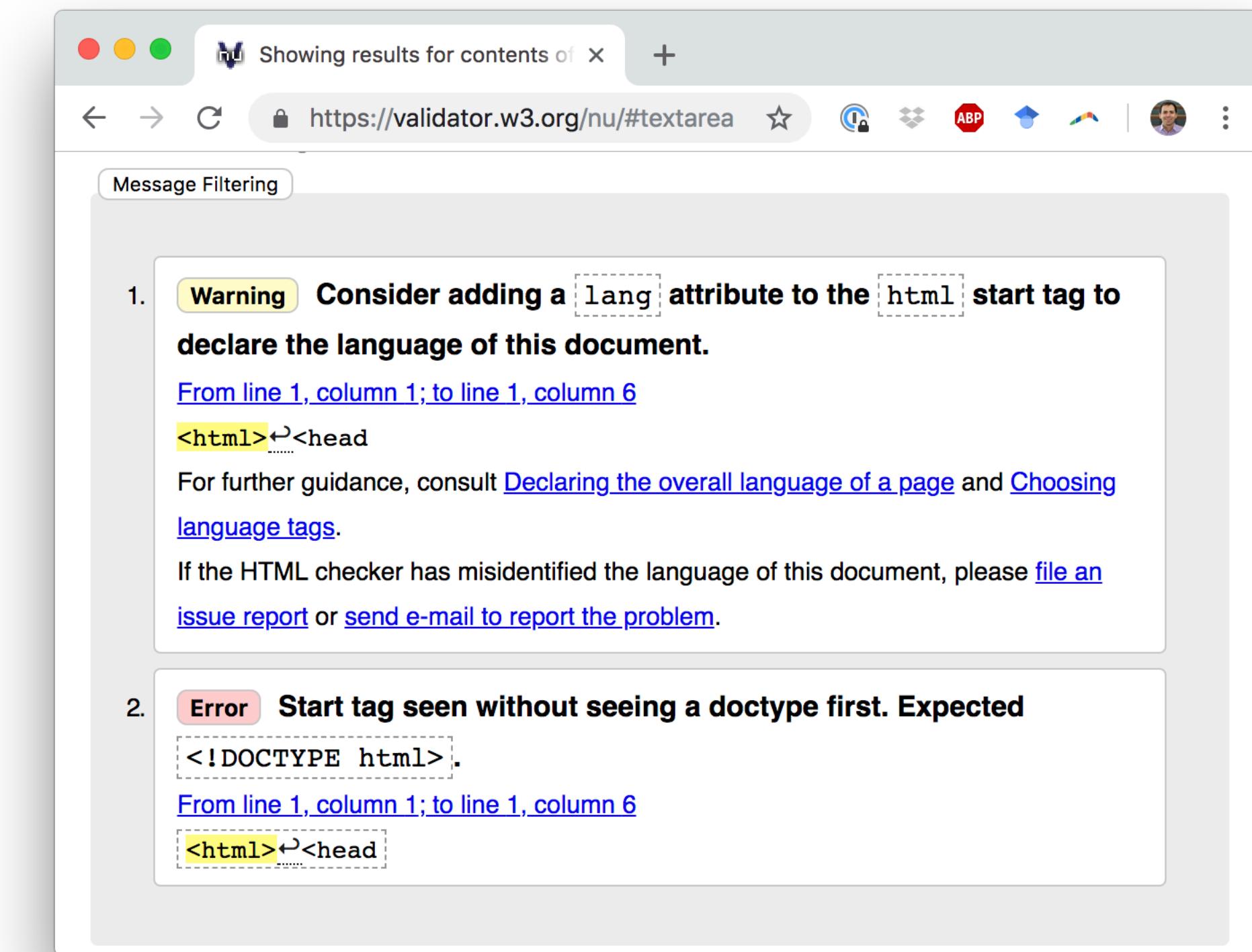
```
<html>
<head>
  <title>My Page Title</title>
</head>
<body>
  <h1>Hello, world!</h1>
  <p>...</p>
```



W3C validator

```
<html>
<head>
  <title>My Page Title</title>
</head>
<body>
  <h1>Hello, world!</h1>
  <p>...</p>
```

- Even the validators are surprisingly accommodating!
- I count 5 structural errors that the validator did not report



Why does HTML structure matter?

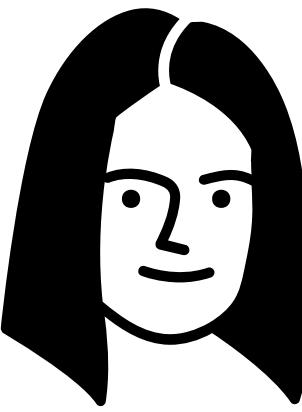
Taking a step back:
Web access is important

**“The power of the Web is in its universality.
Access by everyone regardless of disability is an essential aspect.”**

*-Tim Berners-Lee, inventor of the World Wide Web and 2016 Turing award winner
<https://www.w3.org/WAI/fundamentals/accessibility-intro/>*

**All sorts of people
will use the webpage you create**

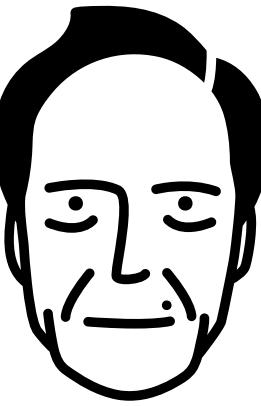
Meet Tracy



Tracy Young is 28 years old and was born blind. She did well in school, getting support from audio tapes and books and the support of tutors. She never bothered really to learn Braille. She holds a college degree in English literature and is very fond of writing poems and short stories. When using her computer for work, she uses the JAWS software, which reads out aloud the content of the computer screen in an artificial voice (screen reader). JAWS runs only on Internet Explorer, which is the standard browser in Tracy's company.

- Adapted from https://publikationen.sulb.uni-saarland.de/bitstream/20.500.11880/25641/1/personas_access.pdf

Meet Gerald



Gerald Oldman is 68 years old, a retired investment banker. He spends several hours a week on the Internet to manage his personal investments and pension funds. Gerald has some impairments which are quite common with senior citizens. His vision has reduced with age. The letters on the screen start to blur after reading for a while, so he needs an overhead light and a magnifying glass. His hands tend to be shaky, so that he has some difficulties making exact movements with a computer mouse. He therefore prefers keyboard controls.

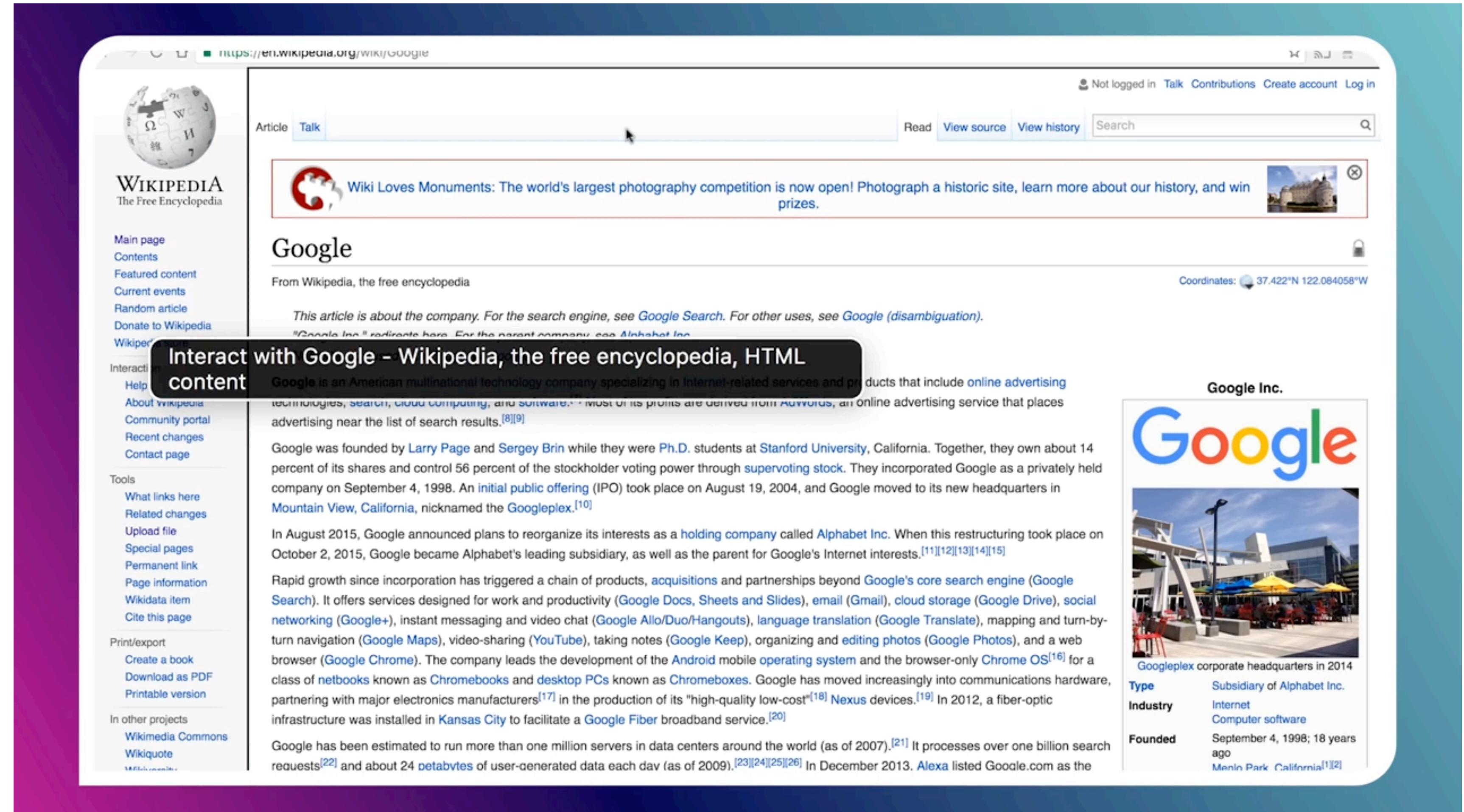
- Adapted from https://publikationen.sulb.uni-saarland.de/bitstream/20.500.11880/25641/1/personas_access.pdf

Common impairments

- Vision
 - Blind, low vision, colorblind
- Motor impairments
 - Arthritis, cerebral palsy, tremors, paralysis
- Cognitive impairments
 - Autism, dyslexia, language barriers
- Much more

One accommodation: Apple VoiceOver

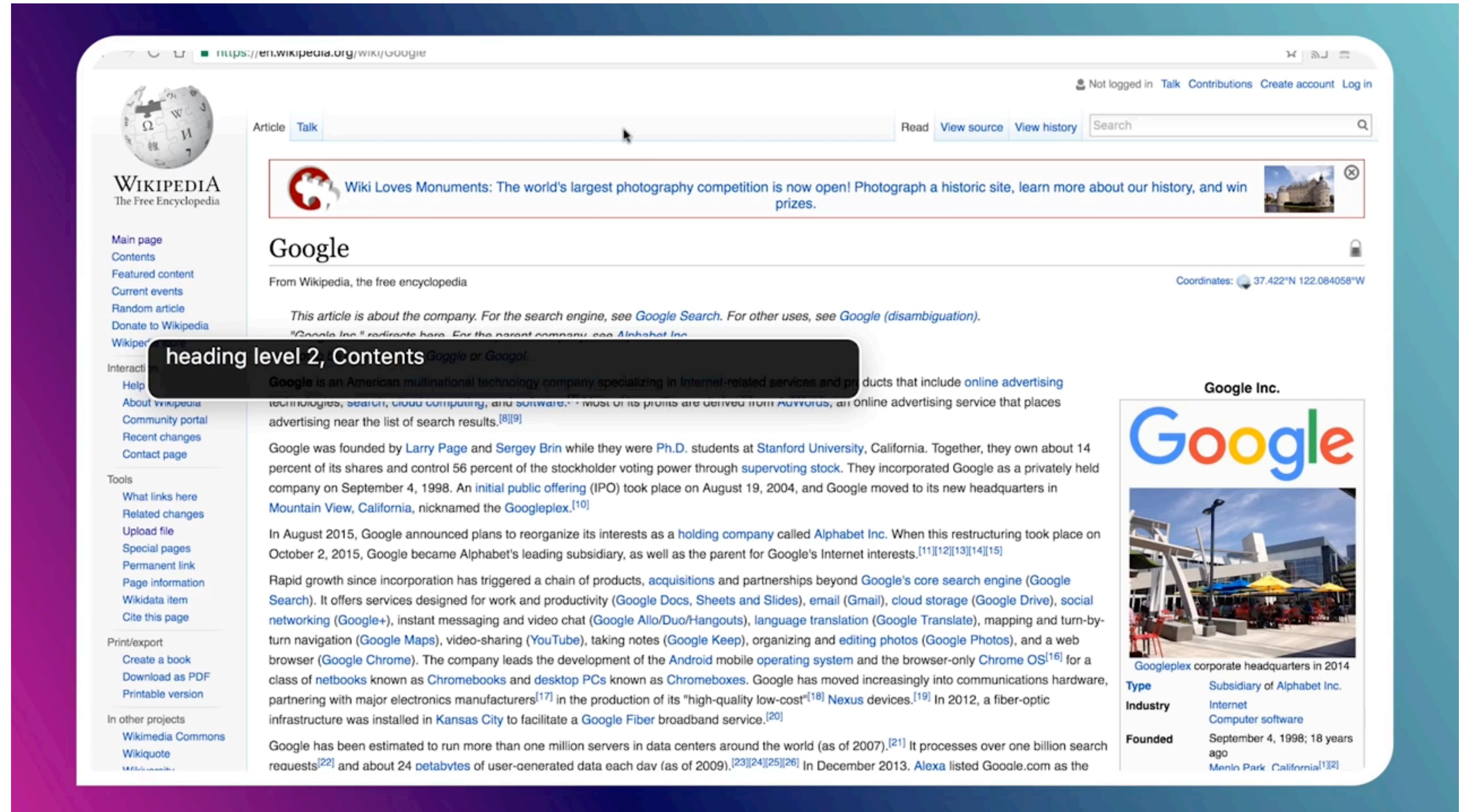
Enables navigating visual content via the keyboard



<https://youtu.be/5R-6WvAihms>

One accommodation: Apple VoiceOver

Navigating via headings



<https://youtu.be/5R-6WvAihms>

One accommodation: Apple VoiceOver

Navigating
via specific types
of content



<https://youtu.be/5R-6WvAihms>

How do we support easy navigation with a screen reader?

**How do we support easy navigation
with a screen reader?**

Add semantic meaning to tags

Semantic (landmark) elements

ARIA roles—the “old” way

- Give non-semantic elements (like <div>s) a role attribute to provide semantic meaning

```
<div role="main">
```

```
<div role="navigation">
```

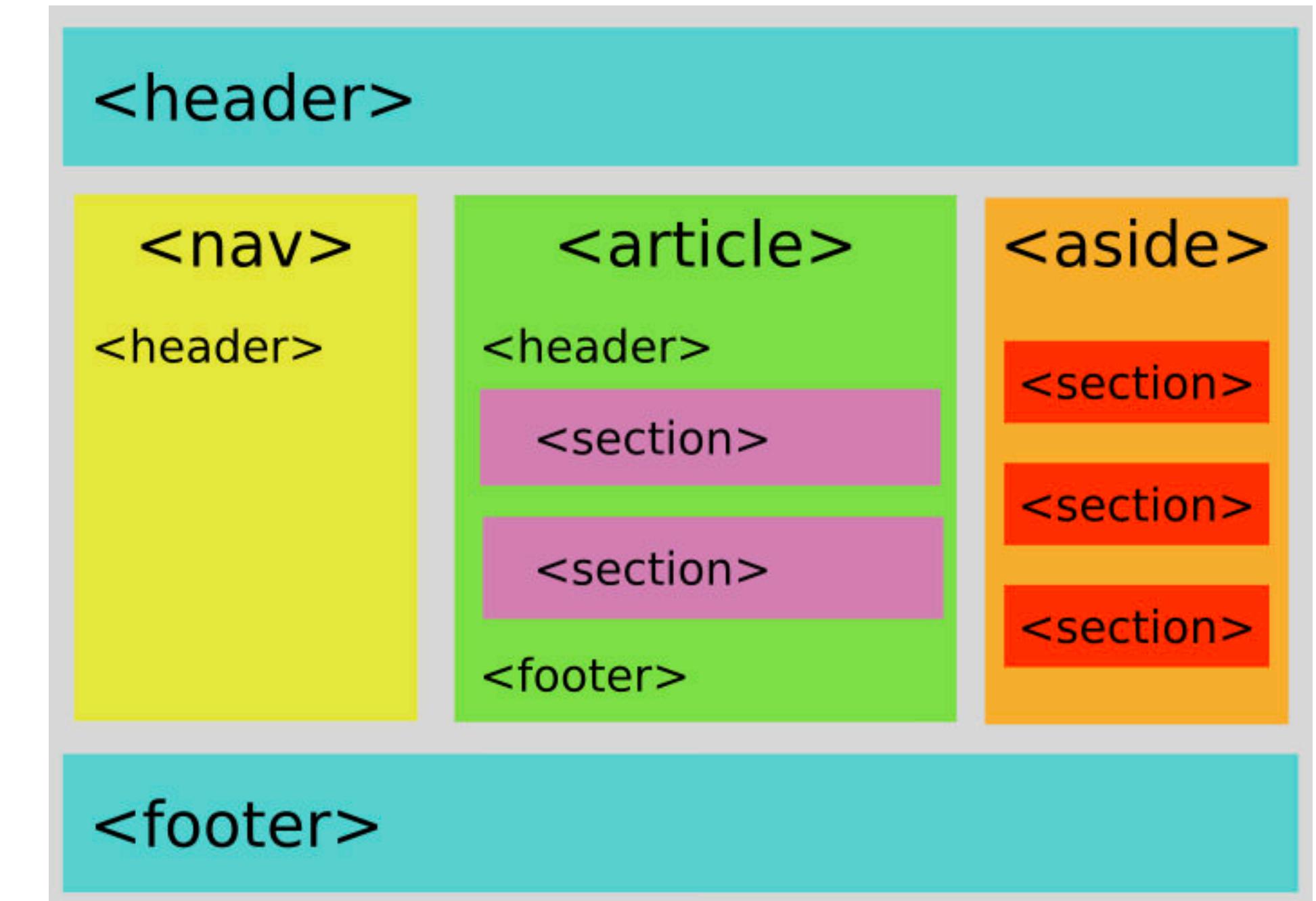
```
<div role="form">
```

- <https://www.w3.org/TR/wai-aria-practices/examples/landmarks/HTML5.html>

Semantic (landmark) elements

HTML5 tags—the “new” way

- Dedicated semantic tags
- https://www.w3schools.com/html/html5_semantic_elements.asp



A few other accessibility examples

- “alt” attributes in images
- “aria-label” attributes to describe non-visual elements (like buttons)

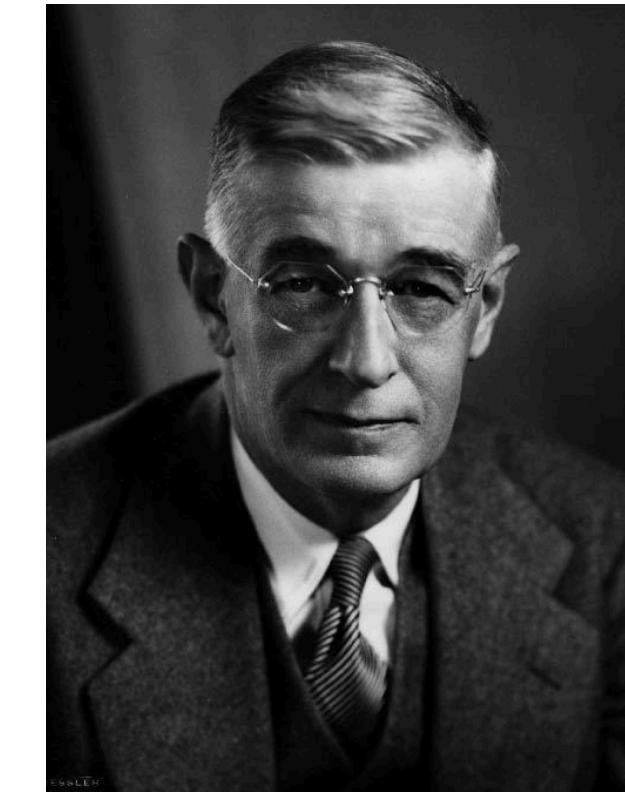
```
<button aria-label="Close">x</button>
```

Question



</> alt

Which alt text would best describe this image?



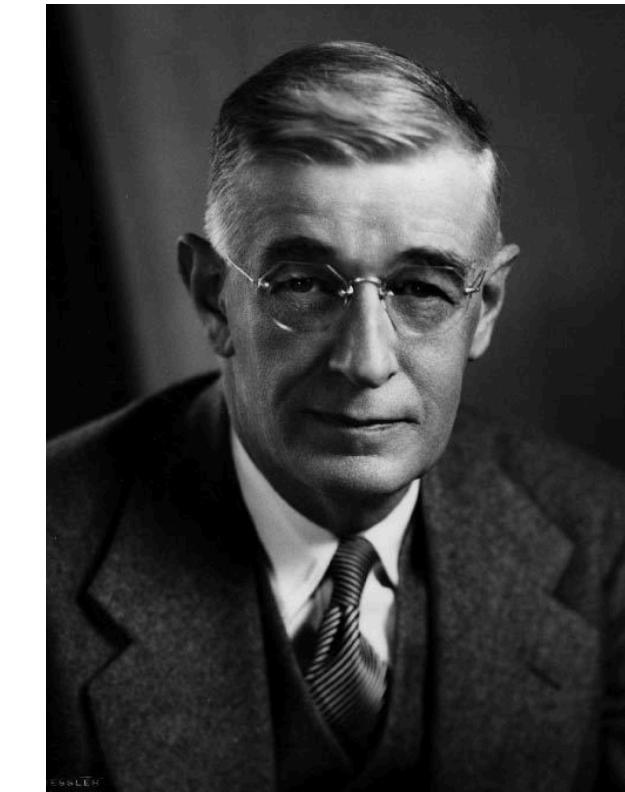
- A ``
- B ``
- C ``
- D ``
- E ``

Question



</> alt

Which alt text would best describe this image?



- A ``
- B ``
- C ``
- D ``
- E ``

Alt text guidelines

1. Always include an alt attribute, even if it's empty
2. Describe the information, not the picture
3. “Active” images and images which contain information require descriptive alt text
4. Decorative images should have empty alt text
5. Be succinct, avoid being redundant with text

- <https://webaim.org/techniques/alttext/>
- <https://www.abilitynet.org.uk/blog/five-golden-rules-compliant-alt-text>



Icons in Google Docs



Daniel Epstein
@daepstein

Cover photos on Twitter/Facebook

Accessibility validators

- WAVE <http://wave.webaim.org/>
- ACheker <https://achecker.ca/checker/index.php>
- Both over-report problems, requires you to think through whether something is actually an accessibility issue
- Can try on your own with a screen reader
 - VoiceOver (Mac, under Settings -> Accessibility)
 - NVDA (Windows, requires download from <https://www.nvaccess.org/>)

Wrap-up:
Inclusive design
is better for everyone

Inclusive design is better for everyone

- The HTML stands alone
 - Developers can glance at a page's source and have a good idea of what it renders
- Semantic HTML helps people identify the content they want
 - Accessibility benefits, as previously discussed
 - Interfaces can selectively remove or de-emphasize contextually unimportant content (e.g., footnotes on a small screen)
 - Search engines can index the important content (e.g., headings, articles) rather than UI content (e.g., nav, footers)

A1

Responsive portfolio in HTML and CSS

- Three requirements: content, responsiveness, validity
- *Content*: contains basic HTML and CSS (today & Monday)
- *Responsiveness*: adapts to a range of screen dimensions (next Wednesday)
- *Validity*: must be well-formed HTML/CSS and pass accessibility guidelines
- Due at 11:59pm on Wednesday, January 20th

A1

Responsive portfolio in HTML and CSS

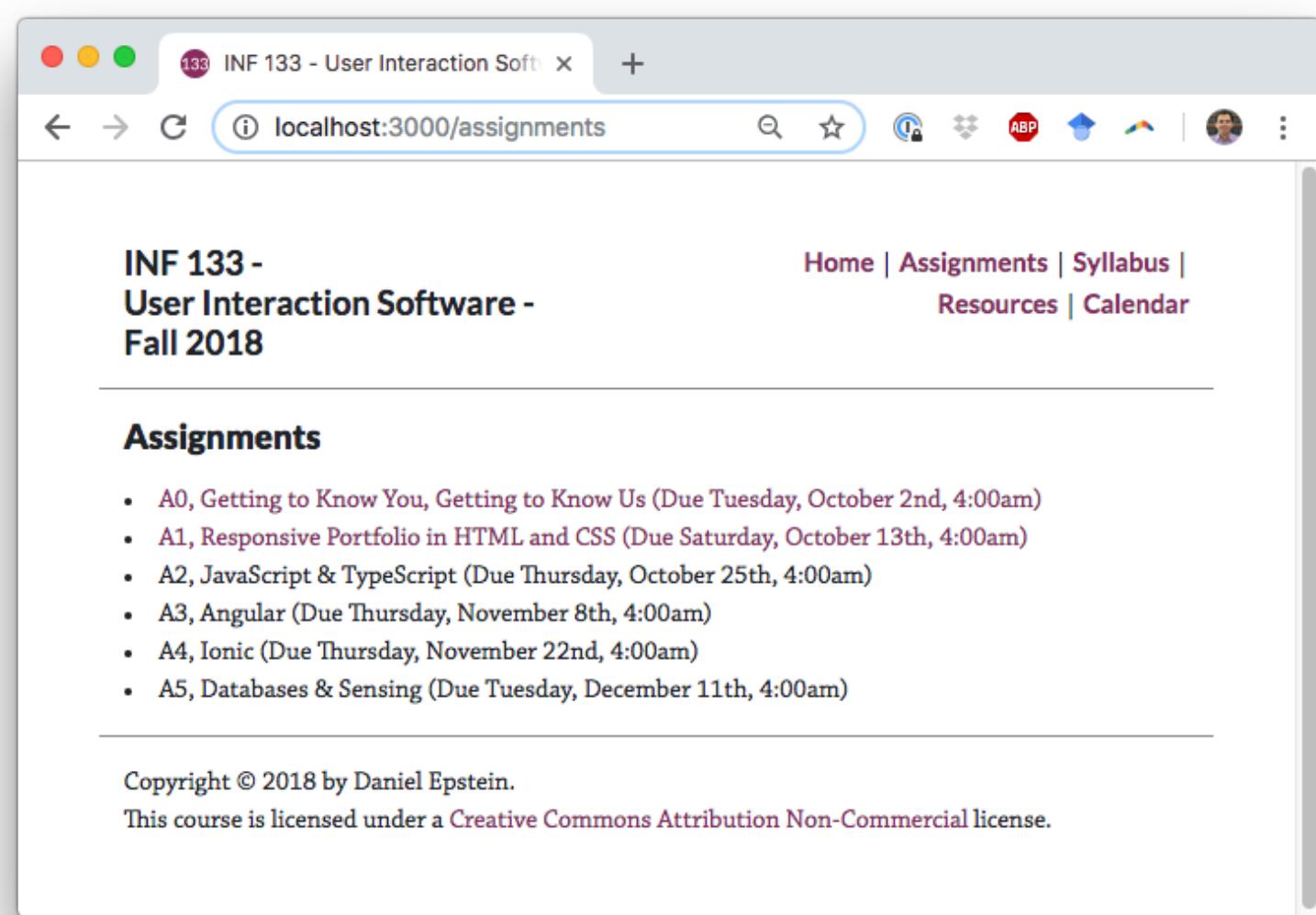
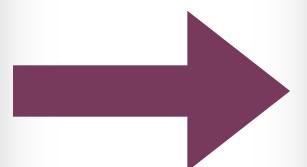
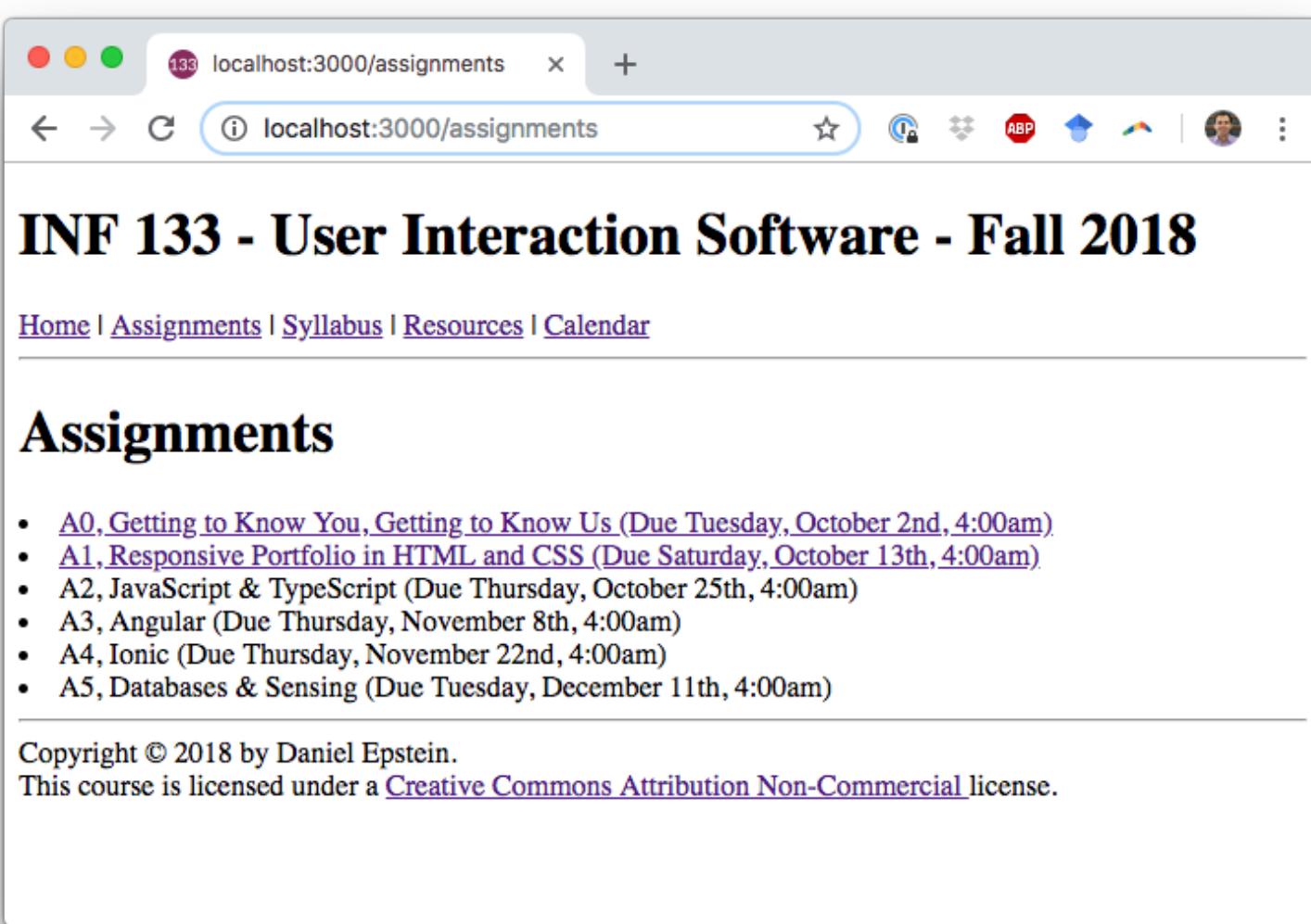
- This assignment is intentionally open-ended
- Many students use their A1 as the foundation for the portfolios they use when applying for jobs
- If you have already made a personal portfolio, you may re-use it for A1
 - But it must satisfy all of the other requirements
 - Consider adding a feature or two for the assignment

Today's goals

By the end of today, you should be able to...

- Describe the fundamentals of web communication
- Identify the syntax of HTML tags and attributes and describe their roles
- Create a HTML template which follows W3C specifications
- Explain the importance of accessible and semantically meaningful markup
- Generate markup which meets accessibility standards

Next lecture: styling pages with CSS



IN4MATX 133: User Interface Software

Lecture 2:
HTML & Accessibility

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