IN4MATX 133: User Interface Software

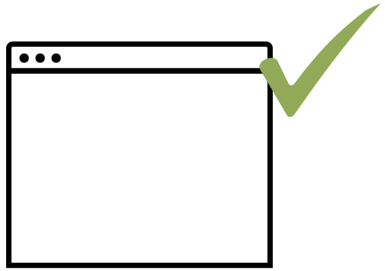
Lecture 2:
HTML & Accessibility

Today’s goals

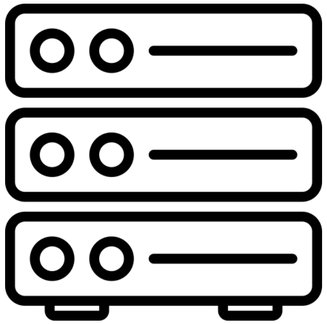
By the end of today, you should be able to…

- 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

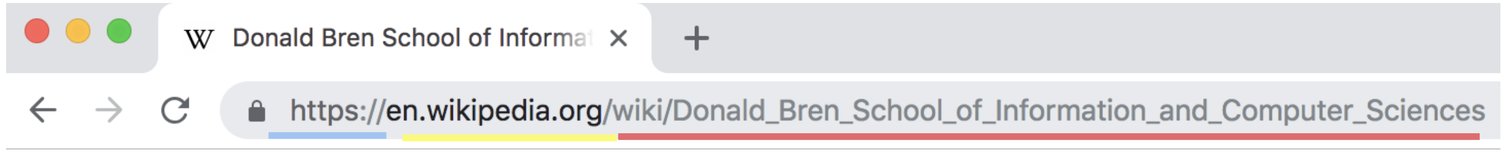


Your browser



Web server

Using the internet

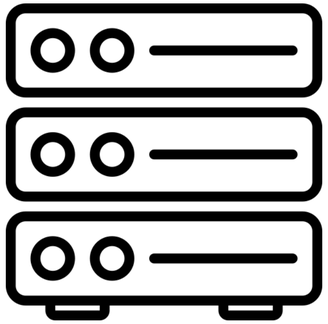


Protocol (how to handle info) Host (who has info) Resource (what info you want)

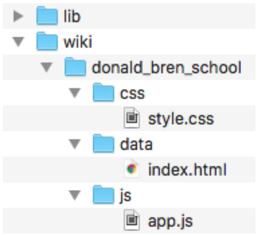
"Hey Wikipedia, I'd like to see the page for the school of ICS!"

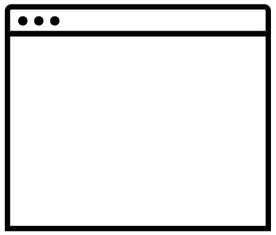
Request

Response

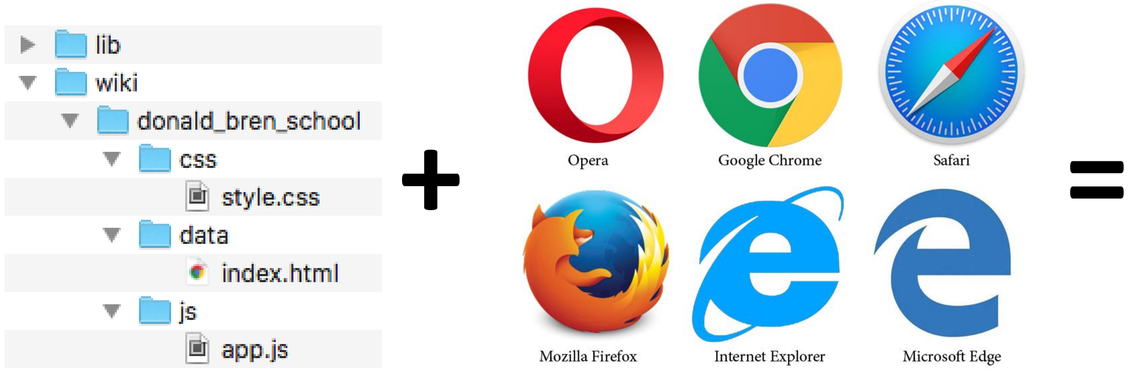


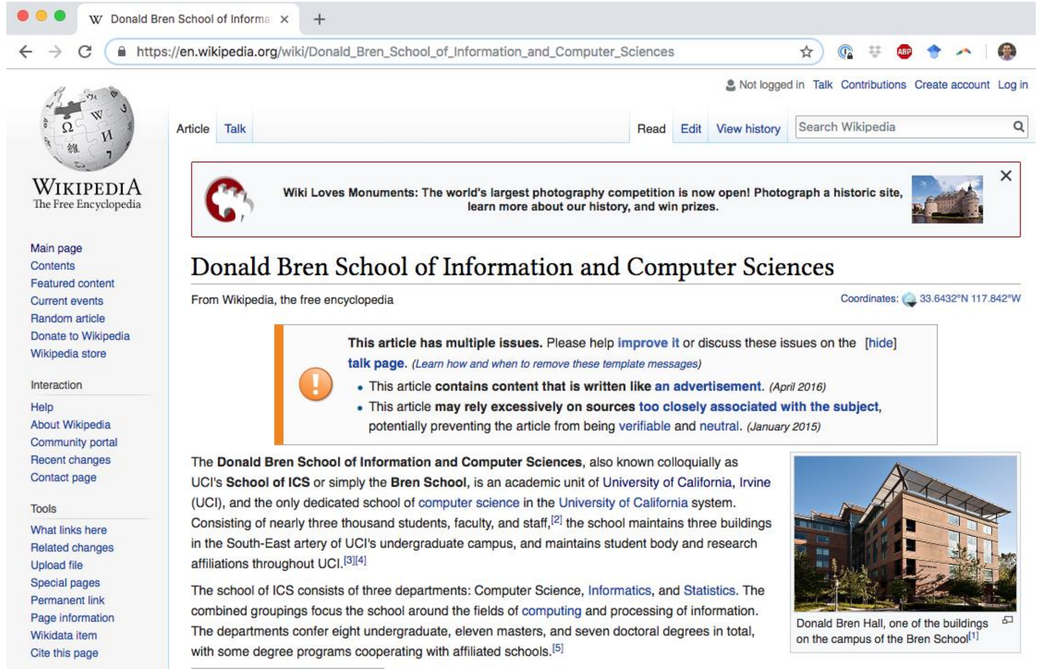
Web server





Your browser


lib
wiki
donald_bren_school
css
style.css
data
index.html
js
app.js
Opera
Google Chrome
Safari
Mozilla Firefox
Internet Explorer
Microsoft Edge


Donald Bren School of Informa
https://en.wikipedia.org/wiki/Donald_Bren_School_of_Information_and_Computer_Sciences
Not logged in Talk Contributions Create account Log in
Article Talk Read Edit View history Search Wikipedia
WIKIPEDIA
The Free Encyclopedia
Wiki Loves Monuments: The world's largest photography competition is now open! Photograph a historic site, learn more about our history, and win prizes.
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]
Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store
Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page
Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item
Cite this page

Fundamentally, the web is designed to send files around

So what does a file on the web look like?

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>
  Content goes here.
</div>
```

Open/start tag

Content

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/

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 acronyms
<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
<b>	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
	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
<del>	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
	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
<font>	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, xmlns
<i>	Defines italic text
<iframe>	Defines an inline sub window height, name, sandbox, seamless, src, width
<img>	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 to not support the ruby element
<rt>	Defines explanation to ruby annotations
<ruby>	Defines ruby annotations
<s>, <strike>	Used to define strikethrough text.
<samp>	Defines sample computer code
<script>	Defines a definition list async, type charset defer, src
<section>	Defines a section cite
<select>	Defines a selectable list autofocus, disabled, form, multiple, name, size
<small>	Defines small text
<source>	Defines media resources media, src, type
	Defines a section in a document
	Defines strong text
<style>	Defines a style definition type, media, scoped
<sub>, <sup>	Defines sub/super-scripted text
<table>	Defines a table summary
<tbody>	Defines a table body summary
<td>	Defines a table cell colspan, headers, rowspan
<textarea>	Defines a text area autofocus, cols, disabled, form, maxlength, name, placeholder, readonly, readonly, required, rows, wrap
<tfoot>, <thead>	Defines a table footer / head
<th>	Defines a table header colspan, headers, rowspan, scope
<time>	Defines a date/tim datetime
<title>	Defines the document title
<tr>	Defines a table row datetime
<tt>	Used to define teletype text
<u>	Used to define underlined text
	Defines an unordered list
<var>	Defines a variable
<video>	Defines a video autobuffer, autoplay, controls, height, loop, src, width

HTML5 TAG CHEAT SHEET

Created by WebsiteSetup.org

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

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

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

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

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

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

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

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

Nesting

- The Content of a tag can contain other HTML tags

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

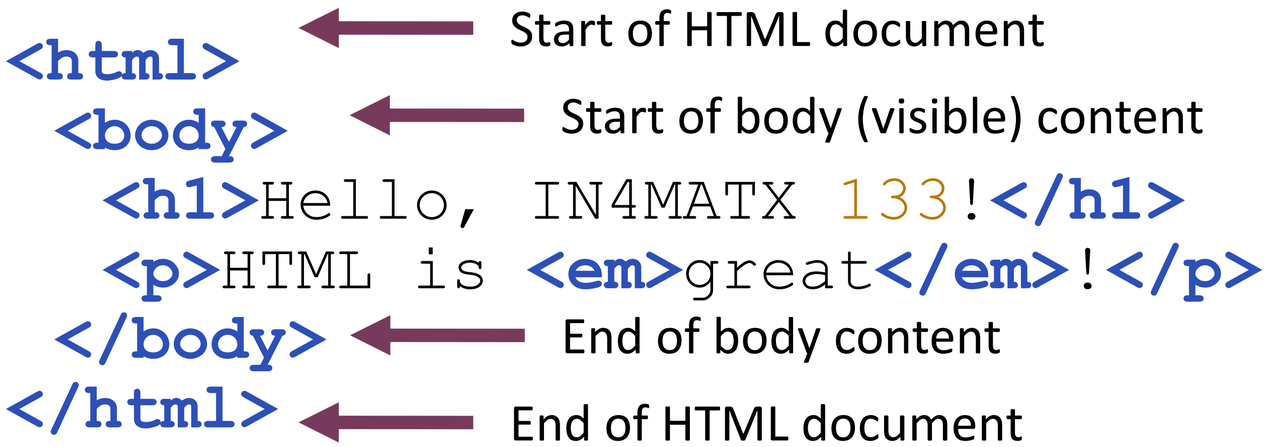
Let’s make a shopping list

Mark’s shopping list

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

Nesting: HTML

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



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-fa20.baldwin.in/">IN4MATX 133</a>
```

anchor (hyperlink)

hypertext reference

```
<img src="logo.jpg" alt="My Dog Dylan Playing Pawball">
```

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

Document format

Specify language

Document header (content that's not shown)

Character set (for non-latin characters)

For search engines

Webpage title in tab

Document body (content that's shown)

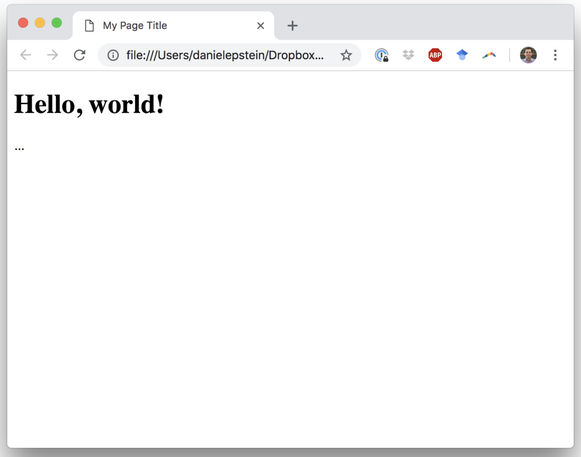
HTML structure

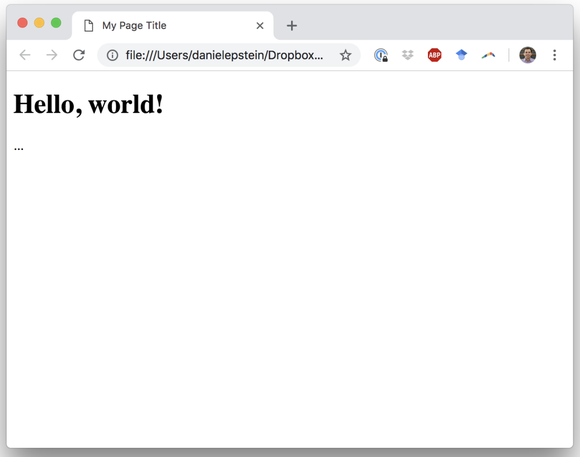
- Surprisingly, browsers are accommodating about HTML structure
- No “compiler errors”
- However, validation can help ensure browser compatibility and site usability

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>...
```





W3C validator

https://validator.w3.org/

Why does HTML structure matter?

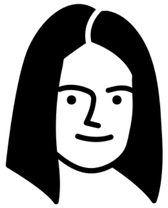
Taking a step back:
Web access is important

“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

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

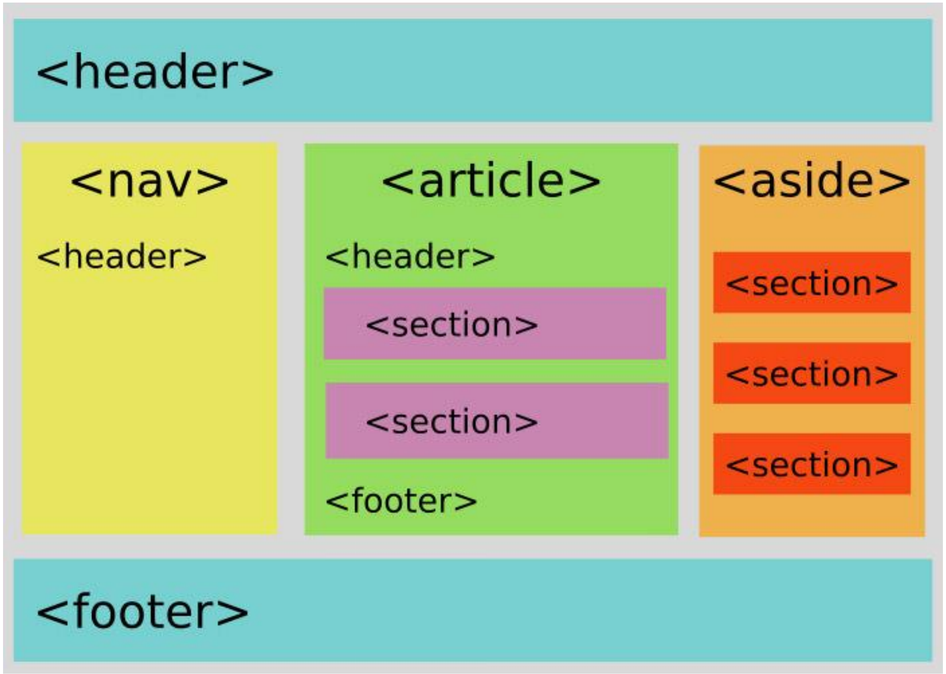
```
<div role="main">

<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

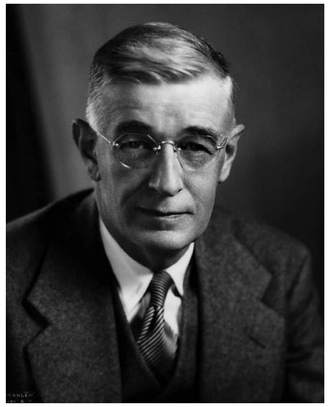


A few other accessibility examples

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

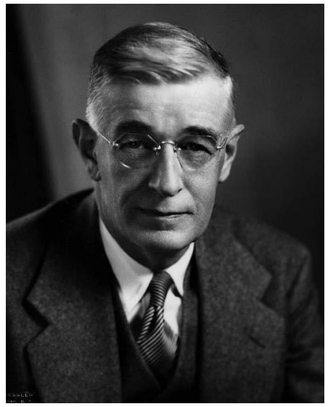
```
<button aria-label="Close">X</button>
```

Which `alt` text would best describe this image?



```
<img src="vannevar.jpg" alt="Vannevar Bush">

<img src="vannevar.jpg" alt="A picture of Vannevar Bush">

<img src="vannevar.jpg" alt="A black-and-white photo">

<img src="vannevar.jpg" alt="">

<img src="vannevar.jpg" alt="Vanneaver Bush, writer of 'As We May Think', posing for a photograph">
```

Which `alt` text would best describe this image?



```
<img src="vannevar.jpg" alt="Vannevar Bush">

<img src="vannevar.jpg" alt="A picture of Vannevar Bush">

<img src="vannevar.jpg" alt="A black-and-white photo">

<img src="vannevar.jpg" alt="">

<img src="vannevar.jpg" alt="A picture of Vanneaver Bush,
writer of 'As We May Think'">
```

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

Icons in Google Docs

Cover photos on Twitter/Facebook

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

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