

IN4MATX 133: User Interface Software

Lecture 2:
HTML & Accessibility

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TA Jamshir Goorabian
TA Simion Padurean

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
- A few people weren't sure, just thought the class sounded interesting

A0 Summary

- A few people were disappointed to not be covering React and Vue.js
 - They're great; they're growing in popularity for web and mobile development
 - A lot of Angular and Ionic concepts we cover will transfer over
 - In 3-5 years there will be something different
 - We'll think about some options for the later assignments

A0 Summary

- Most of you feel at least somewhat confident in Python & Java
- Less so with web technologies
 - ~50% felt confident in HTML & CSS, ~33% JavaScript
 - Much less for Angular/Mobile
 - ~50% 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, feel free 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 Due at 4am tonight/tomorrow

- If you're at 8.8, etc. on the syllabus quiz, please take it again

Tuesday lab 10/2

Jamshir and Simion will...

- Go over the requirements for A1, personal portfolio
- Demonstrate Git, GitHub, and GitHub Classroom
- Show how to import a simple CSS stylesheet
- Answer any questions about HTML or Git
- Not required, but highly encouraged
- First quiz will be next week (10/9)

Clickers for points begin next lecture (10/3)

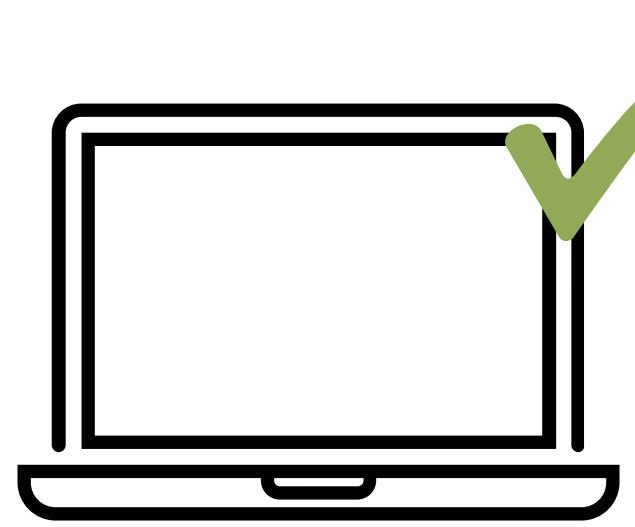
- Assuming today goes smoothly

Today's goals

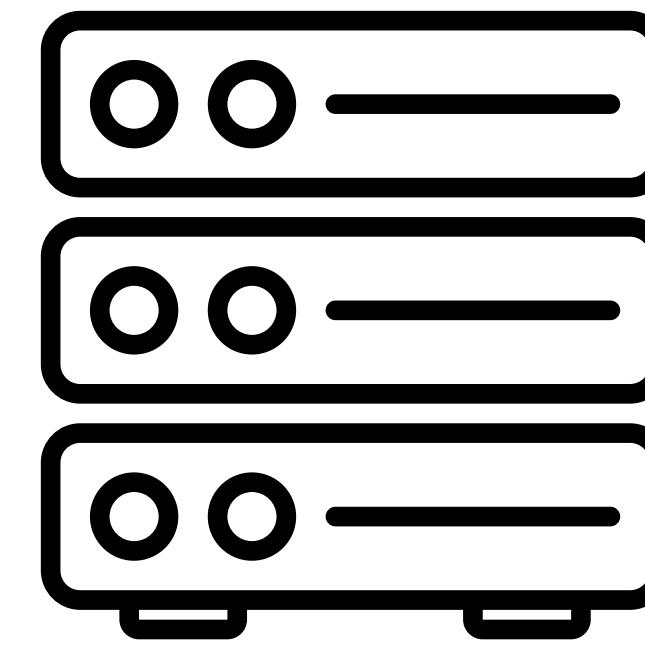
By the end of today, you should be able to...

- 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

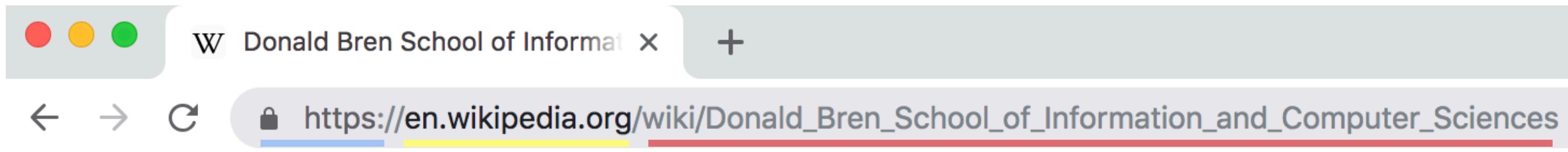


Your device



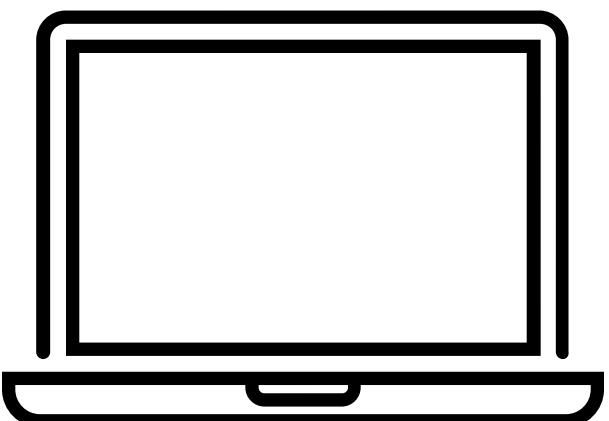
Web server

Using the internet

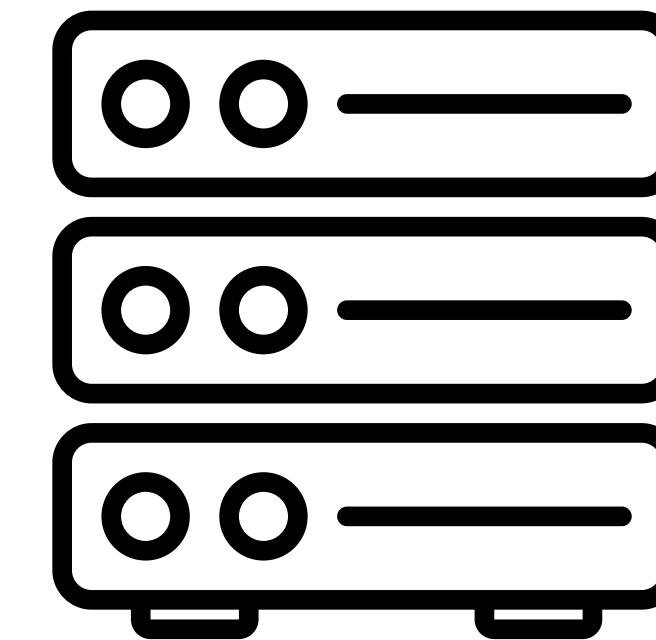
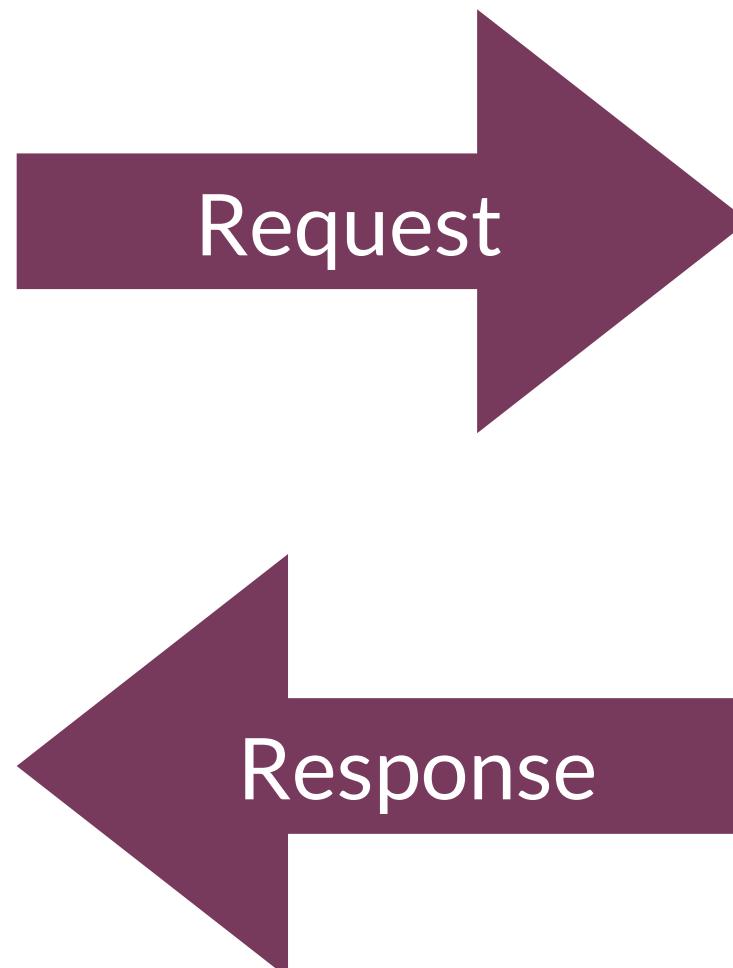


Protocol (how to handle info)	Host (who has info)	Resource (what info you want)
----------------------------------	------------------------	----------------------------------

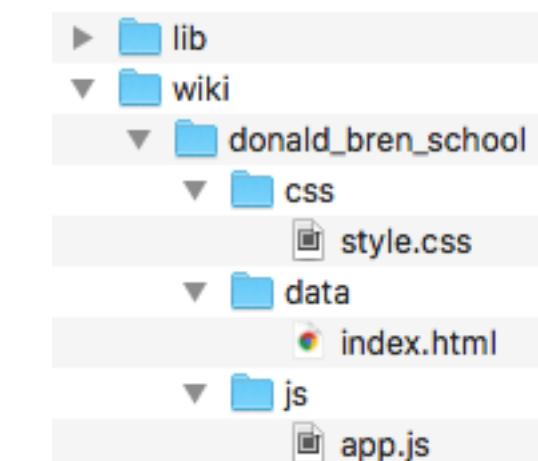
“Hey Wikipedia, I’d like to see the page for the school of ICS!”

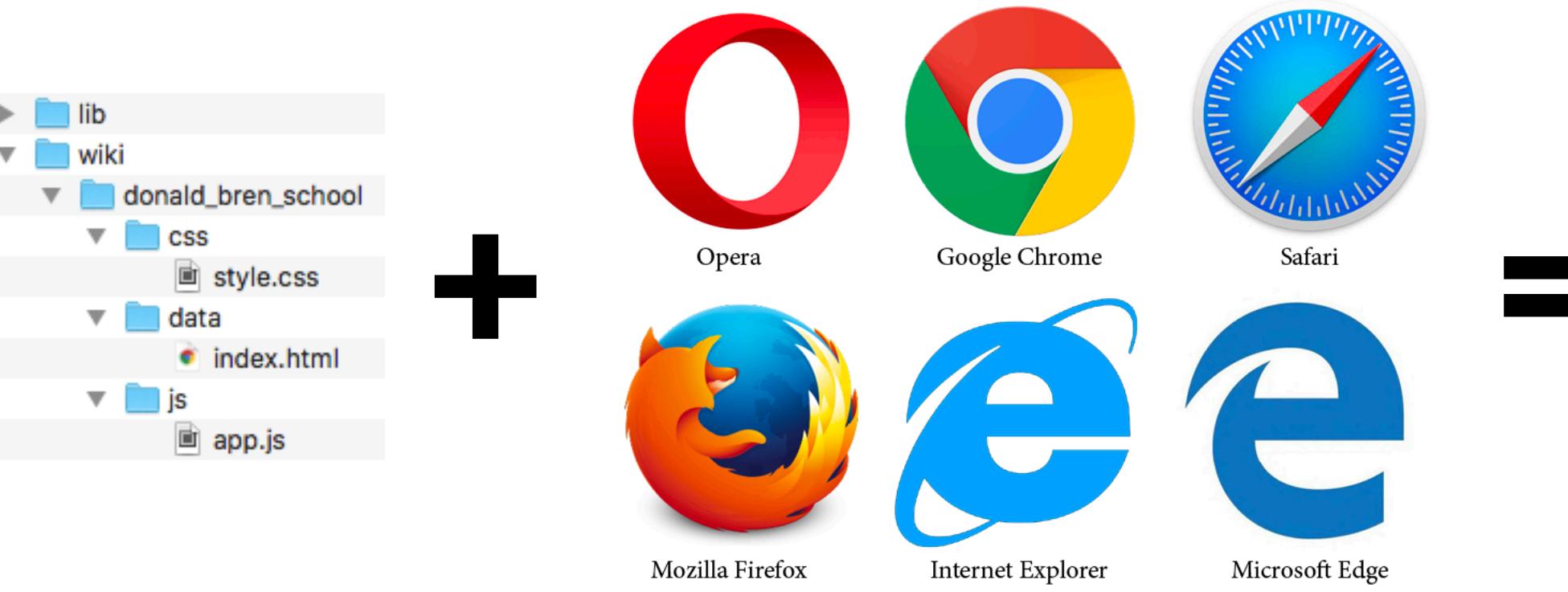


Your device



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]

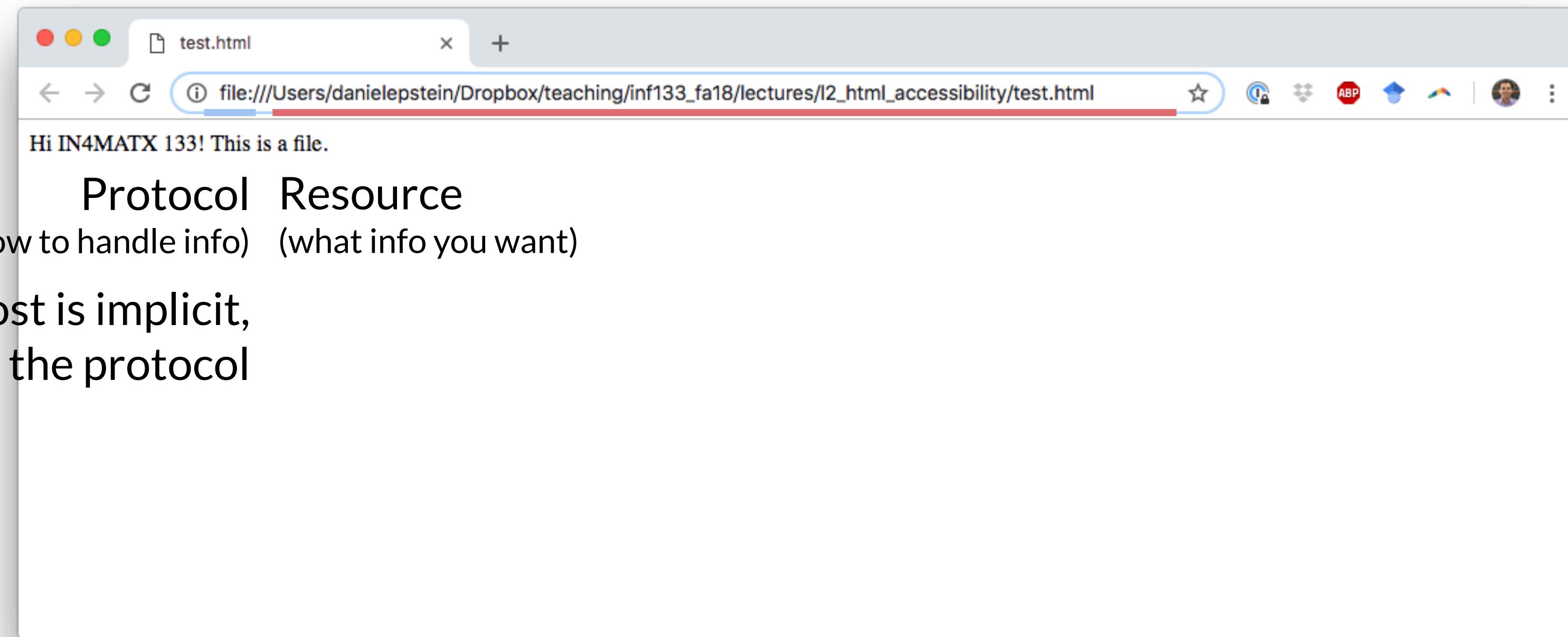
**Fundamentally, the web is
designed to send files around**

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

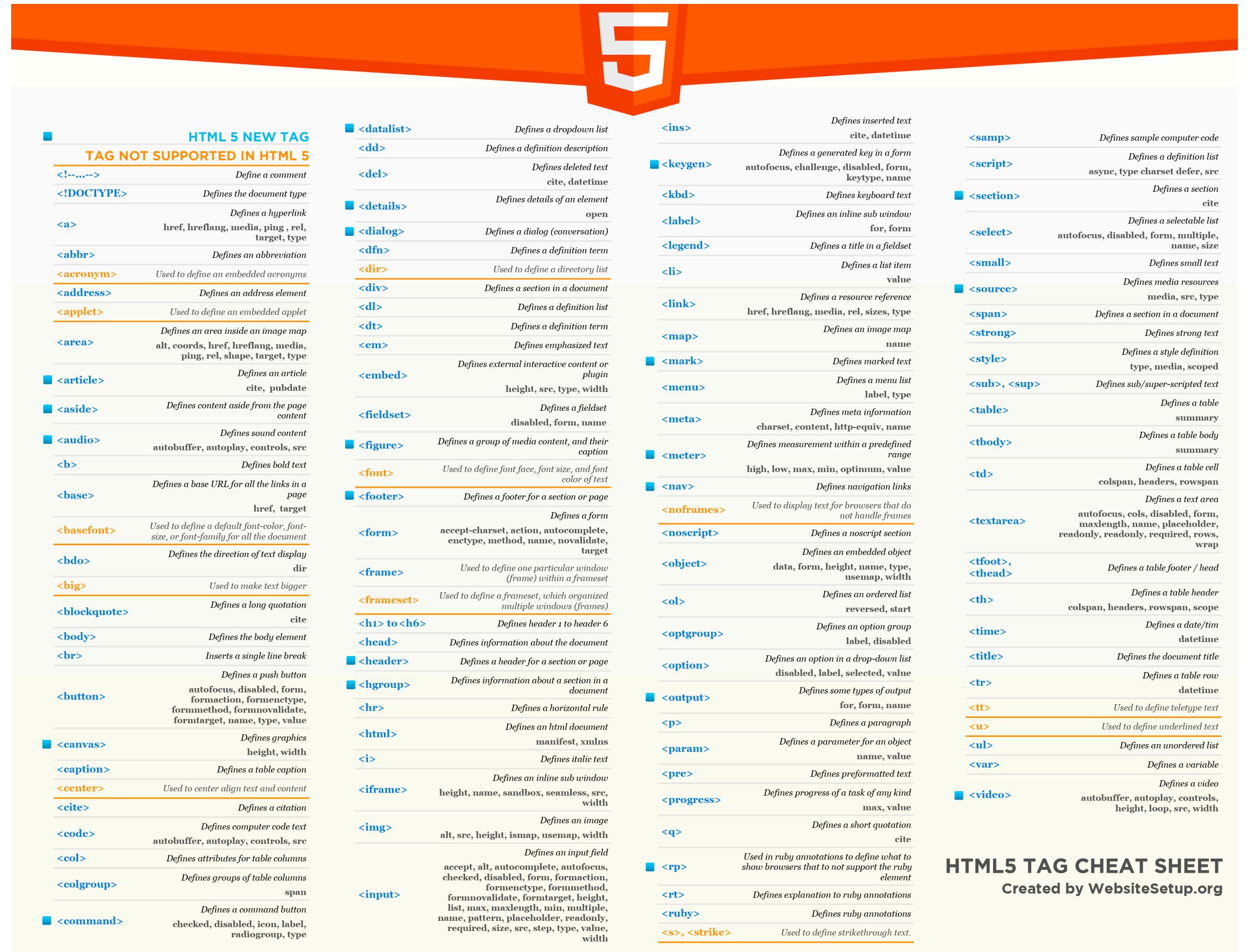
Whitespace and tag case are ignored

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/>

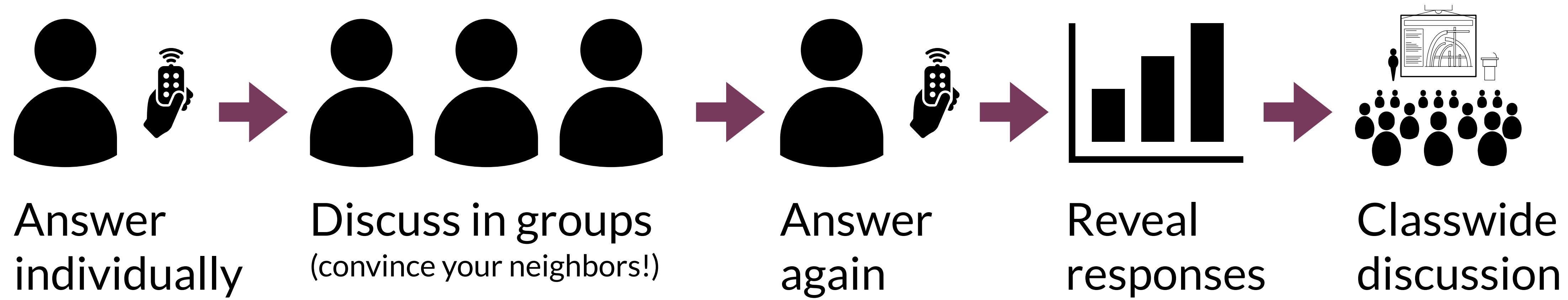


This image shows a comprehensive HTML5 tag cheat sheet titled "HTML5 TAG CHEAT SHEET" created by WebsiteSetup.org. The page features a large orange header with the number "5" and the word "HTML". Below the header is a table listing over 100 HTML tags, each with a brief description of its purpose and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

HTML5 TAG CHEAT SHEET
Created by WebsiteSetup.org

Question



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>`

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>`

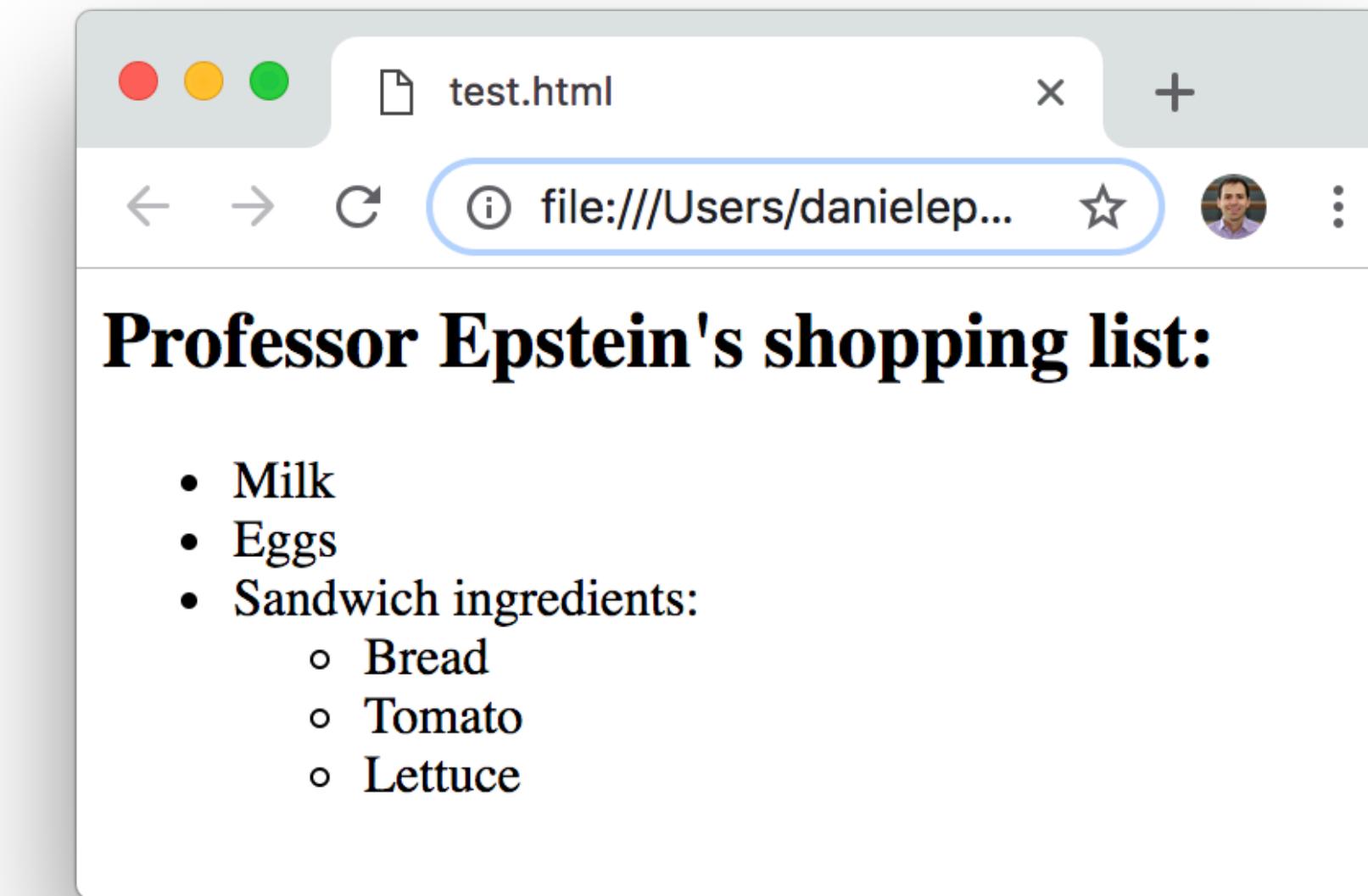
Nesting

- The Content of a tag can contain other HTML tags

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

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

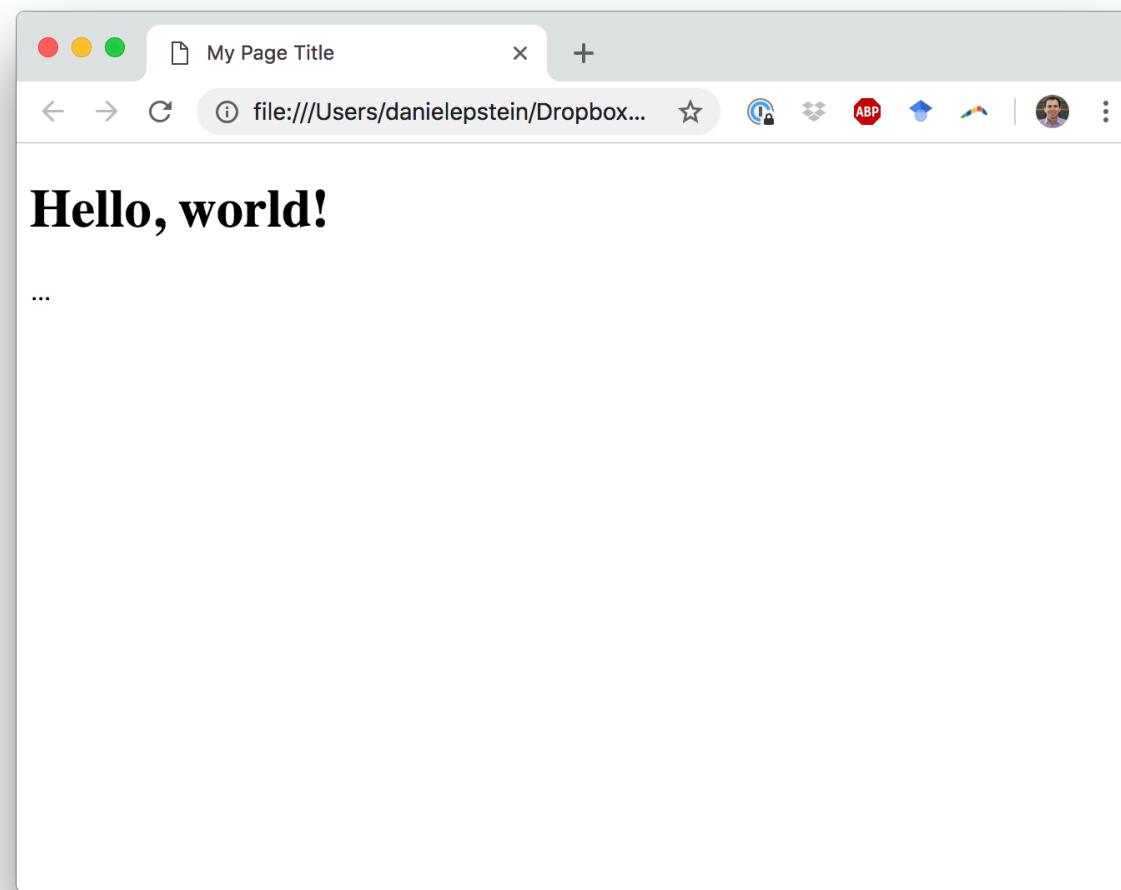
```
<!DOCTYPE html> ← Document format
<html lang="en"> ← Specify language
<head> ← Document header (content that's not shown)
    <meta charset="UTF-8"> ← Character set (for non-latin characters)
    <meta name="author" content="your name"> ← For search engines
    <title>My Webpage</title> ← Webpage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

HTML structure

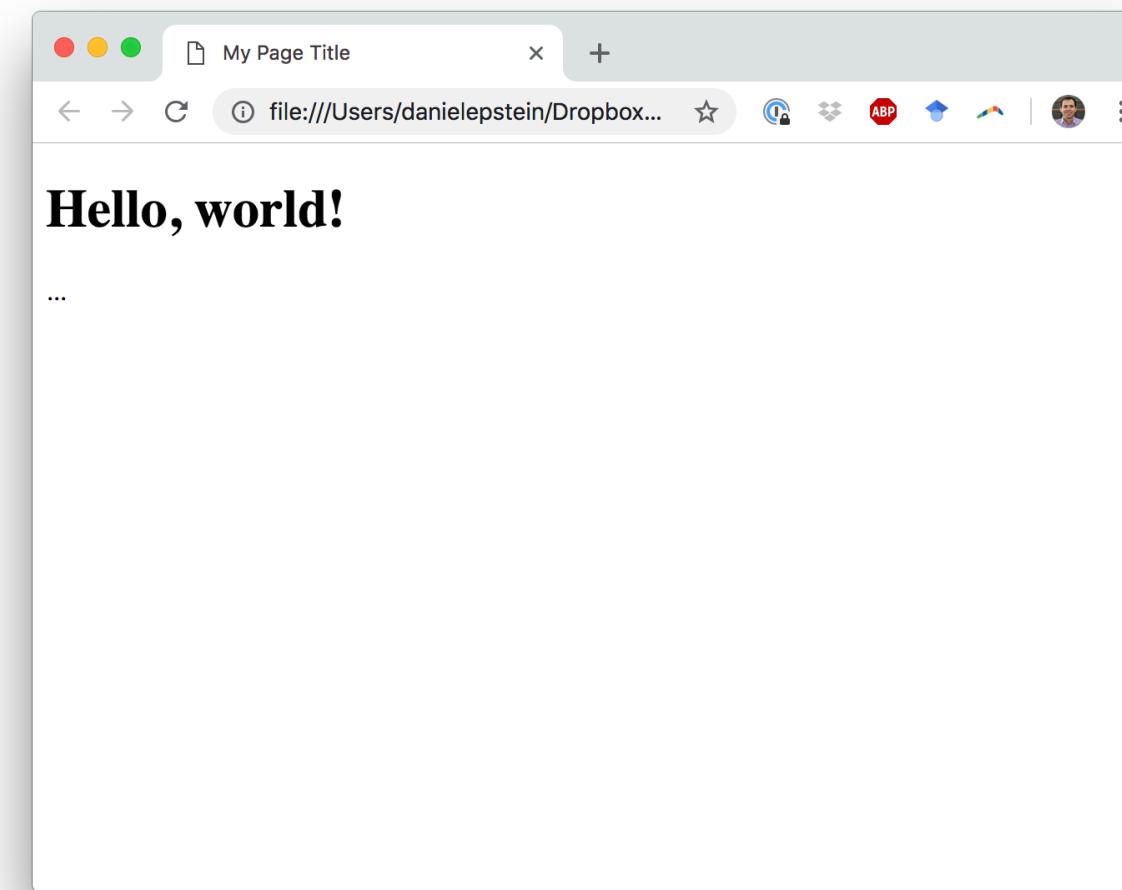
- Surprisingly, browsers are accommodating about HTML structure
- No “compiler errors”
- However, validation can help ensure browser compatibility and site usability

HTML structure

```
<!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>
```



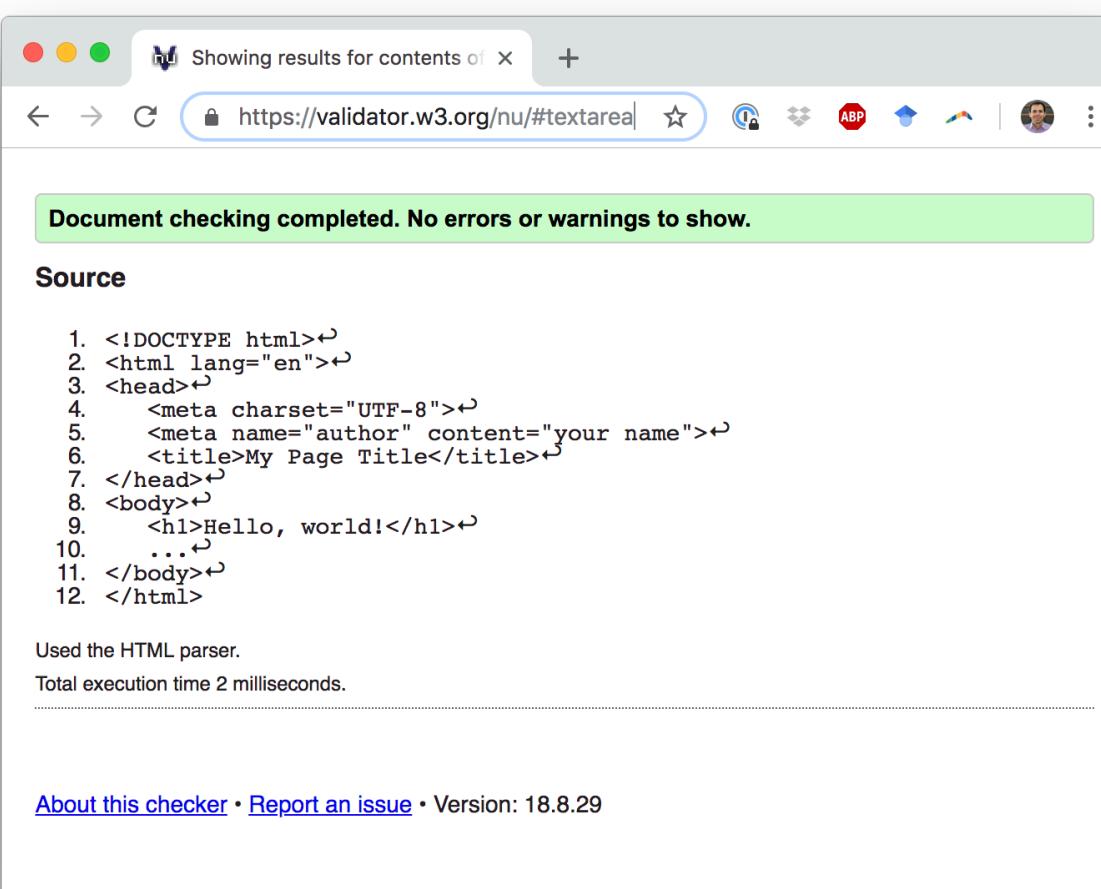
```
<html>
<head>
  <title>My Page Title</title>
</head>
<body>
  <h1>Hello, world!</h1>
  <p>...</p>
```



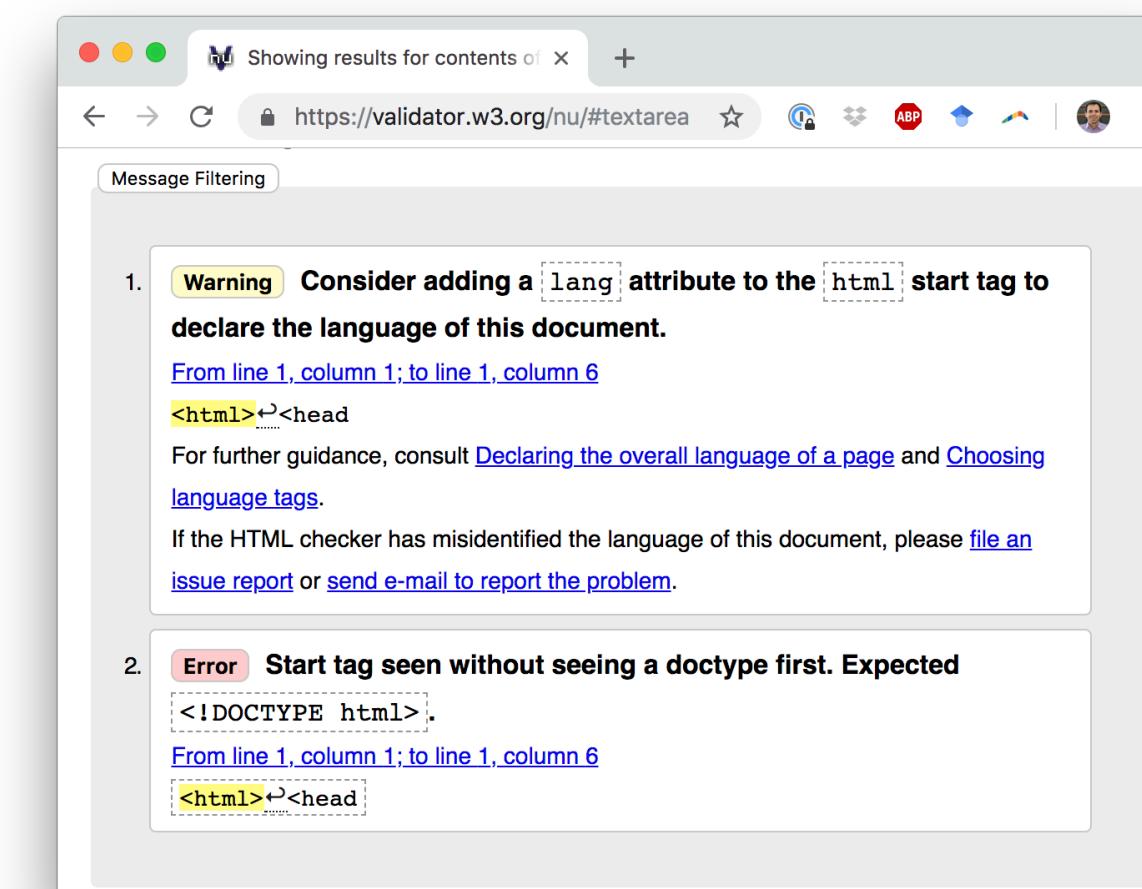
W3C validator

- <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>
```



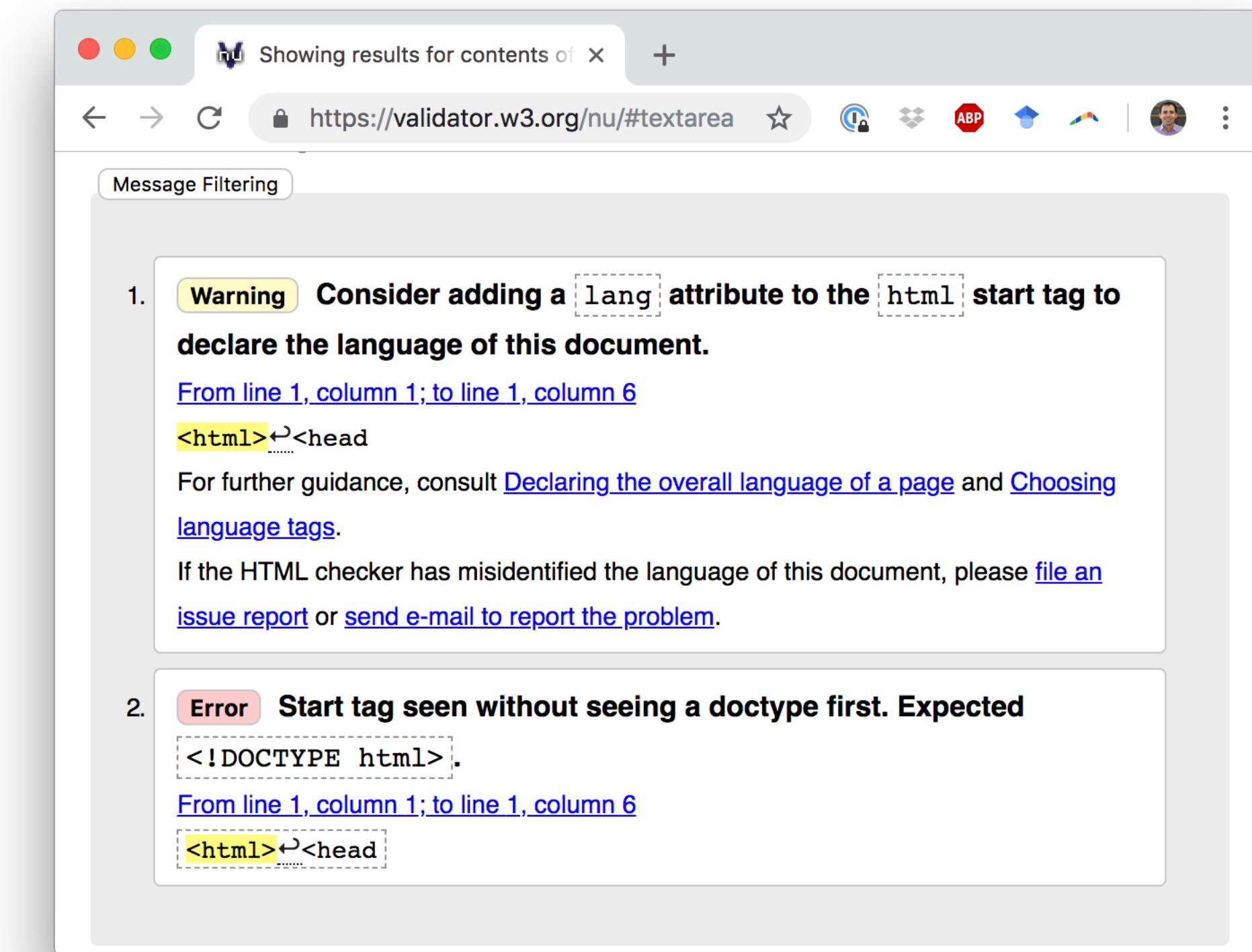
```
<html>
<head>
  <title>My Page Title</title>
</head>
<body>
  <h1>Hello, world!</h1>
  <p>...</p>
</body>
</html>
```



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?

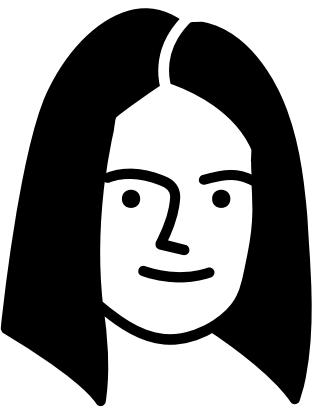
Taking a step back:
Web access is important

**“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**

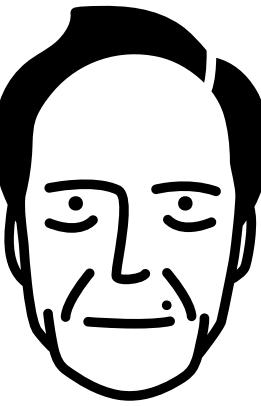
Meet Tracy



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.

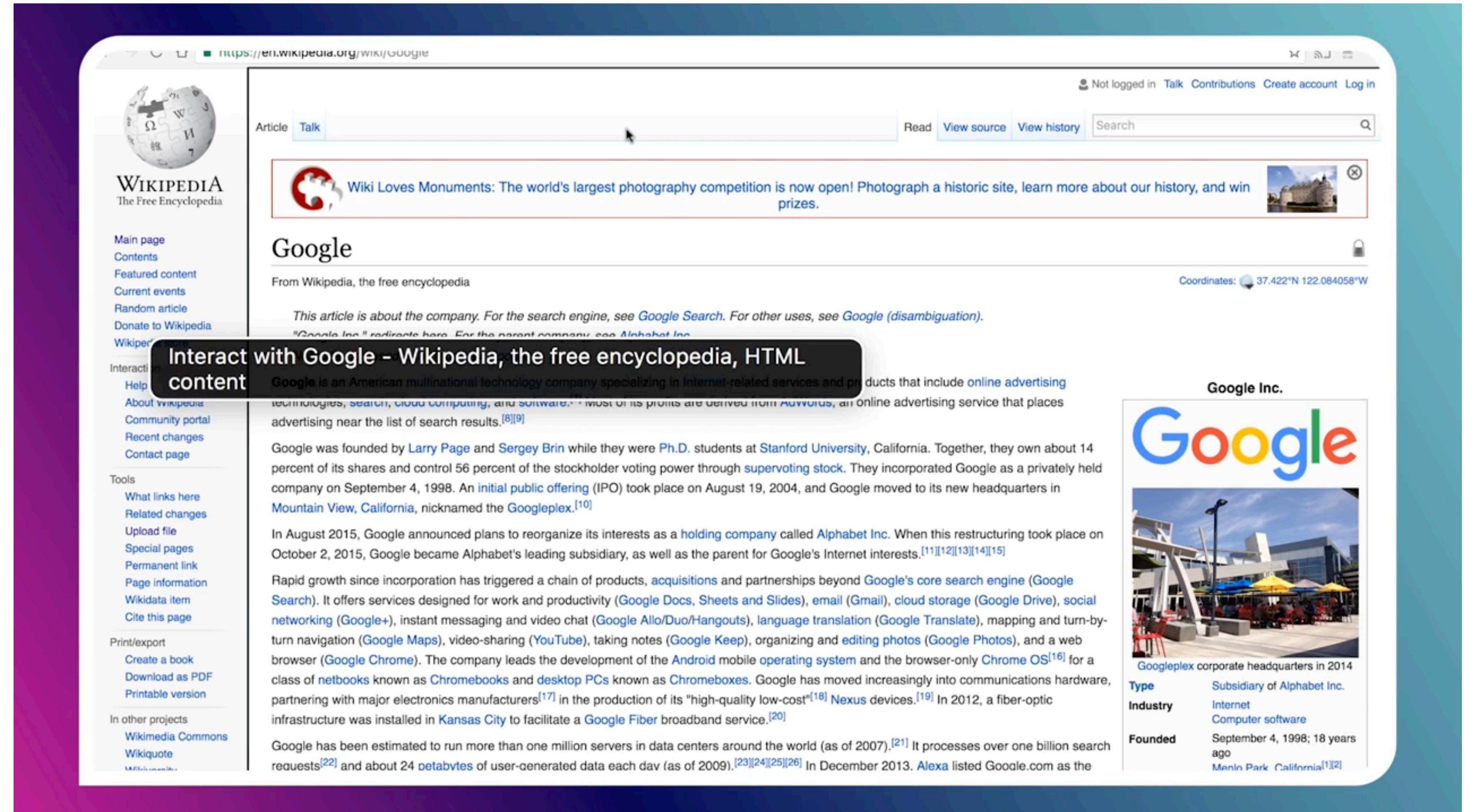
- Adapted from https://publikationen.sulb.uni-saarland.de/bitstream/20.500.11880/25641/1/personas_access.pdf

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

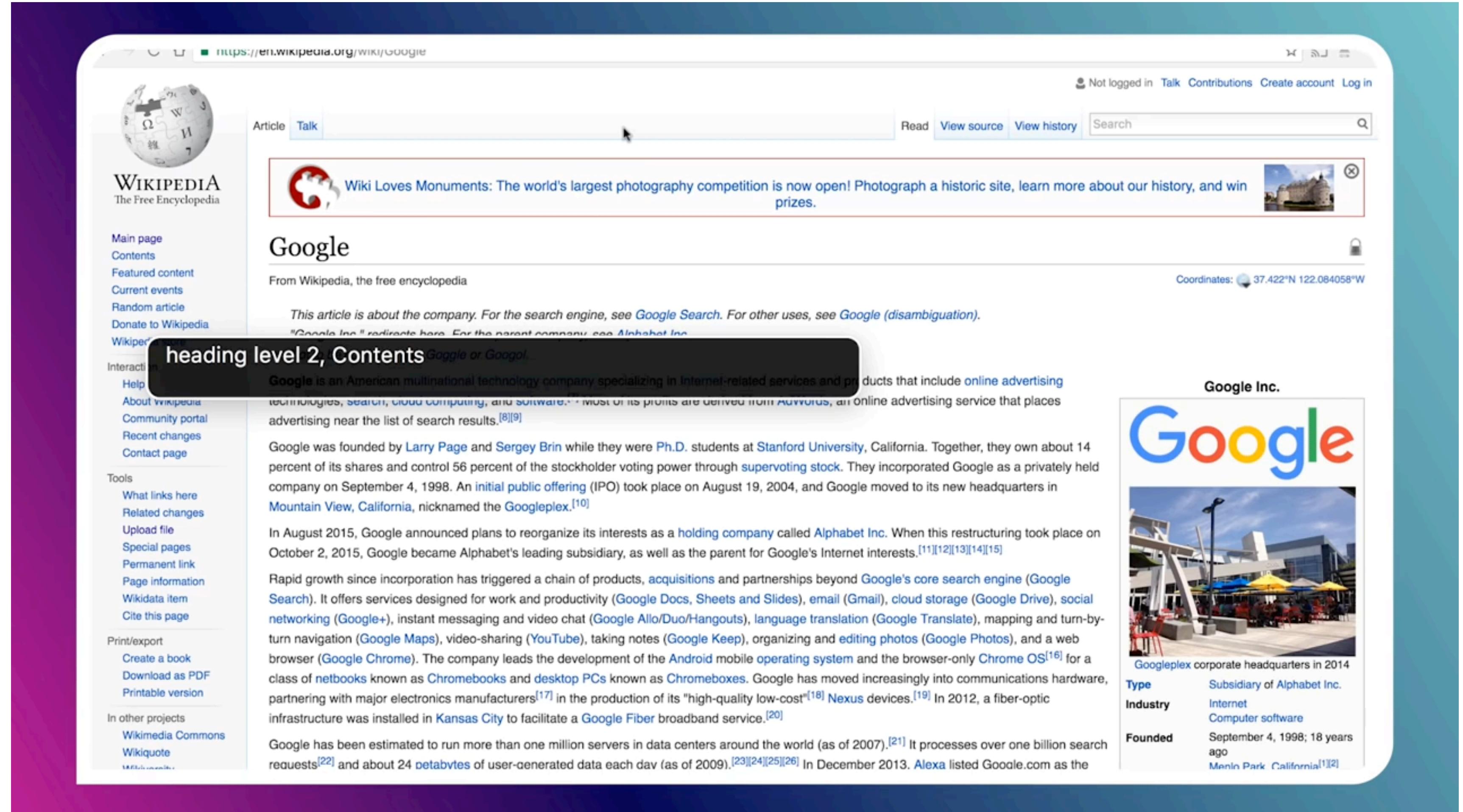
Enables navigating visual content via the keyboard



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

One accommodation: Apple VoiceOver

Navigating via headings



The screenshot shows a web browser displaying the Wikipedia article for "Google". The sidebar on the left contains a navigation menu with various links. A black callout box highlights the "heading level 2, Contents" link under the "Interaction" section. The main content area of the page discusses Google's history, products, and corporate structure. To the right of the main content, there is a sidebar for "Google Inc." which includes the company logo, a photo of the Googleplex headquarters, and some basic information about its type, industry, and founding.

heading level 2, Contents Google or Googol

Google is an American multinational technology company specializing in Internet-related services and products that include online advertising technologies, search, cloud computing, and software.^{[8][9]} Most of its profits are derived from Adwords, an online advertising service that places advertising near the list of search results.^{[8][9]}

Google was founded by Larry Page and Sergey Brin while they were Ph.D. students at Stanford University, California. Together, they own about 14 percent of its shares and control 56 percent of the stockholder voting power through supervoting stock. They incorporated Google as a privately held company on September 4, 1998. An initial public offering (IPO) took place on August 19, 2004, and Google moved to its new headquarters in Mountain View, California, nicknamed the Googleplex.^[10]

In August 2015, Google announced plans to reorganize its interests as a holding company called Alphabet Inc. When this restructuring took place on October 2, 2015, Google became Alphabet's leading subsidiary, as well as the parent for Google's Internet interests.^{[11][12][13][14][15]}

Rapid growth since incorporation has triggered a chain of products, acquisitions and partnerships beyond Google's core search engine (Google Search). It offers services designed for work and productivity (Google Docs, Sheets and Slides), email (Gmail), cloud storage (Google Drive), social networking (Google+), instant messaging and video chat (Google Allo/Duo/Hangouts), language translation (Google Translate), mapping and turn-by-turn navigation (Google Maps), video-sharing (YouTube), taking notes (Google Keep), organizing and editing photos (Google Photos), and a web browser (Google Chrome). The company leads the development of the Android mobile operating system and the browser-only Chrome OS^[16] for a class of netbooks known as Chromebooks and desktop PCs known as Chromeboxes. Google has moved increasingly into communications hardware, partnering with major electronics manufacturers^[17] in the production of its "high-quality low-cost"^[18] Nexus devices.^[19] In 2012, a fiber-optic infrastructure was installed in Kansas City to facilitate a Google Fiber broadband service.^[20]

Google has been estimated to run more than one million servers in data centers around the world (as of 2007).^[21] It processes over one billion search requests^[22] and about 24 petabytes of user-generated data each day (as of 2009).^{[23][24][25][26]} In December 2013, Alexa listed Google.com as the

Google Inc.

Google

Googleplex corporate headquarters in 2014

Type	Subsidiary of Alphabet Inc.
Industry	Internet Computer software
Founded	September 4, 1998; 18 years ago Menlo Park, California ^{[1][2]}

<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">
```

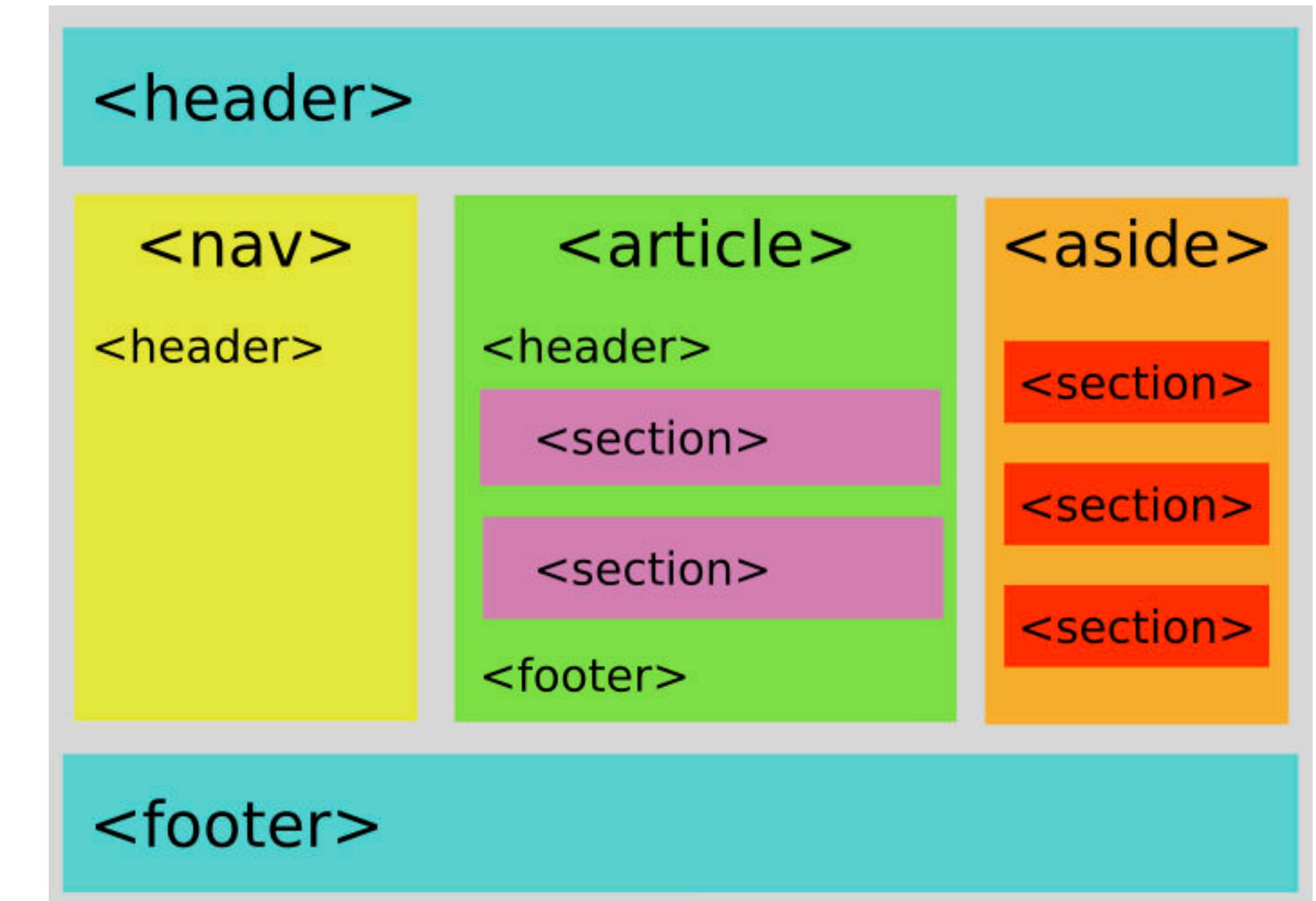
```
<div role="form">
```

- <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

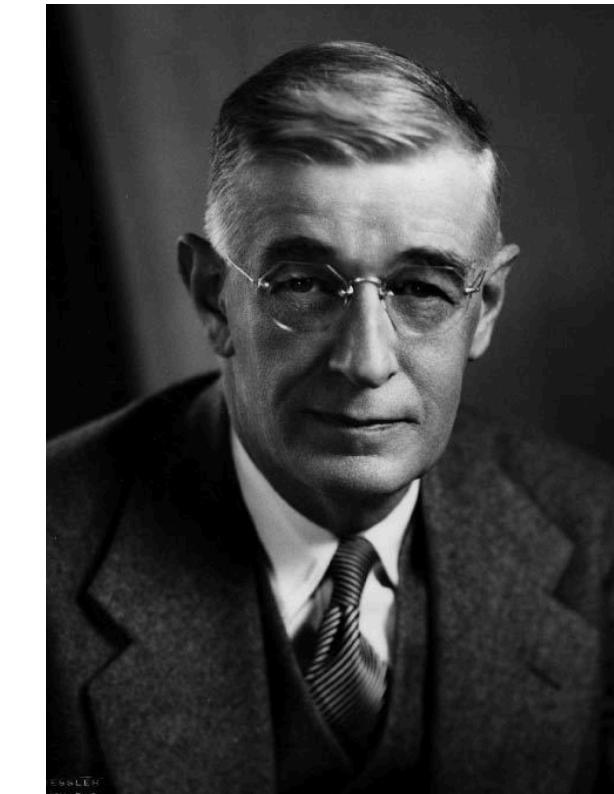
- “alt” attributes in images
- “aria-label” attributes to describe non-visual elements (like buttons)

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

Question



Which alt text would best describe this image?

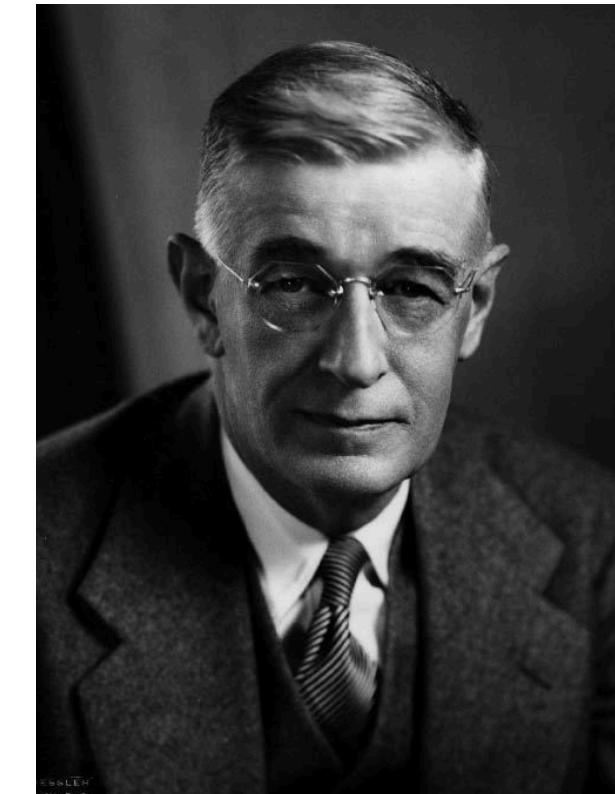


- A ``
- B ``
- C ``
- D ``
- E ``

Question



Which alt text would best describe this image?

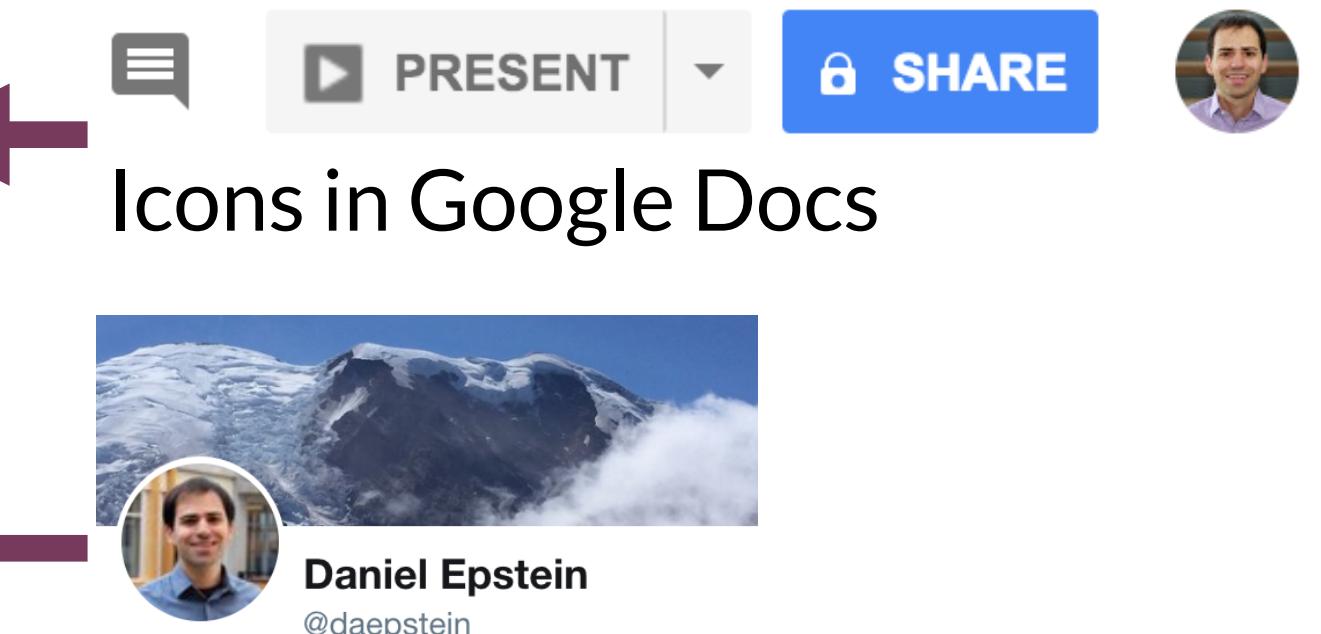


- A ``
- B ``
- C ``
- D ``
- E ``

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>



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

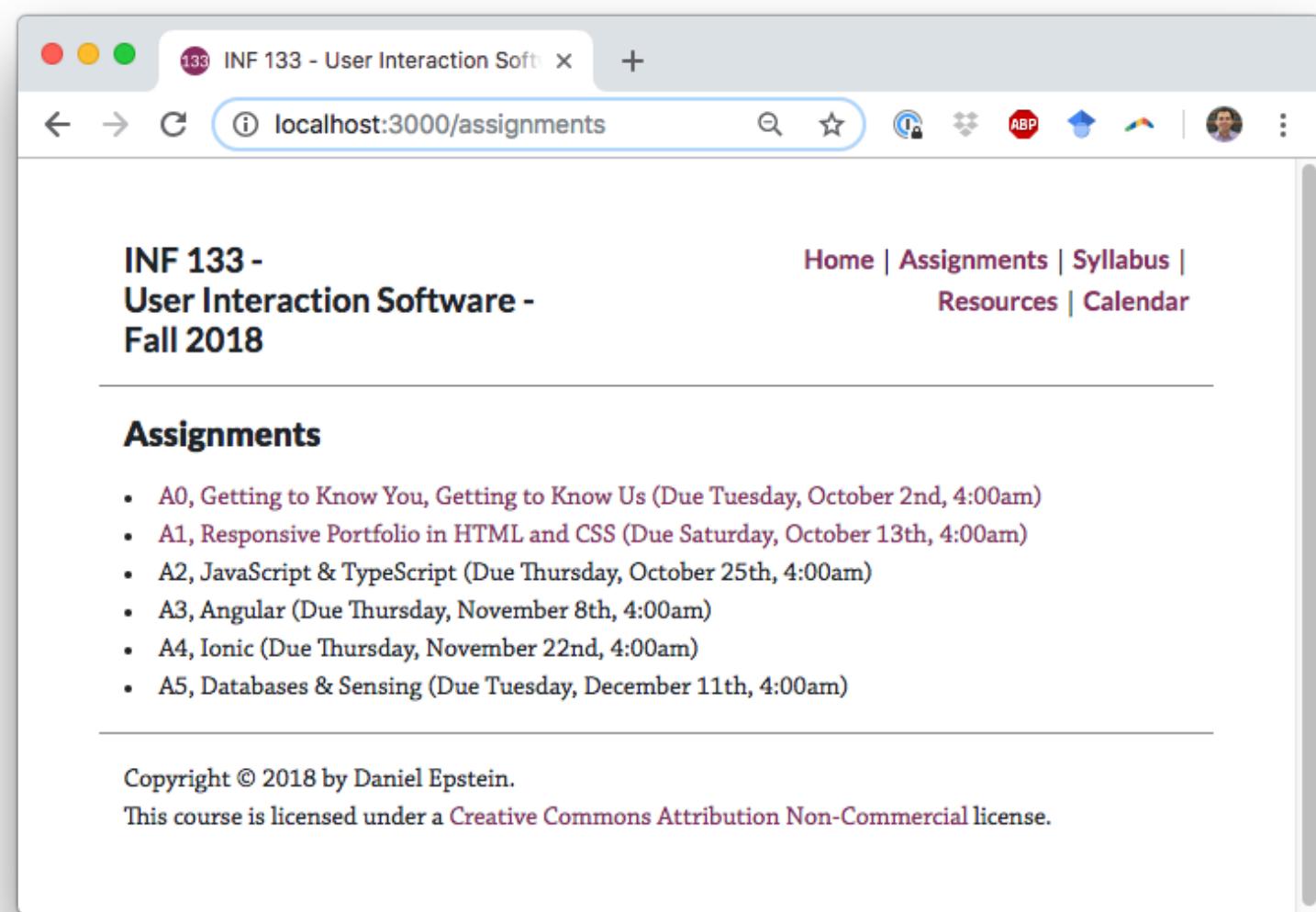
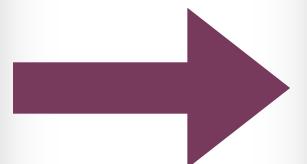
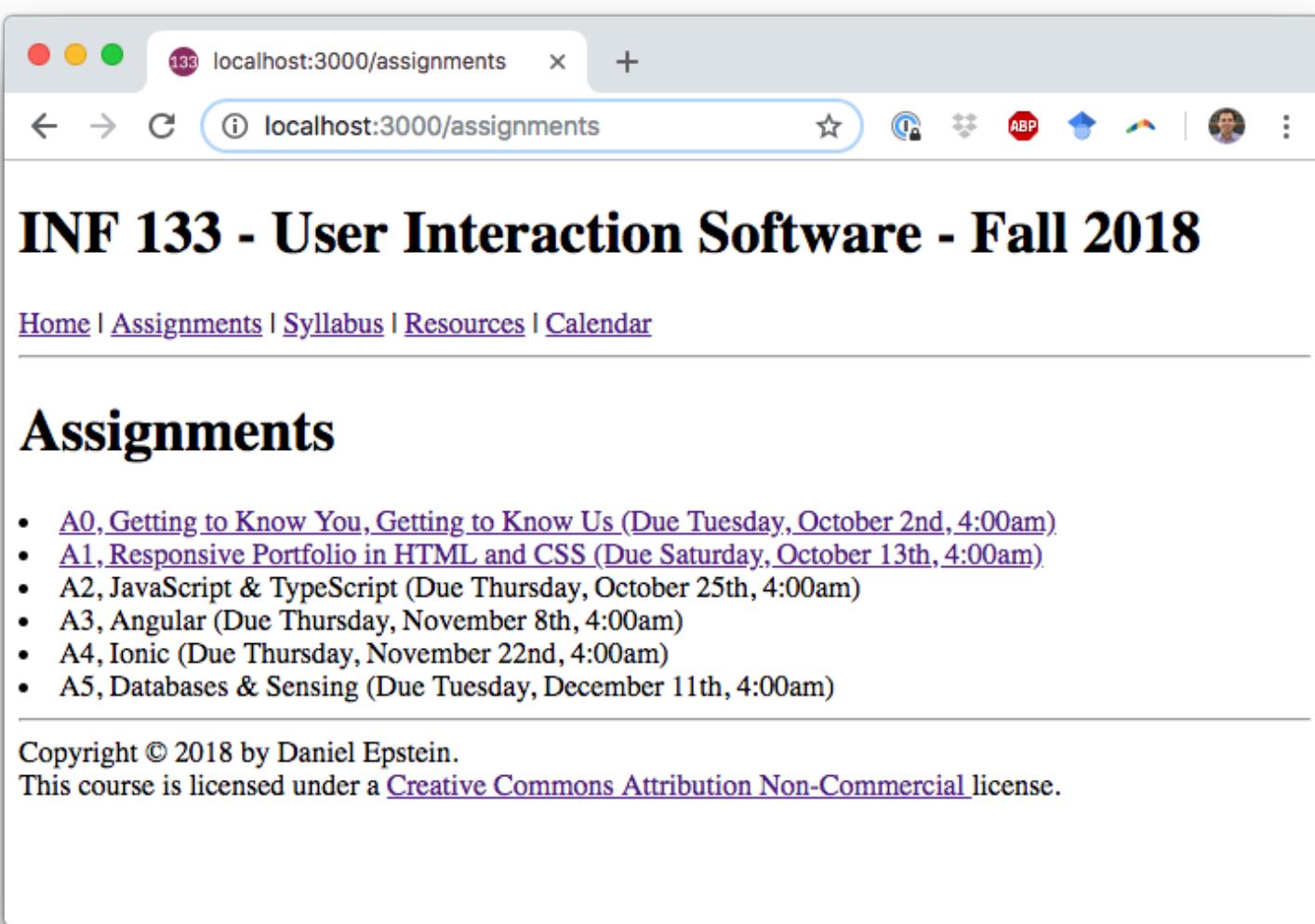
- The HTML stands alone
 - Developers can glance at a page's source and have a good idea of what it renders
- Semantic HTML helps people identify the content they want
 - Accessibility benefits, as previously discussed
 - Interfaces can selectively remove or de-emphasize contextually unimportant content (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)

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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